

*Freshwater Amphipoda  
of the World  
II. Handbook and  
Bibliography*

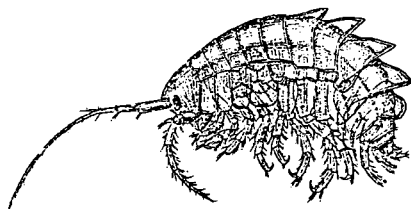
J.L. & C.M. BARNARD

Hayfield Associates

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Hayfield Associates

*Mt. Vernon, Virginia*

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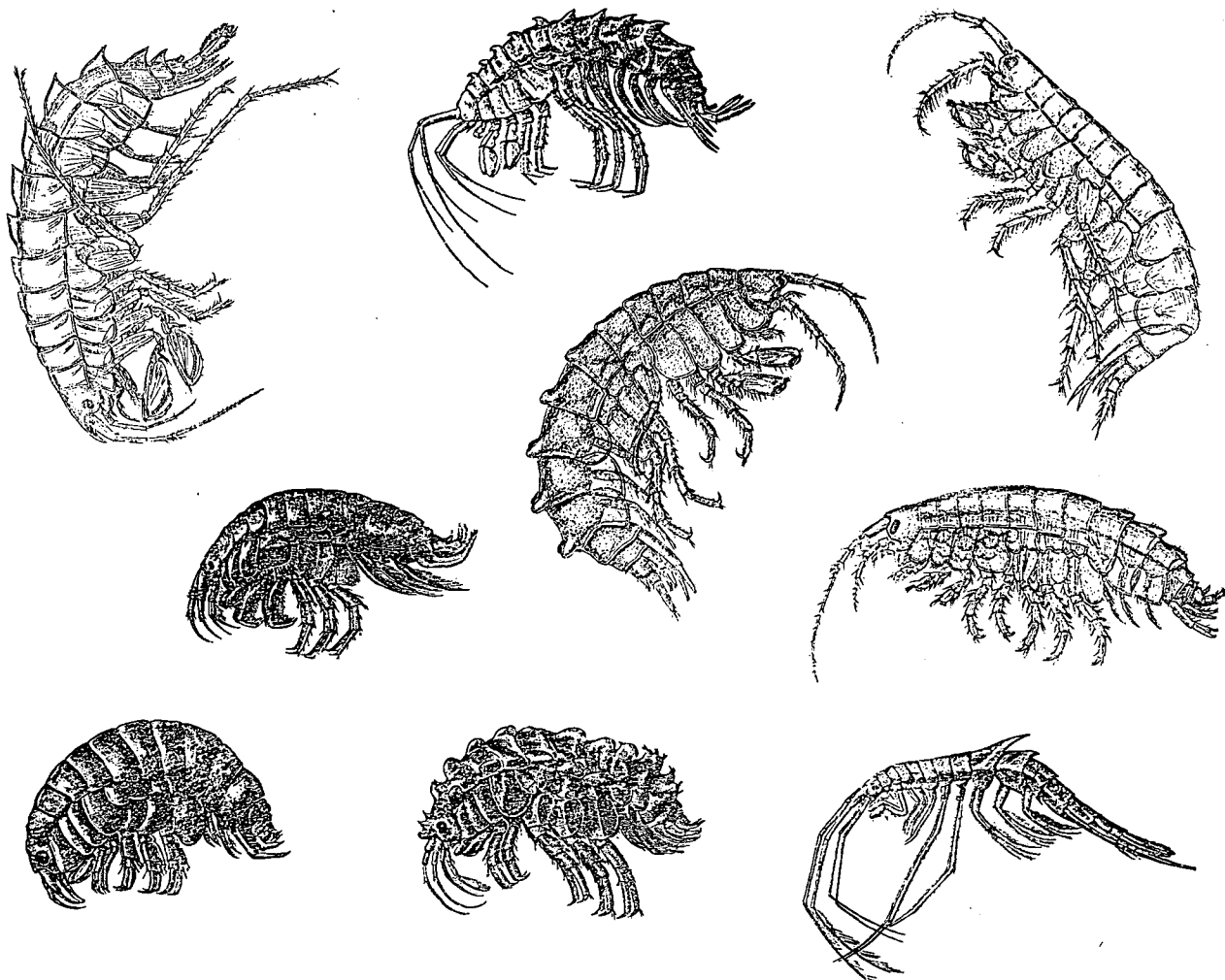
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## APPENDIX IV

## Checklist of World Gammaridans

Amphipoda of the Gammaridan Section are presented in a phyletic index of descending evolutionary order. The genera are diagnosed in Appendix VI. Type-species are given for each genus.

Brackets enclosing species counts include subspecies (especially noted for Baikalian genera). Groups follow the "id" and "oid" forms of Part I but are named by their master genus.

## Gammaridan Section

## I. Sternobranchiate groups (Crangonyctoids)

## A. Phreatogammarus group

Phreatogammarus Stebbing (Gammarus fragilis Chilton)  
New Zealand, epigeal to hypogean, 3

[Paraleptamphopus Stebbing (Calliope subterranea Chilton)]  
New Zealand, epigeal and hypogean, [2] see "other species"

## B. Austrogammarus group

## 1. Australian group

Austrogammarus Williams and Barnard (Gammarus australis Sayce)  
Southeastern Australia and Tasmania, epigeal and hypogean, 6+.

Hurleya Straskraba (Hurleya kalamundae Straskraba)  
Southwestern Australia, hypogean, 1

Uroctena Nicholls (Uroctena affinis Nicholls)  
Southwestern Australia, epigeal but mostly hypogean, 3.

Perthia Straskraba (Neoniphargus branchialis Nicholls)  
Southwestern Australia, epigeal, 2.

## 2. Paramelita group

Paramelita Schellenberg (Gammarus capensis K.H. Barnard =  
Paramelita ctenodactyla Schellenberg)  
South Africa, streamlets to high altitude, cave, 12.

## C. Neoniphargus group

Neoniphargus Stebbing (Neoniphargus thomsoni Stebbing =  
Niphargus montanus Smith) (= Unimelita Sayce, no type-species,  
divisible into several genera)  
Tasmania, Victoria, ?Western Australia, mostly epigeal, 10.

Protocrangonyx Nicholls (Protocrangonyx fontinalis Nicholls)  
see also II.

Western Australia, hypogean, 1

D. Sternophysinx group

1. Sternophysinx group

Sternophysinx Holsinger and Straskraba (Eucrangonyx robertsi Methuen)  
South Africa, caves, 3

2. Falklandella group

Falklandella Schellenberg (Falklandella obtusa Schellenberg)  
Falkland Islands, epigean, 2

E. Northern sternobranchiate group

1. Crangonyx group (Crangonyctidae)

†Paleogammarus Zaddach (Paleogammarus sambiensis Zaddach)  
Baltic amber fossils, 3

Crangonyx Bate (Crangonyx subterraneus Bate) (= Eucrangonyx  
Stebbing)  
Nearctica, Palearctica, epigean to phreatic, 23 [24]

Bactrurus Hay (Crangonyx mucronatus Forbes)  
Nearctica, middle United States, phreatic, 3

Stygobromus Cope (Stygobromus vitreus Cope)  
(= Apocrangonyx Stebbing, = Boruta Wrzesniowsky,  
= Goplana Wrzesniowsky, = Synpleonia Creaser,  
= Stygonectes Hay) (possibly = Synurella  
Wrzesniowsky, Eosynurella Martynov, Diasynurella  
Behning, Lyurella Derzhavin) but many species groups  
occur.

Nearctica, Palearctica, epigean to phreatic, 115 [122]  
(combined total)

2. Pseudocrangonyx group

Pseudocrangonyx Akatsuka and Komai (no type-species)  
(= Niphargonyx Derzhavin)  
East temperate continental Nearctica, Japan, phreatic, 9

Procrangonyx Schellenberg (Eucrangonyx japonicus Ueno)  
(= Eocrangonyx Schellenberg)  
Japan, hypogean, 1

## F. Similar apomorphic groups with sternal gills absent

## 1. Austroniphargus group (possibly apomorphic Crangonyctoids)

Austroniphargus Monod (Niphargopsis bryophilus, Monod)  
Madagascar, freshwater, 2600 m altitude, 2

Sandro Karaman and Barnard (Austroniphargus starmuhlneri Ruffo)  
Madagascar, forest torrent, 1

## 2. Allocrangonyx group

Allocrangonyx Schellenberg (Niphargus pellucidus Mackin)  
Nearctica, midwestern United States, phreatic, 2

## II. Bogidiella group (of mixed phylogeny from Crangonyctids)

Spelaeogammarus da Silva Brum (Spelaeogammarus bahiensis  
da Silva Brum)  
Brazil, cave, 1

Artesia Holsinger (Artesia subterranea Holsinger)  
Texas, hypogean, 1

Parabogidiella Holsinger (Parabogidiella americana Holsinger)  
Texas, hypogean, 1

Bogidiella Hertzog (Bogidiella albertimagni Hertzog)  
(=Jugocrangonyx S. Karaman, Jugocrangonyx skopljensis  
S. Karaman)  
Tethyan arc of Palearctica and Neotropica, hypogean, 27

Afridiella Karaman and Barnard (Bogidiella somala Ruffo)  
Somalia, hypogean, 1

Bollegidia Ruffo (Bollegidia capensis Ruffo)  
South Africa, Andaman Islands, beach interstitial, 2

[Protocrangonyx Nicholls (Protocrangonyx fontinalis  
Nicholls)] analogue see also I.C.  
Australia, western, hypogean, 1

Paracrangonyx Stebbing (Crangonyx compactus Chilton)  
New Zealand, hypogean, 1

Kergueleniola Ruffo (Kerguelenella macra Ruffo)  
(=Kerguelenella Ruffo, homonym)  
Kerguelen Island, hypogean (blind, in stomach of freshwater fish),

Pseudingolfiella Noodt (Ingolfiella chilensis Noodt)  
Chile, Kerguelen Island, anchialine springs, 2

## III. Gammaroid group

## A. Gammaridae, inner ramus of uropod 3 elongate (magnum to variramous)

Gammarus J.C. Fabricius (Cancer pulex Linnaeus)  
 (= Pepredo Rafinesque, = Lepleurus Rafinesque,  
 = Rivulogammarus S. Karaman, = Fluviogammarus  
 S. Karaman and G.S. Karaman, = Mucrogammarus Barnard  
 and Gray, = Lagunogammarus Sket)  
 Holarctic, marine and freshwater, epigean to weakly hypogean,  
 120 [154]

Sowinskya Derzhavin (Sowinskya macrocera Derzhavin) (See also III.C)  
 Caspian, 1

Derzhavinella Birstein (Derzhavinella macrochelata Birstein)  
 Caspian, 1

Heterogammarus Stebbing (Gammarus sophianos Dybowski)  
 Baikal, 3 [5]

Leptostenus Bazikalova (Gammarus leptocerus Dybowski)  
 Baikal, 1

Poekilogammarus Stebbing (none, Gammarus pictus  
 Dybowski used here) (= Bathygammarus Bazikalova,  
 = Onychogammarus Sowinsky, = Gymnogammarus  
 Sowinsky, = Rostrogammarus Bazikalova)  
 Baikal, 18 [24]

Carinogammarus Stebbing (Gammarus cinnamomeus Dybowski)  
 Baikal, 1

Eucarinogammarus Sowinsky (none, now monotypic)  
 (Gammarus wagii Dybowski)  
 Baikal, 1 [2]

Baikalogammarus Stebbing (Gammarus pullus Dybowski)  
 Baikal, 1

Palicarinus, new genus (Gammarus puzyllii Dybowski)  
 Baikal, 1 [2]

Pallasea Bate (Oniscus cancellus Pallas)  
 (= Pallasiella Sars, = Pentagonurus Sowinsky,  
 = Homalogammarus Bazikalova, = Propachygammarus  
 Bazikalova, = Pleuracanthus Garjajeff) (= Dybowskia  
 Garjajeff)  
 Baikal, 14 [23]

Pallasiola, new genus (Pallasea quadrispinosa Sars)  
 Arctic seas and lakes, 1

Parapallasea Stebbing (Gammarus lagowskii Dybowsky)  
Baikal, 3 [6]

Metapallasea Bazikalova (Metapallasea galinae Bazikalova)  
Baikal, 1

B. Brandtia group

Brandtia Bate (Gammarus latissimus Gerstfeldt,  
= Gammarus latus Dybowsky)  
Baikal, 1 [8]

Carinurus Sowinsky (Gammarus solskii Dybowsky)  
(Bazikalova = reissneri, erroneus)  
Baikal, 10

Dorogammarus Bazikalova (Axelboeckia castanea Dorogostaisky)  
Baikal, 1

Boeckaxelia Schellenberg (Gammarus carpenteri Dybowsky)  
Baikal, 3 [5]

Coniurus Sowinsky (Coniurus palmatus Sowinsky)  
Baikal, 3

Gmelinoides Bazikalova (Brandtia fasciata  
Stebbing, = Gammarus zebra Dybowsky, homonym)  
Baikal, 2: (requires further analysis)

C. Echinogammarus group, inner ramus of uropod 3 short (parviramous)

1. Echinogammarus group

Echinogammarus Stebbing (Gammarus berilloni Catta)  
(= Chaetogammarus Martynov, = Homoeogammarus Schellenberg,  
= Marinogammarus Schellenberg, = Parhomoeogammarus  
Schellenberg, = Ostiogammarus S. Karaman)  
W. Palearctica, Nearctica, marine PontoCaspian,  
marine and freshwater, 58 [68]

Sowinskya Derzhavin, see III.A.

Eulimnogammarus Bazikalova (Gammarus verrucosus Gerstfeldt)  
Baikal, 11 [13]

Corophiomorphus Bazikalova (Gammarus sophiae Dybowsky)  
Baikal, 11

2. Sarothrogammarus-group, body pigment absent, pereopod 3 fossorial or filtrative, or uropod 1 spination reduced, antennae and pereopods otherwise Gammarus-like.



- [Echinogammarus Stebbing, see III.C.1. (ancestral form)]
- Sarothrogammarus Martynov (Sarothrogammarus asiaticus Martynov)  
Turkestan, freshwater, 6
- Tadzhikistania Karaman and Barnard (Sarothrogammarus ruffoi G.S. Karaman)  
Central Asia, epigeal, 2
- Lusigammarus J.L. Barnard (Gammarus guernei Chevreux)  
Azores and Madeira, streams and springs, 3
- Comatogammarus Stock (Sarothrogammarus ferghaniensis Martynov)  
Tadzhikistan, 3000 m, spring, 1
- Pectenogammarus Reid (Pectenogammarus planicrurus Reid)  
Western Europe, beach cobbles, 1.
- Neogammarus Ruffo (Gammarus (Neogammarus) festae Ruffo)  
Mediterranean, beach cobbles, 3
- Longigammarus G.S. Karaman (Longigammarus bruni G.S. Karaman)  
Mediterranean, beach cobbles, 1.
- Rhipidogammarus Stock (Gammarus rhipidiophorus Catta)  
Mediterranean, beach cobbles, freshwater to 100 m altitude, 3.
- D. Metohia-group, article 2 of pereopods 5-7 evenly convex posteriorly. Lobe, if present, sharp, very small
- Anopogammarus Derzhavin (Anopogammarus birsteini Derzhavin)  
Trans-Caucasus, hypogean, 2.
- Ilvanella Vigna-Taglianti (Ilvanella inexpectata Vigna-Taglianti)  
Elba Island, hypogean, 1
- Metohia Absolon (Metohia carinata Absolon)  
Yugoslavia, hypogean, 1
- Accubogammarus G.S. Karaman (Typhlogammarus albor G.S. Karaman)  
Yugoslavia, hypogean, 1
- Tadzocrangonyx Karaman and Barnard (Crangonyx schizurus Birstein)  
Tadzhikistan, middle Asia, high altitude springs, ?hypogean, 2.
- Zenkevitchia Birstein (Zenkevitchia admirabilis Birstein)  
TransCaucasus, hypogean, 1

Fontogammarus S. Karaman (Fontogammarus dalmatinus S. Karaman)  
Dalmatia, 1 [2]

Typhlogammarus Schaferna (Typhlogammarus mrazek Schaferna)  
Yugoslavia, caves, 1

E. Fluviogammarus-group, article 2 of pereopod 7 with weak but sharp posteroventral protrusion, posterior margin sinuous

Eurybiogammarus Bazikalova (Gammarus fuscus Dybowsky) originally subgenus of Eulimnogammarus  
Baikal, 29 [35]

Fluviogammarus Dorogostaisky (Fluviogammarus larviformis Dorogostaisky)  
Baikal, 4

Paragarjajewia Bazikalova (Gammarus petersi Dybowsky)  
Baikal, 1

Abyssogammarus Sowinsky (Gammarus sarmatus Dybowsky)  
Baikal, 3 [5]

Koshovia Bazikalova (Koshovia mirabilis Bazikalova)  
Baikal, 1

Philolimnogammarus Bazikalova (Gammarus viridis Dybowsky), originally subgenus of Eulimnogammarus  
Baikal, 13 [16]

Lobogammarus Bazikalova (Lobogammarus latus Bazikalova)  
Baikal, 1

Spinacanthus Dorogostaisky (Gammarus parasiticus Dybowsky)  
Baikal, 5 [6]

Hakonboeckia Stebbing (Gammarus strauchi Dybowsky)  
Baikal, 1

Polyacanthisca Bazikalova (Polyacanthisca calceolata Bazikalova)  
Baikal, 1

Ceratogammarus Sowinsky (Ceratogammarus dybowskyi Sowinsky)  
Baikal, 3

Odontogammarus Stebbing (Gammarus calcaratus Dybowsky)  
Baikal, 3 [7]

F. Weakly Acanthogammarid gnathopods merging to G.

Issykogammarus Chevreux (Issykogammarus hamatus Chevreux)  
[Lake] Issy-kul, 1

[Typhlogammarus Schaferna. See III.C.]

[Eucarinogammarus Sowinsky. See III.A.]

Plesiogammarus Stebbing (Gammarus gerstaeckeri Dybowsky)  
Baikal, 3 [4]

Cheirogammarus Sowinsky (Cheirogammarus inflatus Sowinsky)  
Baikal, 1

Garjajewia Sowinsky (none, based on Gammarus cabanisi  
Dybowsky here) (= Ctenacanthus Garjajeff, homonym, Pisces)  
Baikal, 3 [5]

G. Acanthogammarids (Acanthogammarinae Garjajeff), probably not valid unless severely restricted to Acanthogammarus and Gammaracanthus, other genera plus those in E. with moderate to weakly developed predatorial gnathopods.

Acanthogammarus Stebbing (Gammarus godlewskii Dybowsky)  
(=Brachyuropus Stebbing, = Polyacanthus Garjajeff)  
Baikal, 12 [16]

Gammaracanthus Bate (Gammarus loricatus Sabine)  
Caspian, Arctic Sea, 3 [6]

H. Dikerogammarus-group, fossorial

1. Gmelina subgroup

Yogmelina Karaman and Barnard (Gmelina pusilla Sars)  
PontoCaspian, 5

Gmelina Sars (none, based here on Gmelina costata Sars)  
PontoCaspian, 2

Kuzmelina Karaman and Barnard (Gmelina kusnezowi Sowinsky)  
PontoCaspian, 1

Amathillina Sars (Amathillina cristata Sars)  
PontoCaspian, 5

Axelboeckia Stebbing (Boeckia spinosa Sars) (= Boeckia  
Sars, homonym)  
Caspian, 1

Gmelinopsis Sars (none, based here on Gmelinopsis  
tuberculata Sars)  
PontoCaspian, 2

[Gmelinoides, see Brandtia group]

2. Dikerogammarus group

[Echinogammarus warpachowskyi Sars], ancestor group  
[Caspian, 1] See Echinogammarus

Akerogammarus Derzhavin and Pjatakova (Akerogammarus  
knipowitschi Derzhavin and Pjatakova)  
Caspian, 3

Jugogammarus S. Karaman (Gammarus kusceri S. Karaman)  
Yugoslavia, stream of PontoCaspian, 1

Shablogammarus Carausu et alia (Gammarus chablensis Carausu)  
Lac Sabla, 1 (other species transferred to Akerogammarus)

Dikerogammarus Stebbing (Gammarus haemobaphes Eichwald)  
PontoCaspian, 8

Cephalogammarus Karaman and Barnard (Gammarus macrocephalus Sars)  
Caspian, 1

Lanceogammarus Karaman and Barnard (Gammarus andrussovi Sars)  
PontoCaspian, 1

Baku Karaman and Barnard (Pontogammarus paradoxus Derzhavin)  
Caspian, 1

73 Iphigenella Sars (Iphigenella acanthopoda Sars)  
PontoCaspian, 1 (andrussovi transferred to Lanceogammarus)

I. Pontogammarus group, antenna 1 of fossorial form regardless  
of setation, antenna 1 flagella often grossly unequal but  
accessory flagellum well developed

1. Pontogammarus group

†Andrussovia Derzhavin (Andrussovia sokolovi Derzhavin)  
Fossil Upper Sarmatian, Caucasus, 2

†Praegmelina Derzhavin (Praegmelina andrussovi Derzhavin)  
Fossil Upper Sarmatian, Caucasus, 2

Turcogammarus Karaman and Barnard (Obesogammarus  
turcarum Stock)  
PontoCaspian and escapees, 3

Obesogammarus Stock (Gammarus obesus Sars)  
PontoCaspian and escapees, 6

Pandorites Sars (Pandorites podoceroides Sars)  
(= Pandora Grimm, homonym)  
PontoCaspian, 1

Pontogammarus Sowinsky (Gammarus robustoides Sars)  
PontoCaspian, 3

Euxinia Tucolesco (Euxinia fagei Tucolesco = Gammarus  
maeoticus Sowinsky)  
PontoCaspian, 3

Stenogammarus Martynov (Gammarus macrurus Sars)  
(Subgenus Wolgagammarus Stock)  
Caspian, Volga River, 7

2. Compactogammarus group, flagella of antenna 1 subequal in length

Uroniphargoides Stock (Niphargoides spinicaudatus Carausu)  
Danube River, 1

Niphargoides Sars (Niphargus caspius Grimm)  
PontoCaspian, 3 (one transferred from Paraniphargoides)

Compactogammarus Stock (Niphargoides compactus Sars)  
PontoCaspian, 1

Paraniphargoides Stock (Niphargoides motasi Carausu)  
Caspian, Danube River, ?Black Sea, (one intermediate to  
Niphargoides), 3

Niphargogammarus Birstein (Niphargoides quadrimanus Sars)  
PontoCaspian, 4

J. Cardiophilus group, slick bodied, maxilliped dactyl reduced,  
inquilinous, polyphyletic

Cardiophilus Sars (Cardiophilus baeri Sars)  
PontoCaspian, 2

Behningiella Derzhavin (Behningiella brachypus Derzhavin)  
Caspian, 1

Zernovia Derzhavin (Zernovia volgensis Derzhavin)  
Caspian, Volga Delta, 1

Pachyschysis Bazikalova, see III.L.

K. Pontoporeia group

Pontoporeia Kroyer (Pontoporeia femorata Kroyer)  
Circumboreal, mostly glacial lakes, brackish ocean, 3

88  
—

Bathyporeia Lindstrom (Bathyporeia pilosa Lindstrom)  
Circumboreal, littoral to brackish, to Black Sea, 13

Priscillina Stebbing (Pontoporeia armata Boeck)  
Circumarctic, sublittoral, 1

Amphiporeia Shoemaker (Amphiporeia lawrenciana Shoemaker)  
Northwestern Atlantic, sublittoral, 3

L. Macropereiopus group, gnathopod 1 dominant

Macropereiopus Sowiński (Gammarus flori Dybowski)  
Baikal, 7 [8]

Ommatogammarus Stebbing (Gammarus albinus Dybowski)  
Baikal, 3 [5]

Pachyschysis Bazikalova (Gammarus branchialis Dybowski)  
Baikal, 4

M. Micruropus group, accessory flagellum reduced

Baikalogammarus Stebbing, see III.B.

Micruropus Stebbing (Gammarus wahli Dybowski)  
(= Microgammarus Sowiński, = Gammarisca Bazikalova,  
= Setogammarus Bazikalova)  
Baikal, 30 [47]

Crypturopus Sowiński (Gammarus pachytus Dybowski)  
Validity questioned  
Baikal, 5

Echiuropus Sowiński (Echiuropus macronychus Sowiński)  
(= Asprogammarus Bazikalova, = Smaragdogammarus Bazikalova)  
Baikal, 13 [18]

Pseudomicruropus Bazikalova (no type-species)  
Baikal, 4 [5]

97 Homocerisca Bazikalova (Gammarus perla Dybowski)  
Baikal, 3

N. Hyaellopsis group, uropod 3 severely reduced, body and posterior appendages discoid

Hyaellopsis Stebbing (Gammarus czyrnianskii Dybowski)  
(= Paramicruropus Stebbing)  
Baikal, 17 [19]

Gammarosphaera Bazikalova (Gammarosphaera insularis  
Bazikalova)  
Baikal, 1

IV. Mesogammarus group

11.0  
Mesogammarus Tzvetkova (Mesogammarus melitoides Tzvetkova)  
Pacific Ocean, northwest boreal, littoral, 1

V. Gammaroporeia group

12.5  
Gammaroporeia Bousfield (Micruropus alaskensis  
Bousfield and Hubbard)  
Alaska, marine, littoral, 1

VI. Eoniphargus group

Eoniphargus Ueno (Neoniphargus (Eoniphargus) kojimai Ueno)  
Japan, phreatic, 1

VII. Anisogammarids

A. Anisogammarus group

Spasskogammarus Bousfield (Echinogammarus skasskii Bulycheva)  
Japan Sea to Aleutians, littoral, 2

Jesogammarus Bousfield (Anisogammarus jesoensis Schellenberg)  
Japan, freshwater, 1

Ramellogammarus Bousfield (Gammarus ramellus Weckel)  
British Columbia to California, freshwater, 4

Annanogammarus Bousfield (Gammarus annandalei Tattersall)  
East Asia, freshwater, 1

Eogammarus Birstein (Gammarus kygi Derzhavin)  
North Pacific margins, intertidal, brackish, riparian, 10

Spinulogammarus Tzvetkova (Gammarus ochotensis Brandt)  
Kamchatka to British Columbia, littoral, 3

Anisogammarus Derzhavin (Anisogammarus dybowskyi Derzhavin  
= Gammarus pugettensis Dana)  
Bering Sea to California, littoral 2.

Barrowgammarus Bousfield (Anisogammarus macginitiei  
Shoemaker)  
Beaufort Sea, sublittoral, 1

Locustogammarus Bousfield (Gammarus locustoides Brandt)  
Boreal Pacific, littoral, 4

Carineogammarus Bousfield (Eogammarus makarovi Bulycheva)  
Japan Sea to southern Alaska, littoral, 1

B. Bathyceradocus group

Bathyceradocus Pirlot (Bathyceradocus stephenseni Pirlot)  
IndoPacific marine, abyssal to hadal, 1

Metaceradocoides Birstein and Vinogradova  
(Metaceradocoides vitjazi Birstein and Vinogradova)  
N. Pacific, hadal, 1

VIII. Cheirocratids

A. Gammarellus group

Gammarellus Herbst (Astacus homari J.C. Fabricius)  
(= Amathia Rathke, = Grayia Bate, = Amathilla Bate  
and Westwood, = Pseudogammarellus Lagardere)  
Arctic boreal, marine, 3

Weyprechtia Stuxberg (Amathilla heuglini Buchholz)  
Arctic boreal, marine, 2

Calliopius Liljeborg (= Calliope Bate, homonym)  
(Amphithoe laeviuscula Kroyer)  
Boreal, littoral, 2

B. Cheirocratus-group

Cheirocratella Stephensen (Cheirocratella thori Stephensen)  
Iceland, littoral, 1

Cheirocratus Norman (Gammarus assimilis Liljeborg)  
Biboreal to antiboreal, Eastern Hemisphere, marine, 6

Incratella J.L. Barnard (Cheirocratus inermis Ledoyer)  
Madagascar-South Africa, sublittoral, 1

Casco Shoemaker (Cheirocratus bigelowi Blake)  
W. Atlantic, boreal, 1

New Taxa  
Australia

C. Hornellia group

Hornellia Walker (Hornellia incerta Walker)  
(= Tulearogammarus Ledoyer)  
West IndoPacific, marine, 2



Metaceradocus Chevreux (Metaceradocus perdentatus Chevreux)  
Weakly circumtropical and warm-temperate, 4

Maerella Chevreux (Gammarus tenuimanus Bate)  
Arctic to Mediterranean, littoral, 2

Jerbarnia Croker (Jerbarnia mecochira Croker)  
Micronesia, sublittoral, 1

D. Megaluropus group

Aurohornellia Barnard and Karaman (Tulearogammarus sinuatus  
Ledoyer)  
Madagascar, sublittoral, 1

Megaluropus Hoek (Megaluropus agilis Hoek)  
(=Megalonoura Herdman, = Phylluropus K.H. Barnard)  
Tropical-warm-temperate, marine, 7

E. Argissa group

Argissa Boeck (Syrrhoe hamatipes Norman)  
Cool seas, eurybathic, 1

F. Melphidippa group

Melphidippa Boeck (Melphidippa goesi Stebbing)  
Bipolar, marine, 10

Melphidippella Sars (Atylus macer Norman)  
Boreal Pacific, Atlantic, marine, 1

Melphisana J.L. Barnard (Melphisana bola J.L. Barnard)  
Boreal Pacific, marine, 2

G. Macrohectopus group

Macrohectopus Stebbing (Constantia branicki Dybowsky)  
(= Constantia Dybowsky, homonym)  
Baikal, 1

IX. Hadzioid Group (Marine basis)

A. Greater Ceradocus group

1. Ceradocus group

Ceradocus Costa (Ceradocus orchestiipes Costa)  
(=subgenus Denticeradocus Sheard)  
Cosmopolitan, marine littoral to bathyal, 24

Ceradomaera Ledoyer (Ceradomaera plumosa Ledoyer)  
Madagascar, marine littoral, 1

Ceradocoides Nicholls (Ceradocoides chiltoni Nicholls)  
Antarctic, marine bathyal, 1

[Paraweckelia, see ahead of D2 as founder]

2. Paraceradocus group

Paraceradocus Stebbing (Megamoera miersii Pfeffer)  
Sub-Antarctica, marine, 1

Quadrivisio Stebbing (Quadrivisio bengalensis  
Stebbing) (= Pseudoceradocus Shoemaker)  
Circumtropical, marine brackish, 5

3. Maera group

a. Maera group

Anelasmopus Oliveira (Anelasmopus kraui Oliveira)  
Brazil, marine littoral, 1

Elasmopoides Stebbing (Elasmopoides chevreuxi Stebbing)  
South Africa, marine littoral, 1

Maeropsis Chevreux (Maeropsis perrieri Chevreux)  
North Atlantic, marine bathyal, 1

Maera Leach (Cancer grossimanus Montagu) (= Leptothoe  
Stimpson, = Mulleria Leach, = Linguimaera Pirlot,  
= Meximaera J.L. Barnard)  
Cosmopolitan marine, littoral to bathyal, 59

Lupimaera Barnard and Karaman (Maera lupana J.L. Barnard)  
California, littoral, 1

b. Elasmopus-group

Elasmopus Costa (Elasmopus rapax Costa) (= Neogammaropsis Stout)  
Cosmopolitan, marine shallows, 58

c. Beudetia group (old Beudettiidae)

Parelasmpopus Stebbing (Gammarus suluensis Dana)  
Mid-IndoPacific tropics, marine shallows, 6+

Mallacoota J.L. Barnard (Megamoera diemenensis Haswell)  
Circumtropical and warm-temperate, marine intertidal, 11

Ifalukia J.L. Barnard (Parelasmpopus resacus J.L. Barnard)  
Micronesia, marine, 1

Beudetitia J.L. Barnard (Beudetitia palmeri J.L. Barnard)  
Micronesia, marine, 1

B. Parapherusa group

Parapherusa Stebbing (Harmonia crassipes Haswell)  
(=Harmomia Haswell, = Chloris Haswell)  
Antiboreal, marine, 1

C. Ceradocopsis group

Ceradocopsis Schellenberg (Ceradocopsis kergueleni Schellenberg)  
(= Maeracunha Stephensen, Maeracunha tristanensis  
Stephensen)  
Antiboreal, marine, 3

?Metaceradocoides Birstein and Vinogradova (see  
Anisogammarus group VII.)

C. Gammarella group

Gammarella Bate (Pherusa fucicola Leach) (= Pherusa  
Leach, homonym, = Pherusana J.L. Barnard, = Nuuanu  
J.L. Barnard, = Cottesloe J.L. Barnard)  
Circumtropical and warm-temperate, 6

Tabatzius McKinney and Barnard (Tabatzius copillius  
McKinney and Barnard)  
Caribbean Sea, Yucatan, sublittoral, 1

D. Weckelia-Hadzia group

1. Founder Weckelia group

Paraweckelia Shoemaker (Paraweckelia silvai Shoemaker)  
Cuba, cave, 1.

2. Weckelia group

Paraweckelia Shoemaker, see group 1., founder

Weckelia Shoemaker (Gammarus caecus Weckel)  
Cuba, caves, 1

Alloweckelia Holsinger and Peck (Alloweckelia gurneei  
Holsinger and Peck)  
Puerto Rico, caves, 1.

Mexiweckelia Holsinger and Minckley (Mexiweckelia colei  
Holsinger and Minckley)  
Mexico, Coahuila and Durango, springs, hypogean, 2

Paramexiweckelia Holsinger (Mexiweckelia particeps Holsinger)  
Mexico, Coahuila, hypogean, 1

Mayaweckelia Holsinger (Mayaweckelia yucatanensis Holsinger)  
Mexico, Yucatan region, hypogean, 2

Texiweckelia Holsinger (Mexiweckelia texensis Holsinger)  
Texas, Hays County, San Marcos Well, 1

Allotexiweckelia Holsinger (Allotexiweckelia hirsuta Holsinger)  
Texas, hypogean, 1

Texiweckeliopsis Karaman and Barnard (Texiweckelia insolita Holsinger)  
Texas, hypogean, 1

Holsingerius Karaman and Barnard (Texiweckelia samacos Holsinger)  
Texas, San Marcos Well, hypogean, 1

### 3. Hadziid group (Hadziidae)

Saliweckelia Stock (Saliweckelia emarginata Stock)  
Curacao and Bonaire, marine and salty anchialine, 2.

Metahadzia Stock (Hadzia tavaresi Mateus and Mateus)  
Portugal and ?Italy, hypogean, 1 and ?1

Protohadzia Zimmerman and Barnard (Eriopisa schoenerae Fox)  
Caribbean, sublittoral, 1

Dulzura J.L. Barnard (Dulzura sal J.L. Barnard)  
Hawaii, Galapagos, eastern Pacific, sublittoral, 4

Metaniphargus Stephensen (Metaniphargus curasavicus Stephensen)  
Caribbean Islands, hypogean, 8

Liagoceradocus J.L. Barnard (Liagoceradocus pusillus J.L. Barnard)  
Caroline to Hawaiian Islands, sublittoral or anchialine, 2

Hadzia S. Karaman (Hadzia fragilis S. Karaman)  
Yugoslavia, hypogean, 3

Psammoniphargus Ruffo (Psammoniphargus pauliani Ruffo)  
Reunion, hypogean, 1

### 4. Metacrangonyx group

Metacrangonyx Chevreux (Metacrangonyx longipes Chevreux)  
North Africa, Mediterranean coast and islands, Spain, phreatic, 3

Pygocrangonyx Karaman and Barnard (Metacrangonyx remyi  
Balazuc and Ruffo)  
Northwestern Africa, phreatic, 1

E. Melita (Melitidae)

1. Melita group

Melita Leach (Cancer palmatus Montagu) (divisible into  
several genera) (= Boscia Leach, = Megamoera Bate,  
= Caliniphargus Stout)  
Cosmopolitan in low latitudes, marine, brackish, to bathyal, 61

Dulichchiella Stout (Dulichchiella spinosa Stout)  
Circumtropical, marine, 5+

Psammogammarus S. Karaman (Psammogammarus caecus S. Karaman)  
Tethyan, circumtropical, mostly marine shallows, shoreline  
phreatic, or anchialine, 6

Victoriopisa Karaman and Barnard (Niphargus chilensis Chilton)  
Southern Australia, India, South Africa, 3

Eriopisa Stebbing (Eriopis elongata Bruzelius)  
(= Eriopis Bruzelius, homonym)  
Boreal, deep water, 1

Melitoides Gurjanova (Melitoides makarovi Gurjanova)  
Arctic, marine, 1

Rotomelita J.L. Barnard (Rotomelita lokoa J.L. Barnard)  
Eastern IndoPacific tropics, anchialine, 2

Nainaloa, new genus (Melita latimerus Bousfield)  
Bismarck Archipelago, lake, 1

Tegano Barnard and Karaman (Melita seticornis Bousfield)  
Solomon and Bismarck groups, anchialine, 1.

Paraniphargus Tattersall (Paraniphargus annandalei Tattersall)  
IndoPacific (western) islands, wells, high jungle streams, 2

Maleriopa Barnard and Karaman (Eriopisella dentifera Ledoyer)  
Mauritius, sublittoral, 1

Anchialella J.L. Barnard (Anchialella vulcanella  
J.L. Barnard)  
Galapagos Islands, anchialine, 1

Galapsiellus J.L. Barnard (Paraniphargus leleuporum Monod)  
Galapagos Islands, brackish to phreatic, 1

## 2. Eriopisella group

## a. Eriopisella-group

Eriopisella Chevreux (Eriopisella pusilla Chevreux)  
IndoPacific tropics and South Africa, marine shallows, 8

Netamelita J.L. Barnard (Netamelita cortada J.L. Barnard)  
California, marine intertidal, 1

Indoniphargus Straskraba (Niphargus indicus Chilton)  
India, phreatic, 1

Microniphargus Schellenberg (Microniphargus leruthi  
Schellenberg)  
Belgium, phreatic, 1

Giniphargus Karaman and Barnard (Niphargus pulchellus Sayce)  
Australia, Victoria, probably hypogean, 1

b. Bathyonx group [probably juvenile Gammarus]

Bathyonyx Vejdovsky (Bathyonyx devismesi Vejdovsky)  
Irish Sea, Lough Mask, 1

## 3. Pseudoniphargus group

Pseudoniphargus Chevreux (Pseudoniphargus africanus Chevreux)  
Circum-Mediterranean (west) and Iberia, anchialine,  
phreatic, 1

## 4. Niphargus group (Niphargidae)

Pontoniphargus Dancau (Pontoniphargus racovitzai Dancau)  
Rumania, wells near Black Sea, 1

Niphargus Schiodte (Niphargus stygius Schiodte) (= Stygodytes  
Absolon, = Phaenogammarus Dudich, = Martynovia Derzhavin,  
= Supraniphargus S. Karaman, = Orniphargus S. Karaman,  
= Stygoniphargus S. Karaman, = Karamaniella Sket,  
= Protoniphargopsis Sket)  
Europe (but not Iberia, S. Italy and generally south of farthest  
advance of glaciation), S. British Isles, Crimea,  
Trans-Caucasus, S. Turkey, N. Corsica, N. Sardinia, 139 [265]

[Haploginglymus Mateus and Mateus (Haploginglymus bragai  
Mateus and Mateus)]  
Portugal, phreatic, [1]. See Niphargus

Niphargopsis Chevreux (Niphargopsis legeri Chevreux,  
= Gammarus casparyi Pratz)  
Mid-Southern Europe, phreatic, 2

Niphargellus Schellenberg (Niphargus arndti Schellenberg)

(= Niphargus by Wichers)

Central Europe and southern England, phreatic, 2

Carinurella Sket (Karamaniella paradoxa Sket)

Yugoslavia, phreatic, 1

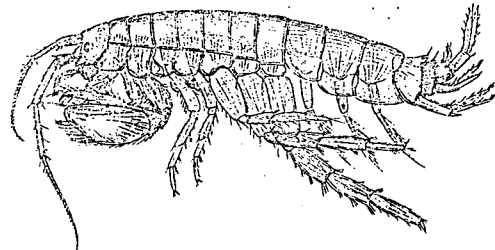
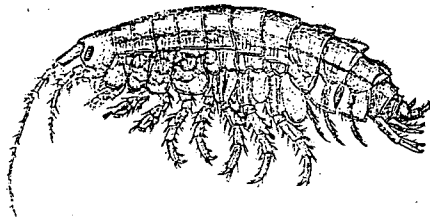
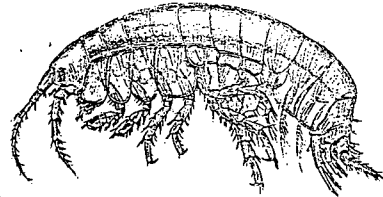
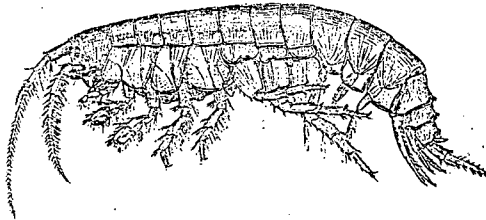
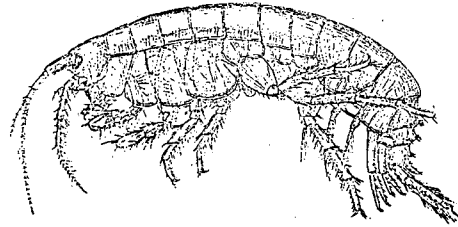
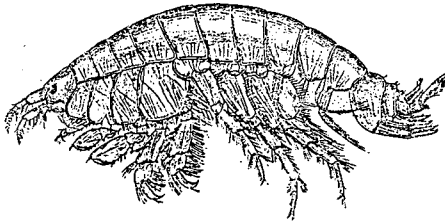
5. Salentinella group

Salentinella Ruffo (Salentinella gracillima Ruffo)

Dalmatia to Pyrenees, hypogean, 10

Parasalentinella Bou (Parasalentinella rouchi Bou)

French Pyrenees, hypogean, 1



## Appendix V

## A. Phyletic Keys

## Elucidation Key of Gammaridans

The purpose of these keys is to amplify character distinctions made in the text and they are not for generic identification; a fully developed key will be published by Barnard and Karaman (in prep.). In order to juxtapose convergent groups and then separate them by key characters, many genera are cited several times, often within couplet frameworks that are otherwise erroneous. For example, couplet 10 of Key D contains Hadziids (Hadzia) erroneously but purposefully included from Key D, couplet 5, part 1, to show convergence towards neighboring taxa; the genera of Hadziids are properly found in Key D, couplet 40.

Many assumptions have to be made because so many taxa are poorly described. One assumption is that all species in all Gammaroid genera of west Europe, Baikal and the PontoCaspian Basin have coxal gill 7 extant. Value judgments are also very difficult, for example, the choice between vermiform and ordinary body plans, or simple and subchelate gnathopods. As often said by taxonomists, keys are only crutches and one must use them digitally by choosing alternate routes through them until absurdities defy progress.

The Baikalian Pallasea remains a very difficult genus because it appears to be composed of species with or without Pontogammarus antenna 1, with or without expanded article 2 on pereopod 7, with or without setose article 2 of pereopod 7, with or without lobate article 2 on pereopod 7, either parvi- or magniramous uropod 3, rostrate or not, cephalic toothed or not, and with odd combinations of other characters. There are numerous endpoints of these species and only a few are so indicated in the keys as we gave up in frustration on that genus.

## Keys to the Genera of Gammaridan Amphipoda

## Elimination Key to Reject Non-Gammaroids

1. Coxa 1 strongly reduced in relation to coxae 2-4  
(less than half size of coxa 2) . . . . . No  
Coxa 2 not strongly reduced. . . . . 2
2. Telson fleshy. . . . . No  
Telson laminar . . . . . 3
3. Gnathopods chelate or carpochelate. . . . . No  
Gnathopods not chelate . . . . . 4
4. Article 3 of gnathopod 2 elongate. . . . . See Jerbarnia  
Article 3 of gnathopod 2 not elongate. . . . . 5
5. Maxilliped palp with fewer than 3 articles . . . . . No  
Maxilliped palp with 3 or more articles. . . . . 6
6. Mandible lacking incisor . . . . . No  
Mandible bearing incisor . . . . . 7
7. Inner plates of maxilliped completely fused together. . . . . No  
Inner plates of maxilliped free. . . . . 8



8. Outer plate of maxilliped reduced or absent. . . . . No  
 Outer plate of maxilliped well developed . . . . . 9
9. Article 1 of primary flagellum in at least one sex elongate . . . . . No  
 Article 1 of primary flagellum not elongate. . . . . 10
10. Some urosomites coalesced. . . . . 11  
 No urosomites coalesced . . . . . 13
11. Only urosomites 2-3 fused together . . . . . No  
 All urosomites fused together. . . . . 12
12. Gnathopods very slender and parachelate. . . . . No  
 Gnathopods subchelate normally, hands expanded . . . . . 13
13. Gnathopod 1 lacking articles 3-7 . . . . . No  
 Gnathopod 2 normal . . . . . 14
14. Mandibular palp absent . . . . . 15  
 Mandibular palp present. . . . . 16
15. Accessory flagellum absent (rare in Gammaridans) . . . . . No  
 Accessory flagellum present. . . . . 16
16. Peduncle of uropod 3 elongate . . . . . see certain Melphidippoids  
 Peduncle of uropod 3 not elongate. . . . . 17
17. Article 3 of pereopod 7 enlarged . . . . . No  
 Article 3 of pereopod 7 ordinary . . . . . 18
18. Some anterior coxae acuminate. . . . . 19  
 No anterior coxae acuminate. . . . . 20
19. Accessory flagellum 0-2 articulate . . . . . No  
 Accessory flagellum 3+ articulate. . . . . 20
20. Head galeate or proboscoïd . . . . . No  
 Head not proboscoïd nor galeate. . . . . 21
21. Mandibles flat and flabellate . . . . . No  
 Mandibles normal . . . . . 22
22. One or both gnathopods with palm obsolescent . . . . . 23  
 Gnathopods subchelate. . . . . 27
23. Anterior coxae of irregular sizes and form . . . . . No  
 Anterior coxae ordinary. . . . . 24
24. Mandibular molar non-tritulative . . . . . No  
 Mandibular molar tritulative . . . . . 25
25. Accessory flagellum 0-2 articulate . . . . . 26  
 Accessory flagellum 3+ articulate. . . . . 27
26. Pleosome with transverse dorsal serrations . . . . . See Melphidippids  
 Pleosome lacking transverse dorsal serrations. . . . . 27
27. Lower lip of pleustid form, ovate tilted lobes widely  
 separated by truncate inner lobes. . . . . Pleustidae  
 Lower lip of other form. . . . . 28
28. Mandibular molar poorly tritulative. . . . . 29  
 Mandibular molar tritulative . . . . . 31
29. Gnathopod 2 of Elasmopus form. . . . . 31  
 Gnathopod 2 not of Elasmopus form. . . . . 30
30. Body vermiform . . . . . 31  
 Body not vermiform . . . . . No
31. Head with visor-like rostrum . . . . . No  
 Head lacking visor-like rostrum. . . . . 32
32. Pereopods fossorial. . . . . 33
33. Gnathopods enfeebled. . . . . See Pontoporeiids  
 Gnathopods not enfeebled . . . . . 34

34. Accessory flagellum 1-2 articulate . . . . . 35  
 Accessory flagellum 3+ articulate. . . . . 40
35. Gnathopods Acanthogammarid . . . . . No  
 Gnathopods not Acanthogammarid . . . . . 36
36. Accessory flagellum 1-articulate . . . . . 37  
 Accessory flagellum 2+ articulate. . . . . 40
37. Gills reduced to 4 or fewer pairs. . . . . Some Bogidiellids  
 Gills 5 or more pairs. . . . . Key A or 38
38. Pleopods vestigial . . . . . Pseudingolffiella  
 Pleopods not vestigial . . . . . 39
39. One ramus of uropod 3 shortened or absent . . . . . Salentinellids  
 Rami of uropod 3 subequally long. . . . . Eusirid-Calliopiid-Pontogeneiid
40. Start Key A . . . . . Key A  
 Alternatively continue. . . . . 41
41. Palm of one or both gnathopods weak to  
 obsolescent . . . . . Melphidippoids-Gammarelloids 42  
 Palm of gnathopods well  
 developed . . . . . Crangonyctoids, Gammaroids, Hadzioids 44
42. Telson scarcely cleft or entire . . . . . Gammarellids  
 Telson cleft. . . . . 43
43. Coxal gill 7 present. . . . . Gammarelloid-Melphidippoid  
 Coxal gill 7 absent . . . . . Melitoid
44. Sternal gills present or dense bifid palmar spines on  
 gnathopods present . . . . . Crangonyctids  
 Sternal gills absent, dense palmar spines on  
 gnathopods absent. . . . . 45
45. Check ancestry in Australia. . . . . possibly Crangonyctid  
 Non Australian . . . . . Starting Key

## Starting Key to Gammaridans

1. Body vermiform or very slender. . . . . Key A  
 Body not vermiform and ordinary . . . . . 2
2. One or both gnathopods simple or poorly subchelate . . . . . Key B  
 Gnathopods fully subchelate . . . . . 3
3. Sternal gills present . . . . . Key C  
 Sternal gills absent. . . . . 4
4. Pereonite 7 lacking coxal gills (or if not known,  
 try marine taxa here) . . . . . Key D  
 Pereonite 7 bearing coxal gills (or if not known,  
 try Palearctic freshwater taxa here). . . . . 5
5. Some coxal gills with accessory appendages. . . . . Key E  
 Coxal gills lacking accessory appendages. . . . . 6
6. Dactyl of maxillipeds vestigial or heavily reduced. . . . . Key F  
 Dactyl of maxillipeds unguiform . . . . . 7
7. Peduncle of antenna 1 of Pontogammarus form . . . . . Key G  
 Peduncle of antenna 1 of Gammarus form though  
 occasionally shortened. . . . . 8
8. Palms of gnathopods packed with notched spines. . . . . Key H  
 Palms of gnathopods not packed with notched spines,  
 spines if present simple or bearing only weak triggers . . . . . 9

9. Article 2 of pereopod 7 expanded or posterior border evenly convex . . . . . Key I  
 Article 2 of pereopod 7 unexpanded or posterior border sinuous, uneven or straight (minutely or grossly) . . . . . 10
10. Pereopod 3 of fossorial or filtrative form or uropod 1 reduced (short or ramal spines absent) . . . . . Key J  
 Pereopod 3 of normal form and uropod 1 not reduced as above. . . . . 11
11. Article 2 of pereopod 7 with small ventrally produced posteroventral lobe . . . . . Key K  
 Article 2 of pereopod 7 without definitely produced ventral lobe. . . . . Key L

In addition, see key M for genera with articulate spines attached to dorsal processes on pereon and pleosome. Keys N, O and P emerge from Keys A-L.

Key A (Special Vermiform Genera, or Reduced Branchiae)

1. Coxae small or vestigial and pereopods 5-7 filiform . . . . . 2  
 These characters not combined . . . . . 3
2. Gnathopods subchelate . . . . . Hellenis<sup>†</sup>  
 Gnathopods simple . . . . . Macrohæctopus
3. Uropod 3 fully magniramous. . . . . 4  
 Uropod 3 parviramous or uniramous . . . . . 12
4. Uropod 1 uniramous, (pleopods sexually dimorphic). . . . . Bollegidia  
 Uropod 1 biramous, (pleopods assumed to be monomorphic). . . . . 5
5. Outer rami of pleopods 1-articulate. . . . . Kergueleniola (part)  
 Outer rami of pleopods multiarticulate. . . . . 6
6. Coxae shorter than broad, often discontinuous or barely touching. . . . . 7  
 Several coxae longer than broad or several strongly overlapping. . . . . 9
- 7a. Inner rami of pleopods multiarticulate, coxal gills 5 pairs, mouthparts reduced. . . . . Parabogidiella  
 b. Inner rami of pleopods multiarticulate, coxal gills 5-6 pairs, mouthparts ordinary . . . . . Melphidippids (part)  
 c. Inner rami of pleopods 1-articulate or absent, gills 4 pairs or fewer, mouthparts ordinary . . . . . 8
8. Mandibular incisor ordinary, molar weakly to strongly tritulative, not spinose or poorly spinose . . . . . Bogidiella  
 Mandibular incisor with large excavate callosity, molar not tritulative, strongly spinose . . . . . Afridiella
9. Inner rami of pleopods 1-articulate. . . . . Spelaeogammarus (part)  
 Inner rami of pleopods multiarticulate. . . . . 10
10. Telson entire . . . . . Paraleptamphopus  
 Telson cleft. . . . . 11
11. Maxillae medially setose, anterior coxae long, accessory flagellum multiarticulate . . . . . Phreatogammarus (part)  
 Maxillae medially naked, anterior coxae short and almost discontinuous, accessory flagellum 1-articulate. . . . . Artesia

12. Uropod 3 parviramous (maxillae not or poorly setose medially) . . . . 13  
 Uropod 3 uniramous (maxillae variable) . . . . . 17
13. Gnathopods fully hammer-like. . . . . Niphargids (Key N)  
 Gnathopods not fully hammer-like. . . . . 14
14. Pleopods uniramous (lower lip with inner lobes) . . Paracrangonyx (part)  
 Pleopods biramous (?lower lip lacking inner lobes) . . . . . 15
15. Telson entire, outer ramus of uropod 3 as  
 long as peduncle. . . . . Protocrangonyx (part)  
 Telson cleft, outer ramus of uropod 3 much  
 longer than peduncle . . . . . 16
16. Article 2 on outer ramus of uropod 3 well developed, palm  
 of gnathopod 1 much more transverse than that of  
 gnathopod 2, hands of gnathopods diverse. . . . . Uroctena (part)  
 Article 2 on outer ramus of uropod 3 vestigial,  
 palm on gnathopod 1 as oblique as that on gnathopod 2,  
 hands of gnathopods similar in shape  
 (though gnathopod 1 small). . . . . Hurleya (part)
17. Palms of gnathopods transverse (almost hammer-like,  
 see also in Niphargids from couplet 6). . . . . Giniphargus (part)  
 Palms of gnathopods strongly oblique. . . . . 18
18. Palms of gnathopods spinose, pleopods biramous, well  
 developed, maxillae setose medially, ramus on uropod 3  
 about 4 times as long as peduncle . . . . . 19  
 Palms of gnathopods sparsely setose except for defining  
 spines, pleopods lacking rami or bearing one vestige,  
 maxillae naked medially, ramus of uropod 3  
 less than twice as long as peduncle . . . . . Pseudingolfiella (part)
19. Article 2 on outer ramus of uropod 3 present . . Pseudocrangonyx (part)  
 Article 2 on outer ramus of  
 uropod 3 absent . . . . . Procrangonyx (= Eocrangonyx) (part)

## Key B (Gammarelloids)

0. Gnathopods mittenform . . . . . Key D  
 Gnathopods not mittenform . . . . . 1
1. Peduncle of uropod 3 not elongate or weakly so. . . . . 2  
 Peduncle of uropod 3 elongate . . . . . 11
2. Telson deeply cleft, plates of maxilla 2 broadened,  
 outer ramus of uropod 2 shortened, pleonites with or  
 without transverse dorsoposterior serrations . . . . . 3  
 Telson almost entire or fully entire, plates of maxilla  
 2 slender, outer ramus of uropod 2 as long as inner  
 ramus, pleonites lacking transverse serrations. . . . . 10
3. Coxa 3 reduced or anterior coxae highly diverse,  
 gnathopod 1 perfectly simple, article 2 of pereopods  
 5-7 with posteroventral lobes. . . . . 4  
 Coxa 3 ordinary, gnathopod 1 with weak palm or hand  
 bulging, article 2 of pereopods 5-7 lacking  
 posteroventral lobes. . . . . 6

4. Rami of uropod 3 foliaceous, outer ramus lacking  
 article 2 . . . . . Megaluropus  
 Rami of uropod 3 lanceolate, outer ramus bearing article  
 2 (peduncle of uropod 3 actually elongate in one taxon) . . . . . 5
5. Pleon with transverse dorsal serrations, dactyl of  
 gnathopod 1 elongate and not apically  
 setiferous. . . . . Aurohornellia (part)  
 Pleon lacking transverse dorsal serrations, dactyl  
 of gnathopod 1 short and apically setiferous . . . . . Argissa
6. Outer ramus of uropod 3 lacking article 2 . . . . . 7  
 Outer ramus of uropod 3 bearing article 2 . . . . . 9
7. Body mysidiform, antennae and pereopod 6 immensely  
 elongate, Baikalian . . . . . Macrohectopus  
 Body ordinary, antennae and pereopod 6  
 ordinary, marine. . . . . 8
8. Gnathopods lacking palms entirely, hands linear. . . . . Incratella  
 Gnathopods with weak palms,  
 hands ovate . . . . . Metaceradocus (and Maera)
9. Telson fully cleft. . . . . Hornellia whakatane  
 Telson not fully cleft. . . . . Hornellia
10. Body dorsally carinate, article 3 of mandibular palp  
 shorter than article 2, inner lobes on lower lip  
 absent, gnathopods with weak palms . . . . . Gammarellus  
 Body not carinate, article 3 of mandibular palp longer  
 than article 2, inner lobes on lower lip present,  
 gnathopods simple . . . . . Weyprechtia
11. Maxillipedal dactyl vestigial or absent . . . . . 12  
 Maxillipedal dactyl well developed, unguiform . . . . . 13
12. Coxa and article 3 of male gnathopod 2 elongate, outer  
 ramus of uropod 3 with article 2. . . . . Jerbarnia  
 Coxa and article 3 of male gnathopod 2 not elongate,  
 outer ramus of third uropod 1-articulate. . . . . Maerella
13. Gnathopod 2 subchelate in male, gnathopods not both thin  
 and linear. . . . . 14  
 Gnathopod 2 scarcely subchelate or simple in male,  
 gnathopods both thin and linear . . . . . 16
14. Female gnathopod 2 simple . . . . . Cheirocratus  
 Female gnathopod 2 subchelate . . . . . 15
15. Antenna 1 nearly as long as antenna 2 . . . . . Cheirocratella  
 Antenna 1 reaching only to end of peduncle  
 on antenna 2. . . . . Casco
16. Anterior coxae elongate but coxa 3 much  
 shortened . . . . . Aurohornellia (part)  
 All anterior coxae short and even . . . . . 17
17. Accessory flagellum 2+ articulate . . . . . Melphidippa  
 Accessory flagellum 1-articulate. . . . . 18
18. Telson cleft. . . . . Melphidippella  
 Telson entire, emarginate . . . . . Melphisana

## Key C (Crangonyctids) (Sternal gills)

0. Telson entire . . . . . Paraleptamphopus (Eusirid)  
 Telson cleft. . . . . 1
1. Hands of gnathopods packed with bifid spines. . . . Crangonyctid (Key H)  
 Hands of gnathopods not packed with bifid spines,  
 occasionally packed with simple spines. . . . . 2
2. Gnathopods mittenform or hammer-like. . . . . 3  
 Gnathopods not mittenform or hammer-like. . . . . 6
3. Telson entire, outer ramus of uropod 3 as long as peduncle. . . . . 4  
 Telson cleft, outer ramus of uropod 3 much longer than peduncle. . . . 5
4. Gnathopods of equal size, sternal gills  
 simple. . . . . Protocrangonyx (part)  
 Gnathopod 1 enlarged, some sternal gills  
 bifid . . . . . Falklandella (part)
5. Inner ramus of uropod 3 present, article 2  
 on outer ramus short or absent. . . . . Neoniphargus  
 Inner ramus of uropod 3 absent, article 2  
 on outer ramus highly elongate [sternal gills unknown]. . Giniphargus
6. Gnathopods raptorial and Eusirid, wrists strongly  
 lobate. . . . . Perthia  
 Gnathopods not Eusirid, poorly to not raptorial,  
 wrists not strongly lobate . . . . . 7
7. Inner ramus of uropod 3  
 absent. . . . . Pseudocrangonyx and Procrangonyx (Key A)  
 Inner ramus of uropod 3 present . . . . . 8
8. Gnathopod 1 larger than gnathopod 2 . . . . . 9  
 Gnathopod 1 smaller than gnathopod 2. . . . . 10
9. Wrist of gnathopod 2 unlobed, outer ramus of uropod 3  
 very elongate, sternal gills simple . . . . . Sternophysinx  
 Wrist of gnathopod 2 weakly lobed, broad, extended,  
 outer ramus of uropod 3 only as long as peduncle,  
 some sternal gills bifid. . . . . Falklandella (part)
10. Antenna 2 and uropod 3 with strong sexual  
 dimorphism, male antenna 2 pediform, male uropod 3  
 with expanded and setose base on outer ramus. . . . . Uroctena (part)  
 Antenna 2 and uropod 3 lacking sexual dimorphism,  
 not specialized . . . . . 11
11. Pleopods uniramous, telson entire. . . . . Paracrangonyx (part)  
 Pleopods biramous, telson cleft . . . . . 12
12. Uropod 3 parviramous. . . . . 13  
 Uropod 3 vari- or magniramous . . . . . 15
13. Gnathopods subequal in size . . . . . Austrogammarus (part)  
 Gnathopod 2 enlarged . . . . . 14
14. Urosome with only 4 dorsal spines, palms of  
 gnathopods elongate [gill formulas unknown]. . . . . Hurleya (part)  
 Urosome dorsally setiferous, palms of gnathopods not  
 elongate. . . . . Paramelita
15. Peduncle of uropod 3 normal, outer ramus with  
 conspicuous article 2. . . . . Austrogammarus (part)  
 Peduncle of uropod 3 elongate, article 2 on  
 outer ramus vestigial or absent. . . . . Phreatogammarus (part)

## Key D (Coxal Gill 7 Absent)

0. If specimens have eyes and come from epigean freshwater  
 Palearctica west of 110° E and north of 30° N,  
 return to Starting Key couplet 5  
 (certain Gammarids lack coxal gill 7). . . . . Starting Key Couplet 5  
 If specimens are blind or do not come from northwest  
 Palearctica as defined above, then proceed to . . . . . 1
1. Male gnathopod 1 weakly to strongly dominant; or pleopods  
 reduced, either missing one ramus or one ramus reduced  
 to 1 article; or coxal gills reduced to 4 pairs  
 or fewer. . . . .  
 . . . . . Phreatogammarids or Bogidiellids (Key A) or Gammaroporeia  
 Male gnathopod 1 not dominant, pleopods with  
 multiarticulate rami and coxal gills 5 pairs . . . . . 2
2. Urosomites with dense and organized clusters of spines,  
 gnathopods Eulimnogammarid in form. . . . . Mesogammarus  
 One or both characters not pertinent. . . . . 3
3. Gnathopods Niphargid or hammer-like (if in doubt or  
 marine also follow couplet 4) . . . . . Key N  
 Gnathopods not Niphargid. . . . . 4
4. Uropod 3 reduced to one small ramus on peduncle  
 (Crangonyctoids) or ramus absent. . . . . Key H  
 Uropod 3 with at least 2 rami or single ramus elongate . . . . . 5
5. Inner ramus of uropod 3  
 absent. . . . . Pseudocrangonyx and Procrangonyx  
 Inner ramus of uropod 3 present . . . . . 6
6. Choose either couplets 7 or 8 . . . . . 7  
 Choose either couplets 7 or 8 . . . . . 8
7. Eyes absent . . . . . Key P  
 Eyes present or condition of eyes unknown . . . . . 8
8. Uropod 3 aequiramous. . . . . 9  
 Uropod 3 dispariramous. . . . . 31
9. Rami of uropod 3 shorter than peduncle, telson entire. . . . . Parapherusa  
 Rami of uropod 3 longer than peduncle, telson cleft . . . . . 10
10. Eyes absent and distribution  
 in fresh water . . . . . See couplet 10 of Hadziid-Weckeliid Key  
 Eyes present or if eyes absent, of marine provenance . . . . . 11
11. Either article 2 on outer ramus of uropod 3 conspicuous  
 or dactyl of maxilliped absent. . . . . 12  
 Article 2 on outer ramus of uropod 3 inconspicuous,  
 dactyl of maxilliped present. . . . . 18
12. Article 2 of pereopod 7 expanded and plate-like. . . . . Gammarella  
 Article 2 of pereopod 7 ordinary. . . . . 13
13. Dactyl of maxilliped absent . . . . . 14  
 Dactyl of maxilliped present. . . . . 15
14. Article 2 on outer ramus of uropod 3 present, article 3  
 of mandibular palp poorly falcate, coxa and article 3  
 of male gnathopod 2 elongate, pleopodal rami  
 1-articulate. . . . . Jerbarnia

- Article 2 on outer ramus of uropod 3 absent, article 3 of mandibular palp falcate, coxa and article 3 of male gnathopod 2 short, pleopodal rami multiarticulate . . . . . Maerella
15. Palm of female gnathopod 2 transverse . . . . . Metaceradocoides  
Palm of female gnathopod 2 oblique. . . . . 16
16. Uropod 3 not exceeding uropod 2,  
rami short . . . . . Ceradocopsis (=Maeracunha)  
Uropod 3 exceeding uropod 2, rami long . . . . . 17
17. Pleon dorsally smooth . . . . . Meximaera  
Pleon dorsally denticulate transversely . . . . .  
. . . . . Hornellia and Metaceradocus
18. Rami of uropod 3 flabelliform, enlarged . . . . . 19  
Rami of uropod 3 lanceolate or stunted. . . . . 20
19. Eyes 4 in number, inner plate of maxilla 1 fully  
setose. . . . . Quadrivisio  
Eyes 2 in number, inner plate of maxilla 1  
only apically setose. . . . . Paraceradocus
20. Inner plate of maxilla 1 densely setose medially. . . . . 21  
Inner plate of maxilla 1 almost devoid of setae . . . . . 24
21. Article 3 of mandibular palp about as long as article 2,  
article 1 lacking tooth (presumptive in Anelasmopus) . . . . . 22  
Article 3 of mandibular palp much shorter than article  
2, article 1 bearing tooth. . . . . 23
22. Accessory flagellum very short, only 2-articulate . . . . . Anelasmopus  
Accessory flagellum 10-20 articulate, almost half as  
long as primary . . . . . Elasmopoides
23. Telson cleft less than halfway. . . . . Ceradocoides  
Telson cleft deeper than halfway . . . . . Ceradocus
24. Article 3 of mandibular palp falcate. . . . . Elasmopus  
Article 3 of mandibular linear and rectangular. . . . . 25
25. Male gnathopod 2 as small as that of female gnathopod 2,  
scarcely larger than gnathopod 1. . . . . Meximaera  
Male gnathopod 2 enlarged . . . . . 26
26. Urosomite 1 with pair of long bilateral dorsal carinae . . . . . 27  
Urosomite 1 smooth dorsally or, if toothed, tooth single  
and medial or forming transverse serrations posteriorly. . . . . 28
27. Article 2 of mandibular palp never shorter than article  
1, or palp 1-articulate or absent, epimeron 3 not  
serrate posteroventrally. . . . . Mallacoota  
Article 2 of mandibular palp shorter than article 1,  
epimeron 3 serrate posteroventrally. . . . . Parelasmopus
28. Article 2 of mandibular palp shorter than article 1 . . . . . Ifalukia  
Article 2 of mandibular palp longer than article 1. . . . . 29
29. Inner plate of maxilla 2 densely setose medially . . . . . Maeropsis  
Inner plate of maxilla 2 almost naked medially. . . . . 30
30. Right and left male gnathopod 2  
symmetrical. . . . . Lupimaera and Maera  
Right and left male gnathopod 2 disymmetrical . . . . . Ceradomaera
31. Gnathopod 1 weakly dominant; telsonic lobes puffy. . . . . Gammaroporeia  
Gnathopod 1 not dominant, telson laminar. . . . . 32



32. Uropod 3 miniaturized, outer ramus subequally as long as peduncle or shorter . . . . .33  
 Uropod 3 with elongate outer ramus. . . . .36
33. Telson entire . . . . .34  
 Telson cleft. . . . .35
34. Mandibular palp absent, maxillae not setose medially, lower lip with inner lobes. . . . . Beaudettia  
 Mandibular palp 1-3 articulate, maxillae setose medially, lower lip lacking inner lobes . . . . . Pycocrangonyx and Metacrangonyx
35. Article 2 of pereopod 7 expanded and plate-like. . . . . Gammarella and Tabatzius  
 Article 2 of pereopod 7 ordinary. . . . . Hurleya and Ceradocopsis (= Maeracunha)
36. Urosomites coalesced. . . . . Sandro and Austroniphargus  
 Urosomites free . . . . .37
37. Telson emarginate . . . . . Pseudoniphargus  
 Telson cleft. . . . .38
38. Male antennae with tympanic calceoli. . . . . Eoniphargus  
 Male antennae without calceoli. . . . .39
39. Gnathopod 2 larger than and distinct from gnathopod 1. . . . .40  
 Gnathopod 2 as small as gnathopod 1, scarcely distinct from or like gnathopod 1, both generally mittenform, or gnathopod 2 like 1 if large. . . . .41
40. Inner lobes of lower lip absent . . . . . See Hadziids  
 Inner lobes of lower lip present . . . . . Maera and see Melitids
41. Coxa 4 much longer than short coxae 1-3. . . . . See Salentinellids  
 Coxa 4 not much larger than similar coxae 1-3 . . . . .42
42. Peduncle of uropod 3 elongate or gnathopod 2 not fully mittenform. . . . . Anchialella and Galapsiellus  
 Peduncle of uropod 3 not elongate, gnathopods mittenform . . . . .43
43. Gnathopods usually enlarged but when small lacking pubescence. . . . . Niphargids (Key N)  
 Gnathopods small, mittenform, with pubescence . . . . . See Bathyonyx and Eriopisellids

## Key E (Anisogammarids)

1. Male gnathopods lacking peg spines on palms . . . . . Gammarus  
 At least male gnathopod 2 with peg spines on palm . . . . .2
2. Gnathopod 1 much smaller than gnathopod 2 in male, hand thin, rectangular, palm transverse, wrist elongate, male gnathopod 2 enlarged, ordinary . . . . . Bathyceradocus  
 Gnathopods 1-2 in both sexes of subequal size and shape, both moderately enlarged and both pairs with peg spines on palms. . . . . See Anisogammarids

## Key F: Maxillipedal dactyl reduced (polyphyletic)

1. Articles 2 and 4 of pereopods 5-7 widely expanded . . . . .2  
Articles 2 and 4 of pereopods 5-7 not widely expanded . . . . .3
2. Article 2 of pereopods 5-7 hatchet-shaped, coxa 1 not  
expanded apically . . . . . Behningiella  
Article 2 of pereopods 5-7 ovate, coxa 1 expanded  
apically. . . . . Zernovia
3. Gnathopods sexually dimorphic, uropod 3  
magniramous . . . . . Bathyceradocus (part)  
Gnathopods not sexually dimorphic,  
uropod 3 parviramous or variramous. . . . .4
4. Article 2 on outer ramus of uropod 3 vestigial,  
articles 5-6 of female gnathopod 2 elongate . . . . . Cardiophilus  
Article 2 on outer ramus of uropod 3 ordinary, articles  
5-6 of female gnathopod 2 not together elongate nor  
slender . . . . . Pachyschysis

## Key G (Pontogammarids and allies)

1. Flagella of antenna 1 of Compactogammarus form. . . . . Key 0  
Flagella of antenna 1 of Pontogammarus form . . . . . 2
2. Antenna 2 of Stenogammarus form . . . . . 3  
Antenna 2 of Pontogammarus-Gammarus form. . . . . 6
3. Article 2 on outer ramus of uropod 3 absent . . . . . Homocerisca (part)  
Article 2 on outer ramus of uropod 3 present. . . . . 4
4. Article 2 of pereopod 7 produced downward  
posteroventrally, pereopods 3-7 not stunted . . . . . 5  
Article 2 of pereopod 7 not produced downward  
posteroventrally, pereopods 3-7 stunted,  
[gnathopod 1 dominant] . . . . . Pachyschysis (part)
5. Gnathopod 1 dominant, article 2 on outer ramus  
of uropod 3 short . . . . . Baku (part)  
Gnathopod 2 dominant, article 2 on outer ramus  
of uropod 3 elongate. . . . . Stenogammarus (part)
6. Article 4 of pereopod 4 with even  
posterior setation. . . . . Pontogammarus and Euxinia  
Article 4 of pereopod 4 with posterior  
setae in clumps. . . . . 7
- 7a. Posterior margin of pereopod 7 article 2 with many  
short setae forming fuzz . . . . . Baku (part)
- b. Posterior margin of pereopod 7 article 2 lacking long  
setae (or setae few) . . . . . 8
- c. Posterior margin of pereopod 7 article 2 with many long setae . . . . 14
8. Uropod 3 severely reduced to small ramus or rami on  
peduncle, body discoid. . . . . 9  
Uropod 3 ordinary . . . . . 10
9. Uropod 3 with 2 vestigial rami, pereopod 5  
immense . . . . . Gammarosphaera  
Uropod 3 with one vestigial ramus or none,  
pereopod 5 not immense . . . . . Hyaellopsis

10. Article 2 of pereopod 7 not ventrally produced. . . . .11  
 Article 2 of pereopod 7 ventrally produced. . . . .13
11. Accessory flagellum 3-articulate, urosomite 1 humped . . . Dorogammarus  
 Accessory flagellum 1-articulate, urosomite 1 not humped . . . . .12
12. Pereonal pleurae unhumped . . . . . Andrussovia<sup>†</sup>  
 Pereonal pleurae humped. . . . . Praegmelina<sup>†</sup>
13. Uropod 3 variramous, eyes  
 irregular posteriorly . . . . .(some spp. of Pallasea) Ommatogammarus  
 Uropod 3 parviramous,  
 eyes regular . . . . . Pandorites and Tadzocrangonyx
14. Posterior lobe of article 2 on  
 pereopod 7 produced downward . . . . .15  
 Posterior lobe of article 2 on pereopod 7 not produced downward. . . . .21
15. Uropod 3 parviramous. . . . .16  
 Uropod 3 magni- or variramous . . . . .19
16. Article 2 on outer ramus of uropod 3 present, eyes present . . .17  
 Article 2 on outer ramus of uropod 3 absent,  
 eyes absent. . . . . Homocerisca (part)
17. Article 2 on outer ramus of uropod 3 elongate. . . . Stenogammarus (part)  
 Article 2 on outer ramus of uropod 3 not elongate . . . . .18
18. Accessory flagellum 2+ articulate  
 . . . . . Obesogammarus and Turcogammarus  
 Accessory flagellum 1-articulate . . . . . Gmelinoides
19. Pereopod 6 much longer than pereopod 7. . . . . Pontoporeia  
 Pereopod 6 not longer than 7. . . . .20
20. Accessory flagellum 3-articulate, gnathopod 1 larger  
 than gnathopod 2, gnathopods highly  
 diverse . . . . . Macropereiopus  
 Accessory flagellum 1-articulate, gnathopods  
 of equal size, homogeneous . . . . . Baikalogammarus (part)
21. Eyes absent. . . . . Homocerisca (part)  
 Eyes present. . . . .22
22. Body tuberculate or toothed . . . . Axelboeckia and Gmelinoides (part)  
 Body smooth . . . . .23
23. Article 1 of antenna 1 strongly inflated  
 [dubious value] . . . . . Crypturopus  
 Article 1 of antenna 1 not strongly inflated. . . . .24
24. Setae on uropod 3 not plumose . . . . . Echiuropus  
 Setae on uropod 3 plumose . . . . .25
25. Palp of mandible with D or A setae plus E setae . . . . . Micruropus  
 Palp of mandible with only E setae. . . . . Pseudomicruropus

## Key H (Crangonyctoids and Gradal Analogues)

1. Gnathopod 2 lacking evenly packed dense spines on palm  
 (Parasalentinella, see Key D) . . . . . Key N  
 Gnathopod 2 with evenly packed dense spines on palm . . . . .2
2. Inner ramus of uropod 3 absent. . . . .3  
 Inner ramus of uropod 3 present . . . . .6

3. Ramus of uropod 3 over 4 times as long as peduncle,  
uropod 1 with basofacial spine, gill 7 ?absent. . . . . 4  
Ramus of uropod 3 shorter than peduncle or absent, uropod 1  
lacking basofacial spine, gill 7 usually present. . . . . 5
4. Article 2 on outer ramus of uropod 3 present . . . . . Pseudocrangonyx  
Article 2 on outer ramus of uropod 3 absent. . . . . Procrangonyx
5. Ramus of uropod 3 as long as peduncle. . . . . Bactrurus (part)  
Ramus of uropod 3 shorter than peduncle or absent . . . . .  
. . . . . A group of closely similar genera awaiting further study:  
Stygobromus (= Apocrangonyx, = Synpleonia), possibly = Synurella,  
Diasynurella, Eosynurella and Lyurella (fide G.S. Karaman, 1974e)
6. Coxal gill 2 bifid, outer ramus of male uropod 3  
secondarily segmented, dactyl of pereopods 6-7  
with outer (posterior) spines. . . . . Allocrangonyx  
Coxal gill 2 not bifid, outer ramus of male uropod 3  
not secondarily segmented, dactyl of pereopods 6-7  
lacking outer spines. . . . . 7
7. Gnathopods feeble, hand of gnathopod 1 narrow, palm short,  
gnathopod 2 not of Crangonyctid form, [inner  
lobes of lower lip absent] . . . . . 8  
Gnathopods strong, hand of gnathopod 1 broad, palm  
elongate, gnathopod 2 of Crangonyctid form, [inner  
lobes of lower lip present or absent]. . . . . 9
- 8a. Outer ramus of uropod 3 almost 3 times length of  
peduncle, gnathopod 2 of Eulimnogammarid form . . . . . Eoniphargus  
b. Outer ramus of uropod 3 shorter than peduncle,  
gnathopod 2 of Hadziid form. . . . . Metacrangonyx  
c. Outer ramus of uropod 3 about 2 times as long as  
peduncle, both gnathopods mittenform. . . . . Neoniphargus
9. Uropod 3 magniramous, peduncle elongate,  
inner lobes of lower lip absent. . . . . Phreatogammarus  
Uropod 3 parviramous, peduncle short,  
inner lobes of lower lip present . . . . . 10
10. Outer ramus of uropod 3 elongate. . . . . Crangonyx  
Outer ramus of uropod 3 short. . . . . Bactrurus (part)

Key I (Gmelina-Amathillina group)

1. Article 2 of pereopod 7 not, or scarcely and broadly  
produced ventrally. . . . . 2  
Article 2 of pereopod 7 grossly or subsharply  
produced ventrally. . . . . 13
2. Male gnathopod 1 much larger than gnathopod 2 . . . . . 3  
Male gnathopod 1 not much larger than gnathopod 2 . . . . . 4
3. Uropod 3 variramous or greater, largest dorsal tooth  
occurring on urosome. . . . . Coniurus  
Uropod 3 parviramous, largest dorsal tooth  
not on urosome. . . . . Gmelinopsis (part)
4. Article 2 on outer ramus of uropod 3 absent . . . . . 5  
Article 2 on outer ramus of uropod 3 present (often reduced) . . . . 10

5. Some dorsal teeth bilateral, uropod 3 parviramous . . . . .6  
 No dorsal teeth bilateral, uropod 3 variramous or greater. . . . .7
6. Head with large rostrum and anteroventral tooth, lateral body  
 teeth not confined  
 to pleosome. . . . . (some spp. of Pallasea) Axelboeckia (part)  
 Head with rostrum and anteroventral tooth  
 obsolescent or absent, lateral body teeth  
 confined to pleosome . . . . . (some spp. of Pallasea) Pallasiola
7. Accessory flagellum 1-articulate. . . . . Brandtia  
 Accessory flagellum 3+ articulate . . . . . 8
8. Article 2 of antenna 2 less than half as long as  
 article 1. . . . . Dorogammarus  
 Article 2 of antenna 2 more than half as long as  
 article 1 . . . . . 9
9. Gnathopods of Gammarus form, telson cleft  
 more than halfway . . . . . Carinurus  
 Gnathopods almost identical, with short lobate wrists  
 and short expanded hands, palms scarcely oblique,  
 telson cleft less than halfway. . . . . Boeckaxelia
10. Body smooth . . . . .  
Echinogammarus (part) (Chaetogammarus warpachowskyi) and Yogmelina  
 Body dorsally toothed or tuberculate. . . . .11
11. Uropod 3 variramous, accessory flagellum  
 2+ articulate . . . . . Carinogammarus + Pallasiola  
 Uropod 3 parviramous, accessory flagellum  
 1-articulate. . . . .12
12. Article 2 of pereopod 7 broad and strongly setose. . . . . Gmelinoides  
 Article 2 of pereopod 7 narrow and  
 weakly setose . . . . . Gmelina and Kuzmelina
13. Uropod 3 variramous or greater . . . . .14  
 Uropod 3 parviramous. . . . .25
14. Lobe on article 2 of pereopod 7 broadly  
 rounded. . . . . Baikalogammarus (part)  
 Lobe on article 2 of pereopod 7 sharp or subsharp . . . . .15
15. Body segments extended laterally over coxae,  
 head with large anteroventral spike. . . . . Hakonboeckia (part)  
 Body segments not extended over coxae,  
 head lacking spike . . . . .16
16. Both pereon and pleosome with dorsal teeth. . . . . Spinacanthus  
 Body lacking teeth except occasionally on pleon . . . . .17
17. Coxa 5 with sharp anteroventral lobe. . . . . Odontogammarus  
 Coxa 5 with anteroventral lobe rounded or blunt . . . . .18
18. Pleon with pairs of bilateral teeth . . . . .19  
 Pleon lacking bilateral teeth . . . . .20
19. Only urosome with bilateral teeth, posterior margin  
 of article 2 on pereopod 7 sinuous . . . . Fluviogammarus (type only)  
 Only pereonite 7 and pleosome with  
 bilateral teeth, posterior margin of article 2  
 on pereopod 7 evenly convex . . . . . Metohia
20. Head with large and protruding ocular lobe. . . . . Lobogammarus  
 Ocular lobe of head normal. . . . . 21

21. Antenna 1 about 3 times length of body, article 2 on  
outer ramus of uropod 3 elongate. . . . . Paragarjajewia  
Antenna 1 shorter than body, article 2  
on outer ramus of uropod 3 not elongate . . . . . 22
22. Article 2 on pereopods 5-7 evenly convex  
posteriorly . . . . . 23  
Article 2 on pereopods 5-7 sinuous posteriorly  
(conflicts Key I) . . . . . See Key K or 24
23. Eyes absent, cephalic lobe conical and extended . . . Accubogammarus\*  
Eyes present, cephalic lobe truncate or rounded,  
not extended. . . . . Poekilogammarus
- \*and see Zenkivitchia revasi Birstein and Levuschkin  
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24. Inner ramus of uropod 3 half or more as long as  
outer . . . . . Eulimnogammarus (Eurybiogammarus)  
Inner ramus of uropod 3 less than one-third as long as  
outer (but not fully parviramous). . . . .  
. . . . . Anopogammarus and Eulimnogammarus (Philolimnogammarus)
25. Pereopods 3-4 prehensile. . . . . Iphigenella  
No pereopods prehensile . . . . . 26
26. Head with anteroventral protrusion. . . . . 27  
Head lacking anteroventral protrusion . . . . . 28
27. Article 2 on outer ramus of uropod 3 present,  
gnathopod 1 enlarged. . . . . Gmelinopsis (part)  
Article 2 on outer ramus of uropod 3 absent,  
gnathopod 1 not enlarged. . . . . Axelboeckia (part)
28. Coxae 1-2 ventrally setose (setae elongate) . . . . . 29  
Coxae 1-2 ventrally glabrous (any setae very  
short or immersed). . . . . 32
29. Article 2 of pereopods 5-7 distinctly setose posteriorly. . . . . 30  
Article 2 of pereopods 5-7 poorly setose  
(only setulose) posteriorly. . . . . Jugogammarus
30. Article 2 on outer ramus of uropod 3 present, cephalic  
lobes rounded, outer plate of maxilla 1 normal. . . . . 31  
Article 2 on outer ramus of uropod 3 absent, cephalic  
lobes sharply angular, outer plate of maxilla 1  
abnormal (Fig. 7E). . . . . Zenkevitchia
31. Article 2 of pereopod 7 with posteroventral corner  
rounded, article 2 on outer ramus of  
uropod 3 reduced . . . . . Obesogammarus (part)  
Article 2 of pereopod 7 with posteroventral  
corner sharp, article 2 on outer ramus of  
uropod 3 ordinary to elongate. . . . . Ilvanella
32. Uropod 3 not extending beyond uropod 1, article 2  
of pereopod 7 widest near distal end. . . . . Amathillina  
Uropod 3 extending beyond end of uropod 1, article 2  
of pereopod 7 widest in middle . . . . . 33
33. Antenna 2 as long as or longer than half of body length,  
article 2 of antenna 1 about 0.75-0.90 times as long  
as article 1 or urosome  
with dorsal studs . . . . . Cephalogammarus and Dikerogammarus

- Antenna 2 less than half as long as body, article 2 of antenna 1 less than 0.67 as long as article 1, urosome lacking dorsal studs. . . .34
34. Article 2 of pereopod 6 not expanded. . . . . Akerogammarus  
 Article 2 of pereopod 6 expanded. . . . . 35
35. Gnathopod 1 greatly enlarged. . . . . Lanceogammarus  
 Gnathopod 1 not enlarged. . . . . Shablogammarus

## Key J (Sarthrogammarids)

0. Telson short and poorly cleft, body teeth bilateral. . . . . Pallasiola  
 Telson ordinary, cleft, body teeth middorsal or absent . . . . . 1
1. Sexual dimorphism occurring on antenna 2,  
 or pereopod 7 or uropod 3, body chromatic . . . Echinogammarus (part)  
 Sexual dimorphism reduced or absent on antenna 2,  
 pereopod 7 and uropod 3, body achromatic. . . . . 2
2. Uropod 1 reduced, rami without dorsal spines. . . . . 3  
 Uropod 1 normal, rami with dorsal spines. . . . . 5
3. Pereopod 3 unmodified, dorsum of urosome unarmed . . . . . Neogammarus  
 Pereopod 3 fossorial, dorsum of urosome spiniferous . . . . . 4
4. Mouthparts modified . . . . . Longigammarus  
 Mouthparts normal . . . . . Rhipidogammarus
5. Pereopod 4 fossorial. . . . . Comatogammarus  
 Pereopod 4 unmodified . . . . . 6
6. Article 2 of pereopods 5-7 strongly setose . . . . . Pectenogammarus  
 Article 2 of pereopods 5-7 not strongly setose. . . . . 7
7. Palm of male gnathopod 2 straight, with midpalmar  
 spine, telson with apical setae and spines . . . . . Sarthrogammarus  
 Palm of male gnathopod 2 concave, without midpalmar  
 spine, telson with apical spines but no apical setae . . Lusigammarus

## Key K (Metohiids)

1. Posterior borders of second articles on pereopods 5-7  
 all evenly convex, shapes of articles similar among themselves . . . 2  
 Posterior border of one or more second articles on  
 pereopods 5-7 not evenly convex, sinuous, or shapes of  
 articles not similar among themselves . . . . . 9
2. Gnathopod 2 of Eulimnogammarid form,  
 lateral lobes of head grossly produced . . . . . Lobogammarus  
 Gnathopods not of Eulimnogammarid form, head not  
 grossly produced . . . . . 3
3. Article 2 on outer ramus of uropod 3 absent, (article 2  
 of pereopods 5-7 weakly to strongly setose posteriorly). . . . . 4  
 Article 2 on outer ramus of uropod 3 present, (article 2  
 of pereopods 5-7 weakly to non-setose). . . . . 6
4. Uropod 3 essentially parviramous, inner ramus very  
 short, outer plate of maxilla 1 with  
 abnormal spination. . . . . Zenkevitchia (part)  
 Uropod 3 magniramous, inner ramus elongate,  
 maxilla 1 normal. . . . . 5

5. Lateral cephalic lobes conical, article 3 of antenna 1 shorter than article 2 . . . . . Zenkevitchia revasi and Accubogammarus (part)  
 Lateral cephalic lobes truncate, article 3 of antenna 1 much longer than article 2 (transitional, see in Gammarids) . . . . . Poekilogammarus
6. Uropod 3 parviramous . . . . . Anopogammarus (part), Ilvanella (part)  
 Uropod 3 variramous . . . . . 7
7. Posteroventral process on article 2 of pereopods 5-7 very long, coxa 5 with sharp anteroventral lobe . . . . . Odontogammarus  
 Posteroventral process on article 2 of pereopods 5-7 weak, coxa 5 with blunt anteroventral lobe . . . . . 8
- 8a. Pleosome with dorsal bilateral teeth, pereon and pleosome not spinose . . . . . Metohia  
 b. Pleosome with dorsal spines extending forward onto pereon . . . . . Polyacanthisca + Ceratogammarus  
 c. Pleosome setose, urosome spinose . . . . . Anopogammarus (part)
9. Pereonites with sharp ventrolateral points, head with large anteroventral cusp . . . . . (Pallasea close) Hakonboeckia (part)  
 Pereonites lacking ventrolateral points, head lacking anteroventral cusp . . . . . 10
10. Article 2 on outer ramus of uropod 3 absent, body with few to many dorsal teeth . . . . . 11  
 Article 2 on outer ramus of uropod 3 present, body lacking dorsal teeth . . . . . 12
11. Dorsal body teeth confined to urosome . . . . . Fluviogammarus (part)  
 Dorsal body teeth distributed on pereon, pleosome and head . . . . . Spinacanthus (part)
12. Antenna 1 thrice as long as body . . . . . Paragarjajewia  
 Antenna 1 less than 1.5 times as long as body . . . . . 13
13. Article 2 on pereopod 7 widest in middle, cephalic lobes not produced dorsally . . . . . (Pallasea close) Dikerogammarus (part)  
 Article 2 on pereopod 7 widest dorsally, cephalic lobes often with small dorsoventral extension or oblique margin convex . . . . . 14
14. Inner ramus of uropod 3 less than 0.33 times length of outer ramus . . . . . 15  
 Inner ramus of uropod 3 more than 0.40 times as long as outer . . . . . Issykogammarus, Abyssogammarus and Eulimnogammarus (Eurybiogammarus)
15. Gnathopods of Eulimnogammarid form . . . . . weakly Fluviogammarus, Eulimnogammarus (Philolimnogammarus)  
 Gnathopod 2 propodus as large as that of gnathopod 1 . . . . . 16
16. Article 2 on outer ramus of uropod 3 absent, urosome with 2 pairs of recumbent dorsal teeth . . . . . Fluviogammarus (part)  
 Article 2 on outer ramus of uropod 3 vestigial or well developed, urosome lacking teeth . . . . . 17



17. Lateral spines on outer plate of maxilla 1  
blade-like . . . . . Fontogammarus  
Lateral spines on outer plate of maxilla 1  
ordinary. . . . . Anopogammarus

## Key L

0. Telson entire and forming lateral wings . . . . . Koshovia  
Telson entire or cleft but not forming wings. . . . . 1  
1. Inner ramus of uropod 3 more than 0.40 times as long as outer. . . . 2  
Inner ramus of uropod 3 less than 0.33 times as long as  
outer (or otherwise parviramous, if in doubt trace  
both pathways). . . . . 31  
2. One or more of coxae 2-4 with protruding cusps or sharp points. . . . 3  
Coxae 2-4 with square or rounded corners . . . . . 7  
3. Body lacking dorsal teeth. . . . . 4  
Body with dorsal teeth. . . . . 5  
4. Coxa 4 with forward and outward pointing spike, outer  
ramus of uropod 3 bearing article 2, telson elongate,  
setae on article 2 of pereopods 5-7 not tufted . . . . Issykogammarus  
Coxa 4 forming adz directed posteroventrally, outer  
ramus of uropod 3 lacking article 2, telson short,  
setae on article 2 of pereopods 5-7 tufted. . . . . Typhlogammarus  
5. Some body segments with dorsal spines . . . . . Garjajewia  
No body segments with dorsal spines . . . . . 6  
6. Rostrum short . . . . . Acanthogammarus  
Rostrum elongate. . . . . Gammaracanthus (part)  
7. Head with strong anteroventral protrusion  
or spike. . . . . Ceratogammarus  
Head lacking strong anteroventral protrusion. . . . . 8  
8. Article 2 on outer ramus of uropod 3 ordinary or well  
developed (visible at 40 magnifications). . . . . 9  
Article 2 on outer ramus of uropod 3 vestigial or absent  
(not visible at 40 magnifications). . . . . 22  
9. Body with dorsal teeth. . . . . 10  
Body lacking dorsal teeth . . . . . 14  
10. No dorsal teeth bilateral, article 2 on outer ramus of  
uropod 3 elongate . . . . . 11  
One or more sets of dorsal body teeth bilateral, article  
2 on outer ramus of uropod 3 vestigial. . . . . 13  
11. Article 2 of pereopod 7 slightly expanded,  
moderately to heavily setose posteriorly. . . . . Carinogammarus  
Article 2 of pereopod 7 not expanded, poorly setose . . . . . 12  
12. One middle spine on hands of gnathopods blunted. . . . . (Mucrogammarus)  
One middle spine on hands of gnathopods  
not blunted . . . . . Gammarus roeselii Group  
13. Body with weak to strong median carina  
besides lateral teeth . . . . . Palicarinus and Pallasea (part)  
Body lacking median carina. . . . . Parapallasea

14. Article 6 of gnathopod 2 smaller than on gnathopod 1  
[very poor character not easily distinguished  
in type] [Bathyonyx, part]. . . . . Heterogammarus  
Article 6 of gnathopod 2 as large as on gnathopod 1 . . . . . 15
15. Both articles 2 and 3 of antenna 1 longer than  
article 1 . . . . . Sowinskya (part)  
Articles 2 and 3 of antenna 1 slightly to greatly  
shorter than article 1. . . . . 16
16. Article 3 of antenna 2 expanded and bearing  
ventral tooth . . . . . Derzhavinella  
Article 3 of antenna 2 ordinary . . . . . 17
17. Articles 2 and 3 of antenna 1 elongate but slightly  
shorter than article 1, together longer than article  
1, antennae and pereopods very elongate  
[dactyl of maxilliped vestigial]. . . . . Abyssogammarus  
Articles 2 and 3 of antenna 1 together usually  
not as long as article 1 or antennae and  
pereopods of ordinary form. . . . . 18
18. Uropods 1-2 with long plumose setae . . . . . 19  
Uropods 1-2 lacking plumose setae . . . . . 20
19. Eyes irregular. . . . . Leptostenus  
Eyes regular . . . . . Polyacanthisca
20. Accessory flagellum 1-articulate, both palps  
of maxilla 1 symmetrical . . . . . Fontogammarus (part)  
Accessory flagellum 2+ articulate, palps of  
maxilla 1 asymmetrical in spination pattern . . . . . 21
21. Gnathopods with midpalmar spine(s). . . . . Gammarus  
Gnathopods lacking midpalmar spine . . . . . Tadzhikistania
22. Dorsal body teeth columnar and appressed . . . . . Eucarinogammarus  
If present dorsal body teeth rounded  
or sharp, not appressed. . . . . 23
23. Article 5 of peduncle on antenna 2 thickened  
distally and carrying circlet of plumose setae. . . . . Plesiogammarus  
Article 5 of antenna 2 ordinary . . . . . 24
24. Ventrolateral margins of pereonites lacking bulges  
(and see Bathyceradocus). . . . . 25  
Ventrolateral margins of pereonites with bulges . . . . . 27
25. Rostrum small or absent . . . . . Poekilogammarus  
Rostrum large . . . . . 26
26. Telson of ordinary length, article 2 of  
pereopods 5-7 expanded and weakly produced. . . . . Cheirogammarus  
Telson short, article 2 of pereopods 5-7  
not expanded and unproduced. . . . . Gammaracanthus (part)
27. Dorsal humps dominant on pleosome  
(rarely including pereonite 7) . . . . . 28  
Dorsal humps on pleosome not dominating humps  
elsewhere . . . . . 30
28. Antennae long, accessory flagellum 4-articulate. . . . . Carinurus  
Antennae short, accessory flagellum 1-articulate. . . . . 29
29. Pereonal pleurae smooth . . . . . Andrussovia<sup>†</sup>  
Pereonal pleurae humped . . . . . Praegmelina<sup>†</sup>

30. Uropod 3 huge, aequiramous, gnathopods  
 Acanthogammarid . . . . . Gammaracanthus (part)  
 Uropod 3 reduced, variramous, gnathopods  
 not Acanthogammarid . . . . . Boeckaxelia
31. Article 3 of antenna 1 highly elongate . . . . . Sowinskya (part)  
 Article 3 of antenna 1 shorter than article 1 . . . . . 32
32. One or more body segments with bilateral teeth. . . . . 33  
 No body segments with bilateral teeth . . . . . 34
33. Dactyls of pereopods 5-7 short,  
 not longer than article 3  
 . . . . . Kuzmelina, Pallasiola, Pallasea (part)  
 Dactyls of pereopods 5-7  
 elongate, twice as long as article 3 . . . . . Metapallasea
34. Accessory flagellum 1-articulate, palps of maxilla 1  
 symmetrical on both members (see  
Gmelina also) . . . . .  
 . . . . . Tadzhikistania (part) and Fontogammarus (part)  
 Accessory flagellum 2+ articulate,  
 palps of maxilla 1 asymmetrical in spination pattern . . . . . 35
35. Article 6 of gnathopod 2 smaller than on gnathopod 1  
 [character dubious, difficult to observe on many  
 species] . . . . .  
 . . . . . (and Corophiomorphus, Eurybiogammarus, Philolimnogammarus),  
Eulimnogammarus and Eoniphargus (but gills pedunculate)  
 Article 6 of  
 gnathopod 2 as large as on gnathopod 1. . . . . 36
36. Dense and elongate setation occurring on one or more of the following:  
 epimera, body, article 2 of pereopods  
 5-7, article 4 of pereopods 3-4 . Pallasiola and Echinogammarus (part)  
 Body and appendages poorly setose . . . . . 37
37. Uropod 3 shape sexually dimorphic, male with article 2  
 on outer ramus vestigial, shape of  
 gnathopods not sexually dimorphic. . . . . Tadzhikistania (part)  
 Uropod 3 shape not grossly dimorphic sexually,  
 male with article 2 on outer ramus ordinary,  
 shape of gnathopods sexually dimorphic  
 [and see Hurleya in Key C]. . . . . (Chaetogammarus)

## Key M-1 (Special)

## Caspian (C) and Baikal (B) Congruent Taxa

1. Telson both short and poorly cleft together . . . . . 2  
 Telson either deeply cleft or of normal length. . . . . 5
2. Article 2 of pereopod 7 expanded and head with  
 anteroventral tooth besides normal ocular lobe. . . . . 3  
 Article 2 of pereopod 7 not expanded  
 and head lacking extra tooth. . . . . 4
3. Pleon with some bilateral teeth. . . . . Axelboeckia (C)  
 Pleon lacking bilateral teeth, often with  
 other teeth . . . . . Gmelinopsis (part) (C)

4. Pleon lacking spines superimposed on cusps,  
uropod 3 reduced . . . . . Boeckaxelia (B)  
Pleon with spines superimposed on cusps,  
uropod 3 ordinary. . . . . Garjajewia (B)
5. Antenna 1 of Pontogammarus form . . . . . 6  
Antenna 1 of Gammarus form. . . . . 8
6. Head with dorsal cusps. . . . . Dorogammarus (B)  
Head without dorsal cusps . . . . . 7
7. Dorsal body cusps dominant on pleosome. . . . . Carinurus (B)  
Dorsal body cusps dominant on urosome . . . . . Coniurus (B)
8. Article 2 of pereopod 7 not expanded. . . . . 9  
Article 2 of pereopod 7 expanded. . . . . 12
9. Body with bilateral teeth . . . . . Kuzmelina (C)  
Body lacking bilateral teeth but often with  
dorsal teeth. . . . . 10
10. Body smooth . . . . . Yogmelina (C)  
Body with teeth . . . . . 11
11. Body cusps lacking spines, uropod 3 parviramous. . . . . Gmelina (C)  
Body cusps bearing spines, uropod 3 vari- or  
magniramous . . . . . Spinacanthus (B)
12. Article 2 on outer ramus of uropod 3 ordinary . . . . . 13  
Article 2 on outer ramus of uropod 3 reduced or absent . . . . . 14
13. Head with anteroventral tooth besides ocular lobe, telson  
elongate, rami of uropod 2 lacking  
marginal spines . . . . . Gmelinopsis (part) (C)  
Head lacking extra anteroventral tooth,  
telson short, rami on uropod 2 with marginal spines . Amathillina (C)
14. Head lacking dorsal cusps, uropod 3  
parviramous . . . . . Gmelinoides (B)  
Head with dorsal cusps, uropod 3 vari- or  
magniramous . . . . . Brandtia (B)

## Key M-2 (Special Baikal Congruents)

1. Dorsal cusps dominant on pleon or urosome . . . . . 2  
Dorsal cusps not dominant on pleon or urosome . . . . . 3
2. Dorsal cusps dominant on urosome, article 2  
of pereopod 7 strongly expanded. . . . . Coniurus  
Dorsal cusps dominant on pleosome, article 2  
of pereopod 7 poorly expanded. . . . . Carinurus
3. Head with dorsal armament besides rostrum . . . . . 4  
Head lacking dorsal armament except rostrum . . . . . 5
4. Body without spines superimposed on cusps. . . . . Dorogammarus  
Body with spines superimposed on cusps. . . . . See Key M-3
5. Cleft and length of telson ordinary,  
article 2 of pereopod 7 strongly expanded. . . . . Gmelinoides  
Telson broader than long, poorly cleft,  
article 2 of pereopod 7 unexpanded . . . . . 6
6. Uropod 3 elongate and magniramous, cusps on  
pleosome with spines . . . . . Garjajewia  
Uropod 3 reduced and variramous, cusps on  
pleosome without spines. . . . . Boeckaxelia

## Key M-3 (Special Baikal Group)

Pereon or pleosome with articulate spines superimposed on teeth

## Alternative 1

1. Article 2 of pereopod 7 expanded. . . . . Brandtia (part)  
Article 2 of pereopod 7 not expanded. . . . . 2
2. Head with dorsal processes, article 3 of  
antenna 1 highly elongate. . . . . Spinacanthus (part)  
Head smooth dorsally, article 3  
of antenna 1 short . . . . . Garjajewia (part)

## Alternative 2

1. Head lacking dorsal processes . . . . . Garjajewia (part)  
Head with dorsal processes. . . . . 2
2. Article 2 of pereopod 7 expanded and  
strongly setose, coxae uncuspidate . . . . . Brandtia (part)  
Article 2 of pereopod 7 slender and  
weakly setose, coxa 4 with posteroventral cusp . Spinacanthus (part)

## Key N (Niphargid-Like)

1. Palm of gnathopod 2 in male with stiff bifid  
spines evenly packed . . . . . Key G  
Palm of gnathopod 2 in male lined with thin flexible  
setae or setules or simple spines mixed with setae. . . . . 2
2. Both gnathopods small and mittenform . . . . .  
. . . . . also return to Key D couplet 4  
One or both pairs of gnathopods enlarged,  
or if gnathopods small and specimens  
from Palearctica, continue to. . . . . 3
3. Gnathopods with long posterior lobe on article 5  
(urosomites coalesced). . . . . 4  
Gnathopods lacking long posterior lobe on article 5  
(urosomites free but one genus with urosomites 2-3  
severely reduced) . . . . . 5
4. Lower lip lacking inner lobes, inner rami of pleopods  
reduced, telson of medium length, cleft one  
third . . . . . Austroniphargus  
Lower lip bearing inner lobes, rami of pleopods  
subequally long, telson elongate and almost  
fully cleft . . . . . Sandro
5. Outer plate of maxilla 1 of special  
filtering form, multispinose. . . . . Niphargopsis  
Outer plate of maxilla 1 ordinary or of weak  
filtering capacity, with 11 or fewer spines . . . . . 6
6. Inner ramus of uropod 3 absent. . . . . 7  
Inner ramus of uropod 3 present . . . . . 8

7. Urosomite 1 normal, maxillae well setose medially . . . . . Giniphargus  
 Urosomite 1 hugely dominating urosomites 2-3, maxillae not setose medially. . . . . Carinurella
8. Article 2 on outer ramus of uropod 3 absent . . . . . 9  
 Article 2 on outer ramus of uropod 3 present. . . . . 10
- 9a. Telson elongate, cleft, outer ramus of uropod 3 almost 4 times length of peduncle . . . . . Haploginglymus  
 b. Telson short and entire, outer ramus of uropod 3 about as long as peduncle . . . . . Protocrangonyx  
 c. Telson short and cleft, outer ramus of uropod 3 longer than peduncle . . . . . Hurleya
10. Palp article 3 of mandible reduced in size and setation. . . . . Niphargellus  
 Palp article 3 of mandible elongate and well setose . . . . . 11
11. Gnathopod 1 much smaller than gnathopod 2, palm transverse, gnathopod 2 not hammer-like, hand longer than broad, palm oblique, telson cleft less than 1/7 its length. . . . . Pseudoniphargus  
 Gnathopods 1-2 definitely hammer-like, closely similar regardless of size, palmar slopes of similar tangent regardless of degree, telson cleft 3/8 or more. . . . . 12
12. Uropod 3 parviramous. . . . . Niphargus  
 Uropod 3 variramous (inner ramus elongate). . . . . Pontoniphargus

## Key 0

(After Stock, 1974c)

1. Article 3 of mandibular palp with well developed D-setae . . . . . 2  
 Article 3 of mandibular palp with D-setae vestigial or absent. . . . . 3
2. Posterior margin of epimeron 3 with fan of setae, outer ramus of uropod 3 with plumose setae laterally, article 2 of mandibular palp slender, longer than article 3. . . . . Niphargoides  
 Posterior margin of epimeron 3 lacking fan of setae, outer ramus of uropod 3 with spines and simple setae, article 2 of mandibular palp enlarged, swollen in middle, subequal to article 3. . . . . Paraniphargoides
3. Posterior margin of epimeron 3 with fan of setae, article 2 of antenna 1 linear, article 2 of outer ramus on uropod 3 short, triangular. . . . . 4  
 Posterior margin of epimeron 3 lacking fan of setae, article 2 of antenna 1 with strong ventral swelling, article 2 on outer ramus of uropod 3 elongate and slender. . . . . Niphargogammarus
4. Lateral margin of uropod 3 with plumose setae, inner ramus short, with plumose setae, article 6 of gnathopod 2 triangular, palm very oblique, longer than posterior margin, posterodistal corner of article 2 on pereopod 7 strongly projecting, overhanging . . . . . Compactogammarus

Lateral margin of uropod 3 with spines only, inner ramus elongate, without setae, article 6 of gnathopod 2 elongate, trapezoidal, palm oblique but shorter than posterior margin, posterodistal corner of article 2 on pereopod 7 scarcely projecting. . . . . Uroniphargoides

Key P (Various Genera of Earlier Keys Included)

Coxal gill 7-absent; sternal gills absent; eyes absent.

1. Uropod 3 aequiramous, rami almost reaching same length, article 2 on outer ramus absent, vestigial or inconspicuous . . . . . 2  
 Uropod 3 strongly dispariramous, either parviramous or article 2 on outer ramus very large (article 2 often absent on strongly parviramous limbs) . . . . . 5
2. Uropod 1 uniramous . . . . . Bollegidia  
 Uropod 1 biramous . . . . . 3
3. One or both rami of pleopods 1-articulate . . . . .  
 . . . . . Kergueleniola, Bogidiella, Afridiella, Spelaeogammarus  
 Rami on pleopods multiarticulate. . . . . 4
4. Gnathopod 1 larger than  
 gnathopod 2. . . . . Artesia and Parabogidiella  
 Gnathopod 1 not larger than  
 gnathopod 2. . . . . Metaceradocoides and Weckeliids
5. Uropod 3 uniramous . . . . . 6  
 Uropod 3 biramous . . . . . 9
6. Palm of gnathopod 1 armed densely  
 with bifid spines. . . . . (those without sternal gills) Crangonyctids  
 Palms of gnathopods without  
 dense packing of bifid spines. . . . . 7
7. Pleopodal rami vestigial. . . . . Pseudoingolfiella  
 Pleopodal rami well developed . . . . . 8
8. Anterior coxae short, maxillae medially  
 setose, mandibular palp 1-articulate. . . . . Pygocrangonyx  
 Anterior coxae elongate, maxillae medially  
 naked, mandibular palp 3-articulate. . . . . Parasalentinella
9. Outer ramus of uropod 3 scarcely longer than  
 peduncle or shorter . . . . . Metacrangonyx  
 Outer ramus of uropod 3 greatly elongate. . . . . 10
10. Coxa 4 elongate, coxae 1-3 very short . . . . . Salentinellids  
 Coxae 1-4 not diversified as in first couplet . . . . . 11
11. Gnathopod 2 like gnathopod 1 regardless of size differences . . . . . 12  
 Gnathopod 2 dissimilar to gnathopod 1 . . . . . 14
12. Wrists of gnathopods not lobate . . . . . Niphargids  
 Wrists of gnathopods lobate . . . . . 13
13. Urosomites free . . . . . Bathyonyx and Eriopisellids (part)  
 Urosomites coalesced. . . . . Austroniphargids
14. Gnathopod 2 of Eulimnogammarid form . . . . . 15  
 Gnathopod 2 not of Eulimnogammarid form . . . . . 16
15. Uropod 3 magniramous. . . . . Metaceradocoides  
 Uropod 3 parviramous . . . . . Eoniphargus

16. Telson almost entire, outer ramus of male uropod 3 multiarticulate . . . . . 17  
 Telson cleft, outer ramus of male third uropod 1 or 2 articulate. . . . . 18
17. Coxal gill 2 bifid, gnathopodal palms densely packed with bifid spines. . . . . Allocrangonyx  
 Coxal gill 2 not bifid, gnathopodal palms without densely packed bifid spines . . . . . Pseudoniphargus
18. Peduncle of uropod 3 elongate. . . . . Anchialella and Galapsiellus  
 Peduncle of uropod 3 of ordinary length . . . . . 19
19. Gnathopods mittenform. . . . . Eriopisellids and Salentinellids  
 Gnathopods not mittenform . . . . . 20
20. Inner lobes of lower lip present. . . . . Melitids  
 Inner lobes of lower lip absent . . . . . 21
21. Maxillae medially setose. . . . . Hadziids  
 Maxillae medially naked . . . . . Psammoniphargus

## B. Geographic Keys

### Key to Geography

1. Lake Baikal, and its rivers. . . . . Key A  
 2. PontoCaspian Basin and its rivers. . . . . Key B  
 3. Europe and Asia west of Baikal, but see 1 and 2 for their rivers. . . . . Key C  
 4. Asia east of Baikal but see 2 for special rivers . . . . . Key D  
 5. North America. . . . . Key E  
 6. Caribbean Islands. . . . . Key E  
 7. South America. . . . . Key F  
 8. Africa south of the Sahara Desert. . . . . Key G  
 9. Africa north of the Sahara Desert. . . . . Key C  
 10. Madagascar . . . . . Key G  
 11. Falkland Islands . . . . . Key G  
 12. Australia and New Zealand. . . . . Key H  
 13. Warm Asia and open-sea islands (=Paleotropics) . . . . . Key I

### Geographical Key A (Baikal)

1. Body mysidiform . . . . . Macrohectopus  
 Body not mysidiform . . . . . 2
2. Telson both entire and almost 3 times as wide as long. . . . . Koshovia  
 Telson cleft or entire, when entire, width not exceeding length. . . . . 3
3. Uropod 3 miniaturized, rami vestigial . . . . . 4  
 Uropod 3 not miniaturized, rami not vestigial . . . . . 5
4. Uropod 3 with 2 rami, pereopod 7 discoid. . . . . Gammarosphaera  
 Uropod 3 with 1 ramus, pereopod 7 not discoid. . . . . Hyalellopsis
5. Article 2, pereopod 7 both expanded and lobate posteroventrally. . . . . 6  
 Article 2, pereopod 7 neither expanded nor lobate together . . . . . 18



6. Eyes of irregular outline . . . . . Ommatogammarus (part)  
Eyes regular or absent. . . . . 7
7. Both coxa 5 and article 2, pereopods 5-7  
with long spike . . . . . Odontogammarus  
Both coxa 5 and article 2, pereopods 5-7 without  
long spike. . . . . 8
8. Head with spike, pereonites extended laterally  
over coxae . . . . . Hakonboeckia  
Head without spike, pereonites not extended  
laterally over coxae. . . . . 9
9. Urosome with dorsal teeth . . . . . Fluviogammarus  
Urosome smooth or only with spines. . . . . 10
10. Antenna 1 of Gammarus-form. . . . . 11  
Antenna 1 of Pontogammarus-form . . . . . 14
11. Peduncle of uropod 3 elongate . . . . . Poekilogammarus  
Peduncle of uropod 3 not elongate . . . . . 12
12. Lateral cephalic lobe grossly enlarged. . . . . Lobogammarus  
Lateral cephalic lobe not grossly enlarged. . . . . 13
13. Inner ramus of uropod 3 about 0.33 times as  
long as outer ramus or less. . . . . Philolimnogammarus  
Inner ramus of uropod 3 about 0.40 times as  
long as outer ramus or more. . . . . Eurybiogammarus
14. Accessory flagellum 3+ articulate . . . . . Macropereiopus  
Accessory flagellum 1-2 articulate. . . . . 15
15. Article 2 on outer ramus of uropod 3 ordinary. . . . . Baikalogammarus  
Article 2 on outer ramus of uropod 3 vestigial  
or absent. . . . . 16
16. Article 1 of antenna 1 thin . . . . . Micruropus  
Article 1 of antenna 1 thick. . . . . 17
17. Article 3 of antenna 1 thick. . . . . Crypturopus  
Article 3 of antenna 1 thin . . . . . Homocerisca
18. Body with dorsal or lateral teeth, cusps, humps. . . . . 19  
Body without dorsal or lateral teeth, cusps, humps. . . . . 42
19. Dorsal humps on head or pereon spinose. . . . . 20  
Dorsal humps on head or pereon not spinose. . . . . 21
20. Accessory flagellum 1-articulate, article 2  
on pereopod 7 not produced, coxa 4 ordinary . . . . . Brandtia  
Accessory flagellum 2+ articulate, article 2  
on pereopod 7 slightly produced posteroventrally,  
coxa 4 with posteroventral cusp . . . . . Spinacanthus
21. At least one pair of dorsal body teeth bilateral. . . . . 22  
Dorsal body teeth not bilateral . . . . . 27
22. Gnathopods of Acanthogammarid-form. . . . . Acanthogammarus (part)  
Gnathopods not of Acanthogammarid-form . . . . . 23
23. Pereonites and pleonites each divided into dorsal  
compartment, with lateral compartments at right angles  
to dorsal, separation effected by pair of low alate,  
outwardly directed lateral carinae . . . . . Palicarinus  
Pereonites and pleonites with simple dorsal and  
bilateral cuspidation. . . . . 24

24. Pereon and/or pleon with dorsal crest and bilateral teeth. . . . . Pallasea  
 Pereon and pleon lacking dorsal crest, only with bilateral teeth. . . . . 25
25. Article 2 on outer ramus of uropod 3 ordinary, dactyls of pereopods 5-7 more than twice as long as article 3. . . . . Metapallasea  
 Article 2 on outer ramus of uropod 3 vestigial, dactyls ordinary . . . . . 26
26. Article 2, pereopods 5-7 thin and poorly setose . . . . . Parapallesea  
 Article 2, pereopods 5-7 slightly expanded and setose. . . . . Pallasiola
27. Dorsal teeth of vertebral spine shape . . . . . Eucarinogammarus  
 Dorsal teeth not of vertebral spine shape . . . . . 28
28. Antenna 1 of Pontogammarus-form, article 2 half or less length of article 1 . . . . . 29  
 Antenna 1 not of Pontogammarus-form, article 2 more than half as long as article 1 . . . . . 32
29. Dorsal teeth on urosome dominant. . . . . Coniurus  
 Dorsal teeth on urosome not dominant. . . . . 30
30. Dorsal tooth on pleosome dominant. . . . . Echiuropus rhodophthalmus plus Carinurus  
 Dorsal teeth on pereon, pleosome, and urosome about equal in size. . . . . 31
31. Pleosome with dorsal spines on processes, head dorsally naked, article 2 on pereopod 7 not expanded. . . . . Garjajewia  
 Pleosome lacking dorsal spines on processes, head with dorsal processes, article 2 on pereopod 7 expanded. . . . . Dorogammarus
32. Pereon with large lateral humps . . . . . 33  
 Pereon without large lateral humps. . . . . 36
33. Coxa 1 turned towards head. . . . . 34  
 Coxa 1 not turned towards head. . . . . 35
34. Rostrum small . . . . . Acanthogammarus (part)  
 Rostrum large . . . . . Gammaracanthus
35. Article 5 of antenna 2 thick and carrying apical circlet of plumose setae. . . . . Plesiogammarus  
 Article 5 of antenna 2 neither thick nor carrying apical circlet of plumose setae. . . . . Pallasea (part) + Boeckaxelia
36. Urosome spinose . . . . . 37  
 Urosome not spinose . . . . . 39
37. Article 2 on outer ramus of uropod 3 absent. . . . . Pallasea (part)  
 Article 2 on outer ramus of uropod 3 present . . . . . 38
38. Uropod 3 variramous, of ordinary size, accessory flagellum 3+ articulate . . . . . Carinogammarus  
 Uropod 3 parviramous, reduced in size, accessory flagellum 1-articulate . . . . . Gmelinoides
39. Article 2 on outer ramus of uropod 3 ordinary, coxa 5 with cusp . . . . . Metapallasea  
 Article 2 on outer ramus of uropod 3 vestigial or absent, coxa 5 lacking cusp. . . . . 40

40. Dorsal body teeth median only. . . . . Cheirogammarus  
 Some dorsal teeth bilateral, median teeth  
 present or absent . . . . . 41
41. Accessory flagellum 3+ articulate, palms  
 of gnathopods with major spines . . . . . Pallasea (part)  
 Accessory flagellum 2-articulate, major spines  
 on palm of gnathopod 2 absent . . . . . Pallasiola (part)
42. Outer ramus of uropod 3 article 2 present . . . . . 43  
 Outer ramus of uropod 3 article 2 absent. . . . . 60
43. Eyes of irregular outline . . . . . 44  
 Eyes not of irregular outline or absent . . . . . 46
44. Accessory flagellum 1-articulate. . . . .  
 . . . . . Echiuropus (Asprogammarus) pulchelliformis  
 Accessory flagellum 4+ articulate . . . . . 45
45. Antenna 1 greatly elongate, article 2  
 of pereopod 7 not expanded. . . . . Leptostenus  
 Antenna 1 of ordinary length, article 2  
 of pereopod 7 expanded. . . . . Ommatogammarus
46. Head with anteroventral spike . . . . . Ceratogammarus  
 Head lacking anteroventral spike. . . . . 47
47. Article 2 of antenna 1 half as long as article 1 or shorter. . . . . 48  
 Article 2 of antenna 1 more than half as long as article 1. . . . . 53
48. Accessory flagellum 2+ articulate . . . . . 49  
 Accessory flagellum 1-articulate or absent. . . . . 51
49. Coxa 4 with large apical cusp projecting laterally. . . . . Issykogammarus  
 Coxa 4 with large apical cusp not projecting laterally . . . . . 50
50. Article 2 of pereopods 5-7 alike, evenly expanded. . . . . Pachyschysis  
 Article 2 of pereopods 5-7 not alike, not evenly  
 expanded. . . . . Macropereiopus
51. Article 1 of antenna 1 thick. . . . . Homocerisca  
 Article 1 of antenna 1 not thick. . . . . 52
52. Setae of uropod 3 plumose . . . . . Micruropus  
 Setae of uropod 3 not plumose . . . . . Echiuropus
53. Pelagic adaptations such as greatly elongated  
 appendages (antenna 1, pereopods, uropod 3) . . . . . 54  
 Pelagic adaptations not present. . . . . 55
54. Telson cleft halfway, body with weak transverse ribs . . . . . Abyssogammarus  
 Telson cleft three-fourths or more, body smooth. . . . . Paragarjajewia
55. Pereon dorsally spinose . . . . . Polyacanthus  
 Pereon not dorsally spinose . . . . . 56
56. Coxa 4 with large cusp projecting distally  
 and laterally . . . . . Issykogammarus  
 Coxa 4 lacking large cusp projecting distally  
 and laterally . . . . . 57
57. Pleosome naked. . . . . 58  
 Pleosome spinose. . . . . 59
58. Eye large, sub-oval or diamond shaped, covering most of head  
 laterally; cephalic lobe rounded . . . . .  
 . . . . . Echiuropus (Asprogammarus) rhodophthalmus  
 Eye medium reniform,  
 cephalic lobe subquadrate . . . . . Heterogammarus

59. Article 2 on outer ramus of uropod 3 absent or vestigial; coxa 1 reduced . . . . . Eulimnogammarus  
 Article 2 on outer ramus of uropod 3 well developed, coxa 1 ordinary. . . . . Corophiomorphus
60. Urosome spinose, article 2 on pereopods 5-7 alike, posteroventral corner weakly and sharply produced, antenna 1 of Gammarus-form . . . . . Poekilogammarus (part)  
 Urosome not spinose, article 2 on pereopods 5-7 diverse, if expanded and lobate then not sharply, antenna 1 of Pontogammarus form . . . . . 61
61. Mandibular palp with A or B and DE setae. . . . . 62  
 Mandibular palp with only DE setae. . . . . 64
62. Article 1 of antenna 1 thickened. . . . . Homocerisca  
 Article 2 of antenna 2 not thickened. . . . . 63
63. Uropod 3 setae not pinnate. . . . . Echiuropus  
 Uropod 3 setae pinnate. . . . . Micruropus (part)
64. Article 3 of antenna 1 thick . . . . . Crypturopus (part)  
 Article 3 of antenna 2 normal. . . . . Pseudomicruropus

## Geographical Key B (Pontocaspian)

1. Gnathopods chelate. . . . . Caspicola (?not Gammarid)  
 Gnathopods subchelate . . . . . 2
2. Body carinate or knobbed. . . . . 3  
 Body not carinate . . . . . 11
3. Gnathopods of eusirid form. . . . . Gammaracanthus  
 Gnathopods not of eusirid form. . . . . 4
4. Head with anteroventral tooth exceeding lateral cephalic lobe. . . . . 5  
 Head with vestigial or no anteroventral tooth . . . . . 6
5. Telson broader than long, outer ramus of uropod 3 lacking article 2 . . . . . Axelboeckia  
 Telson as long as broad, outer ramus of uropod 3 biarticulate. . . . . Gmelinopsis
6. Article 2 of pereopod 7 with large ventral lobe, accessory flagellum 2+ articulate . . . . . 7  
 Article 2 of pereopod 7 with minute lobe or no lobe, accessory flagellum 1-articulate. . . . . 10
7. Pereopod 6 much longer than pereopod 7, articles 2-7 of pereopod 7 short. . . . . Pontoporeia  
 Pereopod 6 not much longer than pereopod 7, articles 2-7 of pereopod 7 not short. . . . . 8
8. Uropod 3 strongly extended, telson incised nearly to base, urosomites with knobs . . . . . Dikerogammarus  
 Uropod 3 not extended, telson not incised more than three fourths its length, urosomites without knobs . . . . . 9
9. Telson cleft nearly to base; urosomites spinose; antenna 1 longer than antenna 2; inner ramus of uropod 3 shorter than one third of first article of outer ramus, outer ramus 2-articulate. . . . . Amathillina

- Telson convex distally, not incised; urosomites smooth;  
 antenna 1 not as long as antenna 2; inner ramus of  
 uropod 3 nearly as long as outer,  
 latter 1-articulate. . . . . Gammarellus
10. Body carina single, lateral cephalic lobes quadrate,  
 head lacking anterolateral wing. . . . . Gmelina  
 Body carina double-knobbed bilaterally,  
 lateral cephalic lobes protruding and rounded,  
 head with anterolateral wing. . . . . Kuzmelina
11. Palp of maxilla 1 with articles subequal to each other,  
 antenna 2 much smaller than antenna 1 . . . . . 12  
 Palp of maxilla 1 with article 2 elongate (or palp 1-articulate),  
 antenna 2 not much smaller than antenna 1. . . . . 14
12. Article 2 of pereopods 5-7 lobate ventrally. . . . . Behningiella  
 Article 2 of pereopods 5-7 not lobate . . . . . 13
13. Coxa 4 weakly lobed, uropod 3 parviramous,  
 telson short, gnathopods dissimilar,  
 wrist of gnathopod 2 elongate. . . . . Cardiophilus (part)  
 Coxa 4 unlobed, uropod 3 uniramous,  
 telson of ordinary length, gnathopods alike,  
 wrists of gnathopods 1-2 short. . . . . Pachyschysis (Baikal)
14. Article 2 of pereopod 7 without ventral lobe. . . . . 15  
 Article 2 of pereopod 7 expanded and ventrally lobate. . . . . 18
15. Accessory flagellum 1-articulate. . . . . Yogmelina  
 Accessory flagellum 2+ articulate . . . . . 16
16. Article 3 of antenna 2 with ventral keel. . . . . Derzhavinella  
 Article 3 of antenna 2 without ventral keel . . . . . 17
17. Article 3 of antenna 1 longer than article 2. . . . . Sowinskya  
 Article 3 of antenna 1 shorter than article 1. . . . . Echinogammarus
18. Primary flagellum of antenna 1 shorter than peduncle  
 (usually shorter than article 2) and also accessory  
 flagellum more than 40 percent as long as primary  
 flagellum (= Niphargoides kind of antenna 1) . . . . . 19  
 Primary flagellum of antenna 1 longer than peduncle and also  
 accessory flagellum less than 40 percent as long as primary  
 flagellum (= Dikerogammarus form of antenna 1) . . . . . 23
19. Epimeron 3 with posteroventral setal fan on face. . . . . 20  
 Epimeron 3 without setal fan. . . . . 22
20. Inner ramus of uropod 3 more than half as  
 long as outer ramus . . . . . Uroniphargoides  
 Inner ramus of uropod 3 about one third as  
 long as outer ramus. . . . . 21
21. Mandibular palp with D-setae, article 2  
 of pereopod 5 unlobed . . . . . Niphargoides  
 Mandibular palp without D-setae, article 2  
 of pereopod 5 with posteroventral lobe . . . . . Compactogammarus
22. Mandibular palp lacking D-setae, article 2 on outer ramus  
 of uropod 3 elongate, articles 4-5 of antenna 2 each  
 about as long as article 3 (scarcely longer) . . . . Niphargogammarus  
 Mandibular palp with D-setae, article 2 on outer  
 ramus of uropod 3 not elongate, articles 4-5 of antenna 2  
 significantly longer than article 3 . . . Paraniphargoides (doubtful)

23. Gnathopod 1 stouter than gnathopod 2. . . . . 24  
 Gnathopod 1 not stouter than gnathopod 2. . . . . 27
24. Pereopods 3-7 prehensile. . . . . Iphigenella  
 Pereopods 3-7 not prehensile. . . . . 25
25. Accessory flagellum 1-articulate  
 (brachyura atypical of Yogmelina). . . . . Yogmelina (part)  
 Accessory flagellum 2+ articulate . . . . . 26
26. Gnathopods strongly dissimilar, gnathopod 2 very thin;  
 antennae elongate; posterodistal corner  
 of epimeron 3 acute but tooth short . . . . . Lanceogammarus  
 Gnathopods alike, gnathopod 2 scarcely smaller  
 than gnathopod 1; antennae short; posterodistal  
 corner of epimeron 3 with strong tooth. . . . . Baku
27. Coxa 4 with poorly developed posterior lobe; eyes  
 situated at anterior margin of head . . . . . 28  
 Coxa 4 with well developed posterior lobe; eyes in  
 middle of cephalic lobe . . . . . 29
28. Gnathopods large, gnathopod 2 enlarged; article 2  
 of pereopod 7 widely expanded and lobate. . . . . Pandorites  
 Gnathopods feeble, gnathopod 2 small  
 but elongate, article 2 of pereopod 7  
 narrow and weakly lobate. . . . . Cardiophilus (part)
29. Article 2 of pereopod 7 with strong  
 posterodistal lobe. . . . . 30  
 Article 2 of pereopod 7 without posterodistal lobe. . . . . 32
30. Article 4 of pereopods 5-7 dilated. . . . . Zernovia  
 Article 4 of pereopods 5-7 not dilated. . . . . 31
31. Article 2 on outer ramus of uropod 3 short,  
 not setose on sides, coxae 1-4 with short  
 or no setae, antenna 1 of Gammarus form. . . . . Shablogammarus  
 Article 2 on outer ramus of uropod 3 elongate,  
 with setae on sides, coxae 1-4 with long setae, antenna 1  
 of Pontogammarus-form. . . . .  
 . . . . . Stenogammarus macrurus of Carausu, 1943
32. Urosome with large knob(s). . . . . 33  
 Urosome without knobs . . . . . 35
33. Head giant. . . . . Cephalogammarus  
 Head ordinary . . . . . 34
34. Coxae 1-4 and article 2 of pereopods 5-7  
 strongly setose on margins . . . . . Turcogammarus  
 Coxae 1-4 and article 2 of pereopods 5-7  
 with short and sparse setae. . . . . Dikerogammarus
35. Article 4 of pereopod 4 with only 4-5 posterior  
 setae, (antenna 1 of Dikerogammarus form). . . . . Akerogammarus  
 Article 4 of pereopod 4 with 10+ posterior setae,  
 (antenna 1 of Pontogammarus form) . . . . . 36
36. Article 2 on outer ramus of uropod 3 "elongate" (15+  
 percent of article 1), first 2 flagellar articles of  
 antenna 2 together more than 95 percent  
 as long as article 5 of peduncle. . . . . Stenogammarus

- Article 2 on outer ramus of uropod 3 not elongate  
(less than 12 percent of article 1), first 2  
flagellar articles of antenna 2 together less  
than 80 percent as long as article 5 of peduncle . . . . . 37
37. Posterior setae on article 4 of pereopod 4  
divided into groups . . . . . Obesogammarus  
Posterior setae on article 4 of pereopod 4 in  
continuous fan . . . . . 38
38. Inner ramus of uropod 3 about half as long as outer ramus. . . . . Euxinia  
Inner ramus of uropod 3 about one third as long  
as outer ramus . . . . . Pontogammarus

## Geographical Key C (West Palearctica)

Excluding Bathyonyx

0. From river or lake. . . . . Also try Key B (PontoCaspian)
0. From stream, river or lake, or cryptic. . . . . 1
1. Sternal gills present and/or palms  
of gnathopods packed with notched spines . . . . . 2  
Sternal gills absent, palms of gnathopods lacking dense  
notched spines. . . . . 3
2. Inner ramus of uropod 3 present . . . . . Crangonyx  
Inner ramus of uropod 3 absent. . . . . Stygobromus
3. Coxal gill 7 present. . . . . 4  
Coxal gill 7 absent . . . . . 34
4. Telson entire . . . . . 5  
Telson cleft or emarginate. . . . . 6
5. Article 3 of mandibular palp shorter than  
article 2, body carinate. . . . . Gammarellus  
Article 3 of mandibular palp longer  
than article 2, body smooth . . . . . Weyprechtia
6. Uropod 3 aequiramous, rami paddle-shaped. . . . . Gammaracanthus  
Uropod 3 dispariramous or rami not paddle-shaped. . . . . 7
7. Inner rami of pleopods about one-half as  
long as outer ramus . . . . . Tadzhocrangonyx (in part)  
Inner rami of pleopods well-developed . . . . . 8
8. Either article 2 of pereopod 7 deeply lobate  
or antenna 1 of Pontogammarus-form . . . . . Key B or Key G  
Article 2 of pereopod 7 with tiny posteroventral  
lobe or none, antenna 1 of Gammarus-form. . . . . 9
9. Rami of uropod 1 lacking marginal spines  
(apical spines usually present) . . . . . 10  
Rami of uropod 1 with marginal and apical spines. . . . . 14
10. Telson emarginate . . . . . Pallasiola  
Telson deeply cleft . . . . . 11
11. Pereopod 3 unmodified, dorsum of urosome unarmed. . . . . 12  
Pereopod 3 modified (as in couplet 14-a), dorsum of  
urosome armed . . . . . 13
12. Uropod 2 much smaller than uropod 1 . . . . . Gmelinids  
Uropod 2 not much smaller than uropod 1 . . . . . Neogammarus

13. Maxillipeds and maxilla 2 greatly broadened. . . . . Longigammarus  
 Mouthparts ordinary . . . . . Rhipidogammarus
14. Pereopod 3 or pereopod 4 or both densely setose  
 in filtrative or fossorial form . . . . . 15  
 Neither pereopod 3 nor pereopod 4 densely setose in  
 filtrative or fossorial form. . . . . 19
15. Body chromatic, sex dimorphism occurring on  
 antenna 2, pereopod 7 or uropod 3 . . . . . Echinogammarus  
 Body not chromatic, sex dimorphism not occurring  
 on antenna 2, pereopod 7 or uropod 3. . . . . 16
16. Pereopod 4 fossorial . . . . . Comatogammarus  
 Pereopod 4 not fossorial. . . . . 17
17. Article 2 on pereopods 5-7 strongly setose . . . . . Pectenogammarus  
 Article 2 on pereopods 5-7 not strongly setose. . . . . 18
18. Palm of male gnathopod 2 straight, with midpalmar  
 spines, telson with apical setae and spines. . . . . Sarothrogammarus  
 Palm of male gnathopod 2 concave, no midpalmar spines,  
 telson with apical spines but no apical setae . . . . . Lusigammarus
19. Article 2 of pereopods 5-7 evenly expanded, evenly  
 setose, posterior margin evenly convex. . . . . 20  
 Article 2 of pereopods 5-7 diverse or not expanded. . . . . 26
20. Article 2 on outer ramus of uropod 3 absent . . . . . 21  
 Article 2 on outer ramus of uropod 3 present. . . . . 23
21. Maxilla 1 outer plate spination abnormal,  
 multifiltrative, spines more than 12 . . . . . Zenkevitchia  
 Maxilla 1 outer plate ordinary. . . . . 22
22. Uropod 3 overreaching uropod 2 strongly,  
 definitely parviramous. . . . . Tadzocrangonyx  
 Uropod 3 not overreaching uropod 2 or very short,  
 outer ramus scarcely longer than inner ramus. . . . . Accubogammarus
23. Pleosome with bilateral teeth, pereon and  
 pleosome not spinose . . . . . Metohia  
 Pleosome smooth, urosome spinose. . . . . 24
24. Outer ramus of uropod 1 shortened . . . . . Ilvanella  
 Rami of uropod 1 extending equally. . . . . 25
25. Palps of maxilla 1 asymmetrical . . . . . Anopogammarus  
 Palps of maxilla 1 symmetrical. . . . . Fontogammarus (part)
26. Coxae 1-4 diverse, gnathopods of Acanthogammarid form. . . . . 27  
 Coxae 1-4 not diverse, gnathopod ordinary . . . . . 28
27. Coxa 4 with spike, outer ramus of uropod 3 present . . . . . Issykogammarus  
 Coxa 4 lacking spike, outer ramus of uropod 3  
 lacking article 2 . . . . . Typhlogammarus
28. Telson short and poorly cleft . . . . . Pallasiola  
 Telson ordinary . . . . . 29
29. Accessory flagellum 1-articulate. . . . . 30  
 Accessory flagellum 2+ articulate . . . . . 32
30. Pereopod 7, article 2 posterior margin sinuous or  
 slightly excavate posteroventrally, not broader  
 than article 2 on pereopod 6 . . . . . Fontogammarus (part)  
 Pereopod 7, article 2 posterior margin not  
 sinuous, article 2 broader than article 2 on pereopod 6. . . . . 31



31. Body not carinate . . . . . Yogmelina  
 Body carinate . . . . . Gmelina
32. Article 2 on outer ramus of uropod 3 vestigial,  
 palms of gnathopods with same angle of slope. . . . . Tadzhikistania  
 Article 2 on outer ramus of uropod 3 normal,  
 palms of gnathopods with differing angles of slope . . . . . 33
33. Uropod 3 vari- or magniramous . . . . . Gammarus  
 Uropod 3 parviramous. . . . . Echinogammarus
34. Uropod 3 magniramous. . . . . 35  
 Uropod 3 vari- or parviramous . . . . . 38
35. Telson entire, inner ramus of pleopods vestigial or absent . . . . . 36  
 Telson cleft, inner ramus of pleopods well developed . . . . . 37
36. Mandible with incisorial callus . . . . . Afridiella  
 Mandible ordinary . . . . . Bogidiella
37. Wrist of gnathopod 2 expanded posteriorly,  
 article 2 of mandibular palp as long as article 1. . . . . Hadzia  
 Wrist of gnathopod 2 lacking posterior lobe,  
 article 2 of mandibular palp longer than article 1. . . . . Metahadzia
38. Both gnathopods with elongated wrists, coxae 1-3 much  
 smaller than coxa 4 . . . . . 39  
 At best one gnathopod with elongated wrist, coxae 1-3  
 not much smaller than coxa 4. . . . . 40
39. Uropod 3 biramous, telson cleft . . . . . Salentinella  
 Uropod 3 uniramous, telson entire . . . . . Parasalentinella
40. Telson fully or deeply cleft. . . . . 41  
 Telson cleft one-half or less . . . . . 42
41. Coxae very short, coxa 4 not lobate, male  
 gnathopod 2 much larger than gnathopod 1. . . . .  
 . . . . . Psammogammarus (=Eriopisa)  
 Coxae ordinary to long, coxa 4 lobate,  
 male gnathopod 1 equal to or larger than gnathopod 2 . Echinogammarus
42. Outer ramus of uropod 3 equal to peduncle. . . . . 43  
 Outer ramus of uropod 3 much longer than peduncle. . . . . 44
43. Inner ramus of uropod 3 vestigial, apex of outer  
 ramus poorly spinose, narrow. . . . . Metacrangonyx  
 Inner ramus of uropod 3 absent, apex of  
 outer ramus strongly spinose, broad . . . . . Pygocrangonyx
44. Gnathopods diverse, gnathopod 1 small  
 and melitid, gnathopod 2 enlarged. . . . . Pseudoniphargus  
 Gnathopods alike. . . . . 45
45. Gnathopods mittenform . . . . . Microniphargus  
 Gnathopods not mittenform . . . . . See Key N (Niphargids)

## Geographical Key D

(Cold East Asian Freshwater--Outside Baikal)

1. Inner ramus of uropod 3 absent. . . . . 2  
 Inner ramus of uropod 3 present . . . . . 4

2. Rami of uropod 3 shorter than peduncle . . . . . Stygobromus (= Synurella, Lyurella)  
Rami of uropod 3 longer than peduncle . . . . . 3
3. Uropod 3 with 2 rami. . . . . Pseudocrangonyx  
Uropod 3 with 1 ramus . . . . . Procrangonyx
4. Accessory flagellum 2+ articulate . . . . . 5  
Accessory flagellum absent or, if present, 1-articulate . . . . . 8
5. Gnathopod palms packed with notched spines. . . . . Crangonyx  
Gnathopod palms not as above. . . . . 6
6. No urosomites strongly spinose. . . . . Eoniphargus  
Some urosomites strongly spinose . . . . . 7
7. Coxal gills with accessory lobes . . . . . Anisogammarids  
Coxal gills lacking accessory lobes. . . . . Gammarus
8. Sternal gills present . . . . . Sternomaera  
Sternal gills absent. . . . . 9
9. Lateral cephalic lobes extraordinary,  
with notch in middle, produced  
margin below, no sinus below that. . . . . Relictomaera  
Head ordinary, though eyes often absent . . . . . 10
10. Gnathopods with short wrists and long palms,  
maxilla 1 palp ordinary . . . . . Paramoera  
Gnathopods with elongate wrists and short almost  
transverse palms, maxilla 1 palp only half  
as long as outer plate . . . . . Awacaris

## Geographical Key E (North America and Caribbean)

1. One or more of following characters present: sternal  
gills, densely spaced and notched spines on palms of  
gnathopods, uniramous uropod 3. . . . . 2  
Sternal gills and notched palmar spines absent and  
these specimens with biramous uropod 3 (but some of  
couplet 2 also with two rami on uropod 3) . . . . . 5
2. Outer ramus of third uropod 2+ articulate, outer plate of  
maxilla 1 with 9 apical spines,  
coxae gill 2 bifid . . . . . Allocrangonyx  
Outer ramus of third uropod 1-articulate or absent,  
outer plate of maxilla 1 with 7 spines, coxae gill 2 simple . . . . 3
3. Inner ramus of uropod 3 absent. . . . .  
. . . . . Stygobromus (= Stygonectes, Apocrangonyx)  
Inner ramus of uropod 3 present . . . . . 4
4. Outer ramus of uropod 3 equal in length to peduncle. . . . . Bactrurus  
Outer ramus of uropod 3 longer than peduncle. . . . . Crangonyx
5. Coxal gill 7 present. . . . . 6  
Coxal gill 7 absent . . . . . See keys to Weckeliids and Bogidiellids
6. Coxal gills simple . . . . . Gammarus  
Coxal gills with accessory appendages . . . . . Anisogammarids

## Geographical Key F

(South American Freshwater Key)

1. Rivers and streams, of talitroid facies, male gnathopod 2 enlarged, mandibular palp absent, uropod 3 with one ramus, sternal gills present, coxae unreduced, eyes well developed, body not vermiform, pleopods well developed . . . Hyalella  
Not applicable, subterranean, and inner ramus of pleopods vestigial or absent. . . . . 2
2. Coxae well developed and overlapping, body not vermiform. . . . . Spelaeogammarus  
Coxae shorter than broad, often discontinuous, or barely overlapping . . . . . 3
3. Pleopods with 1 ramus or with vestigial inner ramus and well developed outer ramus . . . . . Bogidiella  
Rami of pleopods vestigial or absent. . . . . Pseudingolfiella

## Geographical Key G

South Africa, Madagascar and Falkland Islands

1. Urosomites 1-3 coalesced. . . . . 2  
Urosomites 1-3 not coalesced. . . . . 3
2. Peduncle of uropod 3 with large horn. . . . . Sandro  
Uropod 3 ordinary . . . . . Austroniphargus
3. Uropod 1 uniramous. . . . . Bollegidia  
Uropod 1 biramous . . . . . 4
4. Sternal gills absent, uropod 3 aequiramous. . . . . Paramoerella  
Sternal gills present, uropod 3 dispariramous . . . . . 5
5. Gnathopod 1 equal to or smaller than gnathopod 2 . . . . . Paramelita  
Gnathopod 1 larger than gnathopod 2 . . . . . 6
6. Wrist of gnathopod 2 unlobed, outer ramus of uropod 3 very elongate, sternal gills simple . . . . Sternophysinx  
Wrist of gnathopod 2 weakly lobed, outer ramus of uropod 3 only as long as peduncle, some sternal gills bifid . . . . . Falklandella

## Geographical Key H

(Notogaea, Australia, New Zealand, Kerguelén)

1. Uropod 3 without rami, mandible without palp . . . . . Chiltonia and Afrochiltonia  
Uropod 3 with rami, mandible with palp. . . . . 2
2. Telson fleshy, gnathopod 2 immensely merochelate . . . . Paracorophium  
Telson laminar, gnathopod 2 not immensely merochelate . . . . . 3
3. One or both rami of pleopods reduced. . . . . 4  
Rami of pleopods ordinary . . . . . 6

4. Uropod 3 magniramous, only inner ramus of pleopods slightly reduced, both rami 1-articulate . . . . . Kergueleniola  
 Uropod 3 parviramous, inner ramus and often both rami of pleopods vestigial or absent . . . . . 5
5. One ramus of pleopods well developed. . . . . Paracrangonyx  
 Rami of pleopods vestigial. . . . . Pseudingolfiella
6. Uropod 3 aequiramous. . . . . 7  
 Uropod 3 dispariramous. . . . . 10
7. Urosomites 2-3 coalesced. . . . . Paracalliope  
 Urosomites 2-3 distinct . . . . . 8
8. Accessory flagellum multiarticulate . . . . . Phreatogammarus  
 Accessory flagellum 0-1 articulate. . . . . 9
9. Telson cleft, wrists of gnathopods elongate, lobate, lobes projecting axially, sexual dimorphism of gnathopods weak . . . . . Pseudomoera  
 Telson entire, wrists of gnathopods short when lobate, sexual dimorphism in gnathopods strong (male Acanthogammarid, female Eulimnogammarid). . . . . Paraleptamphopus
10. Telson entire . . . . . Protocrangonyx  
 Telson cleft. . . . . 11
11. Uropod 3 uniramous. . . . . Giniphargus  
 Uropod 3 biramous . . . . . 12
12. Gnathopods equally enlarged, raptorial and ensiform. . . . . Perthia  
 Gnathopods otherwise. . . . . 13
13. Antenna 2 and uropod 3 with strong sexual dimorphism, male antenna 2 pediform (like Corophium), male uropod 3 with expanded and setose base on outer ramus. . . . . Uroctena  
 Antenna 2 and uropod 3 lacking strong sexual dimorphism, antenna 2 normal, male uropod 3 not as above. . . . . 14
14. Gnathopods mittenform, small, wrists strongly lobate . . . . . Neoniphargus  
 Gnathopods ordinary . . . . . 15
15. Gnathopods about equal to each other in size, urosome setose . . . . . Austrocrangonyx  
 Gnathopod 2 larger than gnathopod 1, urosome with only 4 dorsal spines. . . . . Hurleya

## Geographical Key I (Paleotropics)

1. Coxal gills with accessory lobes . . . . . Anisogammarids  
 Coxal gills lacking accessory lobes . . . . . 2
2. Telson fleshy . . . . . 3  
 Telson not fleshy . . . . . 6
3. Uropod 3 biramous . . . . . Paracorophium  
 Uropod 3 uniramous. . . . . 4
4. Mandibular palp 2-articulate. . . . . Corophium  
 Mandibular palp 3-articulate. . . . . 5
5. Male gnathopod 1 carpochelate, coxae short, uropod 3 ramus longer than peduncle. . . . . Grandidierella  
 Male gnathopod 1 not carpochelate, coxae long, uropod 3 ramus as long as peduncle . . . . . Stenocorophium

6. Telson entire, compared to pereopods 5 and 6,  
 pereopod 7 greatly elongated with long dactyl . . . . . 7  
 Telson cleft, pereopod 7 not as above . . . . . 8
7. Urosomites separate . . . . . Metoediceropsis and Monoculodes  
 Urosomites 2-3 fused together . . . . . Paracalliope
8. Gnathopods both mittenform. . . . . 9  
 One gnathopod not mittenform. . . . . 10
9. Gnathopods 1-2 wrists alike, moderately lobate,  
 coxa 4 with sharp posterior lobe. . . . . Indoniphargus  
 Gnathopodal 2 wrists diverse, gnathopod 1  
 not lobate, coxa 4 unlobate, gnathopod 2 with lobe. . . . Eriopisella
10. Telson forming a shield . . . . . 11  
 Telson not forming a shield . . . . . 12
11. Uropod 1 ordinary, article 2 on pereopods 5-7 not lobate. . . Rotomelita  
 Uropod 1 reduced, outer ramus naked dorsally,  
 article 2 on pereopods 5-7 lobate. . . . . Nainaloa
12. Uropod 3 variramous . . . . . 13  
 Uropod 3 parviramous. . . . . 14
13. Inner lobes of lower lip present. . . . . Psammogammarus (part)  
 Inner lobes of lower lip absent. . . . . [Hadziids]
14. Mandibular palp less than 3-articulate. . . . . 15  
 Mandibular palp 3-articulate. . . . . 16
15. Mandibular palp 1-articulate, inner lobes of lower lip absent,  
 article 2 of antenna 1 shorter than article 1. . . . . Psammoniphargus  
 Mandibular palp 2-articulate, inner lobes of lower lip  
 present, article 2 of antenna 1 longer than article 1. . . . Tegano
16. Article 2 of uropod 3 absent. . . . . Paraniphargus  
 Article 2 of uropod 3 present . . . . . 17
17. Basal articles of antenna 2 flagellum fused together . . . Victoriopisa  
 Basal articles of antenna 2 free. . . . . 18
18. Uropod 3 peduncle elongate. . . . . 19  
 Uropod 3 peduncle not elongate. . . . . 20
19. Gnathopod 2 enfeebled, wrist elongate, maxilla 1  
 outer plate with 6 spines, maxilliped  
 dactyl lacking nail. . . . . Galapsiellus  
 Gnathopod 2 moderately developed, wrist short,  
 maxilla 1 outer plate with 7 spines,  
 maxilliped dactyl with nail. . . . . Anchialella
20. Uropod 3 article 2 not elongate,  
 some coxae long, coxa 4 excavate . . . . . 21  
 Uropod 3 article 2 elongate, all  
 coxae short, coxa 4 unexcavate . . . . Psammogammarus (Eriopisa, etc.)
21. Coxa 1 tapering and significantly  
 smaller than coxa 2. . . . . Maleriopa  
 Coxa 1 not as above . . . . . Melita



## APPENDIX VI Handbook of World Gammaridans

All Gammaridan genera are presented in handbook fashion, with complete primary synonymies, diagnoses, descriptions, relationships, comments, lists of species and distributions. The order follows that in the "checklist", Appendix IV.

Primary synonymies encompass the minimum list of synonyms limited to the crucial references. These are taken but condensed from a master catalogue to the literature of Gammarideans owned by the authors. A full printing of that catalogue is contemplated.

Generic diagnoses are presented in condensed format in which each diagnosis of complete form is compared to a master common diagnosis (printed below) and congruencies eliminated. Hence, only exceptions to the master diagnosis are printed for each genus and these represent the diagnostic characters. This method saves countless replications of characters common to most Gammaridans. Some of these diagnoses resemble those in a pool created by J.L. Barnard and G.S. Karaman for their forthcoming monograph on the genera of Gammaridea, but the Baikalian diagnoses are of special form designed by Barnard and Barnard and are recognized by the code word "Baikal".

Generic diagnoses account for variability within each genus only to the extent that generic characters might be compromised. Relationships generally are discussed only in descending evolutionary sequence, the genera being arranged as closely as possible in sequences in which the later genera are assumed to be descendents of the earlier genera. Relationships are therefore confined only to immediately surrounding taxa and further affinities must be sought in keys or by cross comparing diagnoses.

Genera are organized loosely into clusters and named with a proper noun ending in "ids", thus Gammarids, Gammaroids, Crangonyctoids, Crangonyctids, none of which are to be used in Linnaean Nomenclature. The diagnoses of these clusters and the keys are not necessarily mutually exclusive as it is impossible to define more than a few groups in absolute terms. The phrases within these particular diagnoses are not in anterior to posterior morphological order but are arranged in an order of descending importance as clues to identification or as quick reminders of the morphological grade being discussed. They are not congruent as they mention only characters of diagnostic value which are in contrast to the basic Gammaridan diagnosis.

Keys and Diagnoses to Groups of Taxa are not intended to be definitive to family level; hence, there is no family Bogidiellidae because the species grouped there overlap with Crangonyctoids, Gammaroids and Hadzioids.

Species are listed alphabetically with primary original references and important modern references. Distributional numbers are cited within brackets according to the geographic system discussed in Appendix III.

Numbers or letters or codes in quotation marks added in front of species names are reference marks to distributional maps; these symbols may be numbers (1,2,3,4,), letters (A,B,C,D,a,b,c,d,) or codes and phrases ("ma", "pu").

Coxal gills are cited per segment, thus "coxal gills 2-6" refers to 5 pairs on segments 2,3,4,5,6.

## Master Description of Gammaridan

Body ordinary, neither thick nor thin, laterally compressed, not depressed, urosomites free. Rostrum short, lateral cephalic lobes protruding, subquadrate, marked below by medium sinus at anteroventral corner of head, corner square or rounded but scarcely protruding. Eyes present (ommatidial).

Antenna 2 ordinary, neither immensely larger than antenna 1 nor extremely smaller; peduncular articles 4-5 dominant, subequally long, flagellum longer than article 5 of peduncle.

Labrum broader than long, entire, rounded. Mandibular incisor toothed, molar triturative, rakers well developed and numerous (4+). Palp of maxilla 1 biarticulate, outer plate of maxilliped medially spinose (only); palp article 3 unlobed, dactyl shorter than 3, unguiform, nail medium.

Pereopods 3-4 ordinary, thin, poorly setose.

Pleopods ordinary, rami multiarticulate.

## List of Taxa

## Corophiidan Section Group

Corophioidea. For structure see J.L. Barnard (1973) or alternatively Bousfield (1973).

Note possibility that Sections II and III and remotely IV of Gammaridans could be placed here.

## Gammaridan Section Group

## I. Sternobranchiate Groups (Crangonyctoids)

Either thorax with sternal gills or palms of gnathopods packed with bifid spines, or calceoli paddle-shaped.

Plesiomorphically with gnathopods bearing heavily spinose palms, spines often bifid; dorsal pleonal setation plesiomorphically confined transversely to posterior margins of segments; sternal gills occasionally absent. Taxa lacking sternal gills and/or lacking coxal gill 7 but bearing densely spinose palms of gnathopods are referable either to the Crangonyctoids or the Hadzioids. Those with elongate uropod 3 are Hadzioids, those with strongly reduced uropod 3 are Crangonyctoids.

Recognizable only by presence of sternal gills, or with bifid gnathopodal spines combined with severely reduced uropod 3.

Austroniphargids are considered to be apomorphic Crangonyctoids with loss of sternal gills and dense bifid palmar spines on gnathopods but marked by coalescence of urosomites. Bogidiellids are a mixture of apomorphic Crangonyctoids having lost sternal gills, bifid gnathopodal spines but marked by one or more of the following characteristics: pygidization, dominance of gnathopod 1, thin bodies, reduced pleopods, residuality in the southern hemisphere.

Key to the Groups of Crangonyctoids including  
Bogidiellids and Austroniphargids

1. Both sternal gills and bifid palmar spines on gnathopods absent. . . . . 2  
     Either sternal gills or bifid palmar spines on gnathopods  
     present, or taxa if characters absent distributed in  
     freshwaters of southern hemisphere. . . . . 3
2. Urosomites coalesced. . . . . Austroniphargids  
     Urosomites free . . . . . Bogidiellids
3. Uropod 3 aequiramous . . . . . Phreatogammarids  
     Uropod 3 dispariramous. . . . . 4
4. Gnathopods mittenform . . . . . Neoniphargids  
     Gnathopods not mittenform . . . . . 5
5. Palmar spines on gnathopods simple or absent. . . . . 6  
     Palmar spines on gnathopods bifid . . . . . 8
6. Telson entire or scarcely cleft . . . . . 7  
     Telson deeply cleft . . . . . Austrogammarids
7. Uropod 3 parviramous. . . . . Sternophysingids  
     Uropod 3 lacking inner ramus. . . . . Pseudocrangonyctids
8. Coxal gill 2 bifid, male uropod 3 outer ramus  
     multiarticulate . . . . . Allocrangonyctids  
     Coxal gill 2 simple, male uropod 3 outer ramus  
     1-articulate . . . . . Crangonyctids

Phreatogammarids

Crangonyctoids with sternal gills present or absent; coxal gill 2 simple; urosomites free; gnathopods mittenform or not, palmar spines simple, dense to sparse; uropod 3 aequiramous; telson deeply cleft.

Phreatogammarus Stebbing

Figures 6, 8, 11, 18, 19, 23, 47, Map 7

Phreatogammarus Stebbing, 1899c: 427; 1906: 453. (Gammarus fragilis Chilton, 1882, original designation).--Hurley, 1954b: 604.

Body ordinary to slender, urosomites strongly setospinose dorsally. Rostrum absent, lateral cephalic lobes short, truncate, sinus absent. Eyes absent or present.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles = 27:24:6, primary flagellum much longer than peduncle, accessory flagellum 5+ articulate. Antenna 2 ordinary but flagellum elongate.

Ratio of mandibular palp articles = 12:18:15, article 3 almost linear, setae = ACDE or DE. Inner lobes of labium absent, ungaped. Maxillae medially setose, inner plate of maxilla 1 broadly subtriangular, fully setose medially, outer plate with 11 spines, symmetrical. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of medium size, about as broad as long, coxa 1 quadrate, coxa 4 lobed, much longer than coxa 5. Gnathopods various, apparently similar in both sexes in type-species but sexually diverse in other species; type with



large similar gnathopods bearing short lobed wrists; large, elongate ovate hands with very oblique poorly defined and strongly spinose palms; propinquus female with gnathopod 1 enlarged like type but gnathopod 2 very small, wrist elongate, unlobed, hand short, broad, rectangular or trapezoidal, palm transverse, short; helmsi male like type but gnathopod 2 larger than 1; helmsi female with gnathopods feeble, alike, wrists of medium length, weakly lobate, hands small, weakly trapezoidal, weakly expanded, palm oblique, minutely spinose.

Pereopods 5-7 elongate, 5 shorter than 6-7, article 2 ovate, unexpanded, unlobate, tapering, posterior margin serratosetose; dactyls multispinose inferiorly.

Rami of uropods 1-2 extending equally, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 strongly extended, aequiramous, peduncle elongate, rami longer than peduncle, uniarticulate, strongly spinose, almost cylindrical. Telson short, broad, fully cleft, lobes tumid, strongly spinose apically (and dorsally at times).

Coxal gills 2-6, ovate [?pediculate]. Oostegites very broad. When present, sternal gills simple.

Relationship.--Perhaps the most primitive gammarid because of the aequiramous uropod 3 combined with sternal gills.

Species.--31 fragilis (Chilton, 1882) (Hurley, 1954b) [937];

32 helmsi Chilton, 1918 [935];

33 propinquus Chilton, 1907 [938];

New Zealand, freshwater, epigeal to hypogean, 3.

#### Austrogammarids

Crangonyctoids with sternal gills present or rarely absent; coxal gill 2 simple; urosomites free; gnathopods not mittenform, palmar spines simple and sparse; uropod 3 dispariramous, inner ramus present; telson deeply cleft.

#### Key to the Genera of Austrogammarids

1. Gnathopods raptorial and Eusirid, wrists strongly lobate . . . Perthia  
Gnathopods not raptorial, wrists moderately to poorly lobate. . . . . 2
2. Uropod 3 vari- or magniramous. . . . . Austrogammarus (part)  
Uropod 3 parviramous. . . . . 3
3. Gnathopods subequal in size . . . . . Austrogammarus (part)  
Gnathopod 2 enlarged in either male or female . . . . . 4
4. Urosome with only 4 dorsal spines, palms of gnathopods  
(or only male gnathopod 2) elongate. . . . . 5  
Urosome dorsally setiferous, palms of gnathopods  
not elongate . . . . . Paramelita
5. Male uropod 3 [unknown], hands of female gnathopods  
pyriform, article 2 on outer ramus of uropod 3  
vestigial. . . . . Hurleya

Male uropod 3 bearing comb, hands of female gnathopods  
 subrectangular, article 2 on outer ramus of uropod  
 3 large. . . . . Uroctena

Austrogammarus Barnard & Karaman, in press

Figures 6, 13, 17, 19, 23, 33, 41, 44, Maps 6, 7

Austrogammarus Barnard & Karaman, 1983: xx, in press (Gammarus  
australis Sayce, 1901a, original designation).

Urosomites occasionally with transverse posterodorsal setation. Rostrum weak to obsolescent, lateral cephalic lobes weakly projecting, subrounded. Eyes potentially present or absent.

Antenna 1-2 elongate, antenna 1 longer than 2, ratio of peduncular articles = 22:15:7, accessory flagellum 3-6 articulate. Antenna 2 usually bearing paddle-shaped calceoli (at least in male).

Ratio of mandibular palp articles = 7:20:17, article 3 weakly falcate, setae = BDE. Labium lacking inner lobes. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with [?] spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Maxillipedal palp articles 2-3 densely setose laterally or ventrally.

Coxae 1-4 elongate, strongly setose, coxa 1 not expanded below, not prominent, coxa 4 lobate, coxa 5 much shorter than 4. Gnathopods 1-2 of medium size, alike, but male gnathopod 2 slightly enlarged and with shortened wrist, article 5 of gnathopod 1 and female gnathopod 2 as long as article 6, poorly lobed, article 6 alike in both pairs, palms weakly oblique, lacking bifid spines.

Pereopods 5-7 not elongate, article 2 weakly expanded, ovate to pyriform, lobed or unlobed, dactyls not spinose.

Epimera lacking vertical rows of setae on lateral faces. Rami of uropods 1-2 extending subequally, margins spinose, uropod 1 [?with basofacial armaments]. Uropod 3 weakly extended, variramous, peduncle short, outer ramus 2-articulate, article 2 short, inner ramus generally reaching to M. 67 on article 1 of outer ramus in male but only to M. 50 in female. Telson short, cleft to base, lobes tumid, with dorsal and apical spination.

Variants.--Anterior coxae often with posteroventral spines; peduncle of uropod 2 often setose.

Relationship.--Differing from Phreatogammarus in the diverse rami of uropod 3 (they are unequal in size and armaments), short article 1 of mandibular palp and poorly spinose palms of the gnathopods; from Paramelita in the diversity of male and female gnathopods, longer inner ramus of uropod 3, more strongly setose maxillae and lack of vertical facial rows of epimeral setae. Differing from Crangonyx in the elongate inner ramus of uropod 3, fully cleft telson and absence of bifid spines on the gnathopodal palms.

Species.--1 australis (Sayce, 1901a) [943];

4 haasei (Sayce, 1902) [943];

Australia, Victoria, epigean, 2.

Austrocrangonyx Barnard and Barnard, new genus

Maps 6, 7

Type-species.--Gammarus barringtonensis Chilton, 1916, original designation).

Like Austrogammarus but uropod 3 fully parviramous; maxillae poorly setose medially.

Variants.--Accessory flagellum only 3-4 articulate; inner plate of maxilla 1 with only 3-7 setae; article 2 on outer ramus of uropod 3 present or absent; eyes occasionally absent.

Relationship.--Differing from Paramelita in the similarity of male and female gnathopods and absence of facial epimeral setae.

Species.--2 antipodeus (G.W. Smith, 1909b) [941];

3 barringtonensis (Chilton, 1916a) [943];

5 mortoni Thomson, 1893) [941];

15 ?niger (G.W. Smith, 1909b) [941];

6 ripensis (G.W. Smith, 1909b) [941];

Southeastern Australia and Tasmania, epigean to hypogean,  
4 species and one probable species.

Hurleya Straskraba

Map 7

Hurleya Straskraba, 1966: 291 (Hurleya kalamundae Straskraba, 1966, monotypy).

Body somewhat slender, urosomites 2-3 each with dorsolateral spine each side. Rostrum obsolescent, lateral cephalic lobes protuberant, mammilliform, sinus absent. Eyes absent.

Antenna 1 elongate, longer than antenna 2, ratio of peduncular articles = 21:15:10, primary flagellum longer than peduncle, accessory flagellum 5-articulate. Antenna 2 short and slender.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative], ratio of palp articles = ?:20:10, article 3

[?linear or weakly falcate], setae = DE. Inner lobes of labium absent, no gape. Maxillae poorly setose medially, inner plate of maxilla 1 elongate-oval, with one apical and one apicomedial setae, outer plate with [?7] spines, palps 2-articulate, asymmetric. Inner plate of maxilla 2 with one stout medial seta, otherwise no facial setae, medial margin hairy.

Coxae of medium size, weakly setose, about as broad as long, coxa 1 shorter than 2 but unproduced, coxa 4 weakly lobate, longer than coxa 5. Gnathopods of female medium to large, gnathopod 2 much larger than 1 but generally alike, wrists short and moderately lobate, hands large, pyriform, palms strongly oblique but well defined, armed with simple spines, dactyls long; males unknown. Pereopods 5-7 of medium size to elongate progressively, article 2 almost unexpanded, ovate, unlobate (7) or with weakly produced corner on pereopods 5-6, posterior margins moderately serratosetulose.

Outer rami of uropods 1-2 slightly shortened [armaments of these uropods unknown]. Uropod 3 not extended, short, parviramous, inner ramus extremely small, outer ramus moderately spinose, with vestigial article 2. Telson short, broad, cleft about halfway, lobes tapering, sparsely spinose apically.

Coxal gills [?2-6, ovate, pediculate?]. Oostegites broad. Sternal gills [unknown].

Relationship.--Males unknown; very close to females of Uroctena but hands of gnathopods pyriform instead of subrectangular and article 2 on outer ramus of uropod 3 vestigial instead of well developed.

Like Ceradocopsis but gnathopods of similar form, outer plate of maxilliped ordinarily spinose.

Species.--27 kalamundae Straskraba, 1966 [948];

S.W. Australia, hypogean, 1.

#### Uroctena Nicholls

Figures 11, 17, 19, Map 7

Uroctena Nicholls, 1927b: 106 (Uroctena affinis Nicholls, 1927b, original designation = U. westralis Chilton, 1925b). [Italicized items taken from setosa].

Body subvermiform, urosomites weakly setose dorsally. Lateral cephalic lobes strongly protruding, narrowing then truncate, sinus large. Eyes absent (or vestigial and yellow, this possibly glandular material).

Antennae elongate, antenna 1 slender and much longer than antenna 2, ratio of peduncular articles = 19:16:9, flagellum longer than peduncle, accessory flagellum 4-6 articulate. Antenna 2 ordinary in females, very stout in males (like females of Corophium).

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative], ratio of palp articles = 7:27:20, article 3 linear or weakly clavate, setae = ADE. Inner lobes of labium absent, weak

gape present. Maxillae poorly setose medially, inner plate of maxilla 1 ovate, with one apical and 2 apicomедial setae, outer plate with 7 spines, palps asymmetric. Inner plate of maxilla 2 with 2 setae in oblique facial row, medial margin hairy. Outer plate of maxilliped medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail.

Anterior coxae of medium size, poorly to moderately setose, about as broad as long, overlapping, coxa 4 scarcely lobate, longer than coxa 5. Gnathopod 2 of male enlarged, wrist short, strongly to weakly lobed, hand pyriform, palm oblique, sculptured and well defined, or smooth and poorly defined, dactyl stout, short, curved; gnathopod 1 of male small, wrist of ordinary length, hand of same length, trapezoidal, apically expanded, palm slightly oblique, short, exceeding short stout dactyl; female gnathopods small, gnathopod 2 like male or palm not overextended, gnathopod 2 scarcely larger than 1, wrist short, weakly lobed, hand subrectangular, palm oblique, defined, short; gnathopods strongly setose, especially anteriorly (setosa only).

Pereopods 5-7 of medium size, progressively slightly longer, article 2 moderately expanded, untapering, with moderately protuberant posteroventral corner, posterior margin minutely serratosetulate; dactyls short, with several inferior spinules.

Pleopods [?ordinary]. Rami of uropods 1-2 marginally spinose, outer rami scarcely shortened [?lacking basofacial armaments]. Uropod 3 weakly extended, parviramous, outer ramus of medium extent, moderately spinose, article 2 large, between one third and one half as long as article 1, in males article 1 swollen and strongly combed medially. Telson of ordinary length, cleft halfway to two thirds, lobes weakly tapering apically and dorsally spinose and setose.

Coxal gills [?2-6], broad. Oostegites [?broad]. Sternal gills fimbriate.

Variants.--Antenna 2 poorly setose (westralis) heavily setose (setosa); article 2 of male gnathopod 2 with numerous giant spines (westralis).

Relationship.--Like Hurleya but hands of female gnathopods subrectangular (not pyriform) and article 2 on outer ramus of uropod 3 large; (male of Hurleya unknown); differing from Neoniphargus in the diverse gnathopods, one of which has unlobed wrist; otherwise, the male of Uroctena is very strange, with pediform antenna 2 and combed uropod 3.

Species.--23 setosa Nicholls, 1927b [948];

24 yellandi Nicholls, 1927c [948];

25 westralis (Chilton, 1925b) (= affinis Nicholls, 1927b) [948];

S.W. Australia, (epigean to) hypogean, 3.

Perthia Straskraba

Figures 14, 19, Map 7

Perthia Straskraba, 1964: 133 (Neoniphargus branchialis Nicholls, 1924, original designation).

Urosomite 2 weakly setose dorsolaterally. Lateral cephalic lobes broad, truncate, sinus [?weak].

Antennae of medium extent, antenna 1 scarcely longer than 2, ratio of peduncular articles = 24:18:13, primary flagellum shorter than peduncle, accessory flagellum 2-articulate. Article 5 of antenna 2 much shorter than 4, flagellum shorter than articles 4-5 of peduncle together, with paddle-shaped calceoli in male.

Mandibular molar small, nontritulative, without seta, ratio of palp articles = 10:22:16, article 3 scarcely subfalcate, setae = BDE. Inner lobes of labium very small, buds separating and causing gape of outer lobes. Maxillae not medially setose, inner plate of maxilla 1 ovate, with 2 apical setae, outer plate with 7 spines, palps 2-articulate [symmetric]. Inner plate of maxilla 2 lacking facial and medial setae. Outer plate of maxilliped small but medially spinose, dactyl weakly unguiform, with nail.

Coxae large, ordinary, coxa 4 lobed. Gnathopods large, subchelate, alike, of Eusirid structure, wrist short, with narrow lobe, hand attached to produced narrow apex of wrist, hands ovate or subcircular, palms weakly oblique, long, weakly or minutely armed, dactyls long.

Pereopods 5-7 elongate, pereopod 6 longest, article 2 expanded, weakly pyriform, posterior margin minutely serratosetulate, convex, posteroventral corners weakly produced; dactyls multispinulose on inferior margin.

Rami of uropods 1-2 extending equally, margins spinose except for outer ramus of uropod 2, basofacial armaments [?unknown]. Uropod 3 strongly extended, parviramous or variramous, outer ramus elongate, setospinose, article 2 small. Telson very elongate, cleft about three fourths, lobes narrow, tapering, apically and dorsally spinose.

Coxal gills 2-6, ovate, weakly pediculate. Oostegites slender. Sternal gills 2-5, fimbriate.

Variants.--Uropod 3 variramous, inner ramus about half as long as outer ramus, strongly setose medially (acutitelson, possibly distinct genus).

Relationship.--The only southern Crangonyctid with Eusirid gnathopods.

Species.--28 acutitelson Straskraba, 1964 [948];

29 branchialis (Nicholls, 1924) [948];

S.W. Australia, epigean, 2.

Paramelita Schellenberg

Figures 4, 6, 11, 17, 19, 43, Maps 9, 10

Paramelita Schellenberg, 1926: 367 (Paramelita ctenodactyla Schellenberg, 1926, monotypy, = Gammarus capensis K.H. Barnard, 1916).

Urosomites occasionally with transverse dorsal setation. Rostrum obsolescent, cephalic lobes weakly to moderately projecting, falciform or subrounded. Eyes present or vestigial.

Antennae 1-2 elongate, antenna 1 longer than antenna 2, ratio of peduncular articles = 21:13:6; accessory flagellum 3-5 articulate. Antenna 2 ordinary or often pediform, hence resembling Corophium, with articles 3-4 swollen or produced; calceoli [not reported].

Labrum longer than broad. Ratio of mandibular palp articles = 4:22:19, article 3 falciform, setae = A,B,D,E. Labium lacking inner lobes. Inner plates of maxillae poorly or not setose medially. Inner plates of maxilla 2 with 5-6 mostly apical setae, outer plate with 9-10 spines, palps asymmetric. Inner plate of maxilla 2 lacking oblique facial row and lacking medial setae (except "hairs"). Plates of maxilliped ordinary, outer not reaching apex of palp article 2; palp articles 2-3 setose laterally.

Coxae 1-4 of medium length, setose, coxa 1 not expanded and not prominent, coxa 4 weakly lobed. Gnathopods 1-2 of medium size, alike, but gnathopod 2 slightly enlarged; article 5 of both pairs shorter than article 6, weakly lobed, article 6 alike and subquadrate in both pairs except large on gnathopod 2, palms weakly oblique, lacking bifid spines.

Pereopods 5-7 not elongate, 5 slightly shorter than 7, article 2 ovate to pyriform, lobate or not lobate, dactyls spinose or setulose on inferior margin.

Uropods 1-2 ordinary, though peduncles occasionally setose (very unusual character), basofacial spine on uropod 1 [unknown]. Uropod 3 elongate, peduncle short, parviramous but inner ramus not always scale-like, often exceeding M.20 on article 1 of outer ramus, article 2 of outer ramus short to vestigial. Telson deeply cleft, with dorsal and apical setation and spination.

Coxal gills 2-7 [size unknown]. Sternal gills simple, 2-7, often in multiples. Oostegites "large".

Variants.--Epimera [?always] with ventrofacial setation arranged in vertical rows. Male pereopod 3 rarely subchelate.

Relationship.--Differing from Crangonyx in the absence of bifid spines on gnathopodal palms and from Austrogammarus in the shorter gnathopodal wrists, lack of sexual diversity in gnathopods, and the shorter inner ramus of uropod 3.

Species.--41 aurantius (K.H. Barnard, 1927) [917];

42 auricularius (K.H. Barnard, 1916) [917];

43 barnardi Thurston, 1973 [917];

- 44 capensis (K.H. Barnard, 1916 (= ctenodactyla Schellenberg, 1926) [917];  
45 crassicornis (K.H. Barnard, 1916) [917];  
46 granulicornis (K.H. Barnard, 1927) [917];  
47 kogelensis (K.H. Barnard, 1927) [917];  
48 nigroculus (K.H. Barnard, 1916) [917];  
49 persetosus (K.H. Barnard, 1927) [917];  
50 seticornis (K.H. Barnard, 1927) [917];  
51 spinicornis (K.H. Barnard, 1927) [917];  
52 tulbaghensis (K.H. Barnard, 1927) [917];

South Africa, epigeal and weakly hypogean, 12.

#### Neoniphargids

Crangonyctids with sternal gills usually present; coxal gill 2 simple, urosomites free; gnathopods mittenform, palmar spines dense and bifid; uropod 3 parviramous; telson deeply cleft.

Protocrangonyx debateably in this group, therefore key not constructed.

#### Neoniphargus Stebbing

Figures 2, 6, 9, 14, 19, Maps 6-8

Neoniphargus Stebbing, 1899c: 424; 1906: 404 (Neoniphargus thomsoni Stebbing, 1899c, original designation, = Niphargus montanus Thomson, 1893, homonym).

Unimelita Sayce, 1901a: 237 (Unimelita spenceri Sayce, 1901a, here selected).

Type-species poorly described, following description composed from several species:

Body slender or ordinary. Rostrum obsolescent, lateral cephalic lobes short, triangular or rounded, sinus present or absent (fultoni). Eyes present (or absent).

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 26:18:14, primary flagellum longer than peduncle, accessory flagellum 2-articulate (or 1-4). Antenna 2 ordinary, but flagellum slightly shorter than articles 4-5 of peduncle, (with club-shaped calceoli, = nichollsi).



Labrum [broader than long, entire, rounded, = spenceri]. Ratio of mandibular palp articles = 4:13:12, article 3 weakly falcate or almost linear, setae = (A)DE. Inner lobes of labium [absent, gape moderate, = spenceri]. Maxillae not medially setose, inner plate of maxilla 1 ovate, with 2 apical setae, outer plate with 7 spines, palp [asymmetric, = obrieni]. Inner plate of maxilla 2 lacking facial and medial setae (only with medial hairs).

Maxilliped palp article 3 lobed or unlobed, dactyl shorter than 3, unguiform, with small nail.

Coxae ordinary, moderately setose ventrally, coxa 1 rectangular or weakly tapering, coxa 4 lobed. Gnathopods feeble, almost mittenform, alike and not sexually dimorphic, wrists short and strongly lobed, hands broadly rectangular or trapezoidal, thus expanded apically, palms almost transverse, short, armed with bifid spines, often posterior margins of hand at palmar corner bulging (and pubescent).

Pereopods 5-7 ordinary, not elongate, 5 scarcely shorter than others, article 2 weakly to moderately expanded, weakly to moderately lobate, posterior margin minutely serratosetulose; dactyls with one inferior setule.

Rami of uropods 1-2 extending equally, marginally spinose, [basofacial armaments unknown]. Uropod 3 not extended (or extended in spenceri, etc.), parviramous, outer ramus short (or elongate), article 2 absent (or vestigial). Telson short or of ordinary length, cleft halfway or more, lobes weakly to strongly tapering, apically spinose.

Coxal gills [?2-6, ovate, slender, ?pediculate]. Oostegites [?slender]. Sternal gills [?universally present, fimbriate in obrieni].

Variants.--Outer rami of uropods 1-2 slightly shortened (obrieni); coxal gills narrow (obrieni); oostegites broad (obrieni); eyes vestigial (obrieni); urosomites 2-3 each with dorsolateral spine on each side (fultoni); dactyls of pereopods with 3 inferior setules (spenceri).

Relationship.--Differing from Austrogammarus and Paramelita in the feeble gnathopods with strongly lobed wrists; from Austrogammarus in the telson not being fully cleft.

Species.--11 alpinus G.W. Smith, 1909b [941];

12 exiguus G.W. Smith, 1909b [941];

13 fultoni Sayce, 1902 [993];

14 nichollsi Straskraba, 1964 [998];

16 obrieni Nicholls, 1927a [943];

17 spenceri (Sayce, 1901a) [943];

18 thomsoni Stebbing, 1899c (= montanus Thomson, 1893) [941];

19 tasmanicus G.W. Smith, 1909b [941];

20 wellingtoni G.W. Smith, 1909b [941];

21 yuli G.W. Smith, 1909b [941];

Victoria and southwestern Australia, Tasmania, epigean to hypogean, 10.

Protocrangonyx Nicholls

Figures 14, 18, 20, 23, Map 7

Protocrangonyx Nicholls, 1927d: 72 (Protocrangonyx fontinalis Nicholls, 1927d, monotypy).

Body subvermiform, pleonites weakly setose dorsally. Rostrum absent, lateral cephalic lobes narrow, strongly protruding, subacute. Eyes absent.

Antennae of medium extension, antenna 1 longer than antenna 2, ratio of peduncular articles = 21:12:6, primary flagellum longer than peduncle, accessory flagellum 3-articulate. Antenna 2 ordinary though basal articles of flagellum elongate and therefore peduncle blending into flagellum.

Mandibular molar large [?tritulative], ratio of palp articles = 9:18:16, article 3 linear, setae = DE. Inner lobes of labium absent, no gape. Maxillae not medially setose, inner plate of maxilla 1 very small, ovate, with one apical seta, outer plate with 9 spines, palps [?2-articulate], asymmetric. Inner plate of maxilla 2 lacking facial setae, with medial hairs. Inner plate of maxilliped unusually narrow, with 3 stout apical spines closely crowded, outer plate with crowded apical spination, inner margin naked (though described as being medially setose), dactyl shorter than 3, scarcely unguiform, with nail.

Coxae short, broader than long, ventral setae sparse and short, no distinction between coxa 4 and 5, 4 unlobed, coxa 1 hemicircular. Gnathopods small, alike, weakly mittenform, wrist short, weakly lobed, hand short, trapezoidal, palm oblique, sparsely and finely setose, dactyl short.

Pereopods 5-7 short, progressively longer, article 2 ovate to ovato-linear progressively, almost naked, unlobed, article 6 weakly setospinose, dactyls short, with one inferior setule.

Pleopods small but biramous, rami unequal, pleopod 3 shortened. Outer rami of uropods 1-2 shortened, all rami [?spinose] [written as so but our doubt entertained] [without basofacial armament]. Uropod 3 not extended, very short, parviramous, inner ramus extremely small, naked, outer ramus short, moderately spinose, 1-articulate. Telson short, broad, entire, with 2 pairs of apical spines.

Coxal gills 2-6, very small. Oostegites [unclear]. Sternal gills simple.

Relationship.--Differing from Neoniphargus in the unclleft telson, weaker lobation on wrists of gnathopods; differing from Sternophysinx in equality and small size of gnathopods; from Pseudocrangonyx in the presence of an inner ramus on uropod 3 and the small equal gnathopods.

See Paracrangonyx.

Species.--26 fontinalis Nicholls, 1927d [948];

western Australia, hypogean, 1.

### Sternophysingids

Crangonyctoids with sternal gills; coxal gill 2 simple; urosomites free; gnathopods not mittenform, palmar spines simple; uropod 3 dispariramous, inner ramus present; telson entire or poorly cleft.

#### Key to the Genera of Sternophysingids

Wrist of gnathopod 2 unlobed, outer ramus of uropod 3 very elongate, sternal gills simple. . . . . Sternophysinx  
 Wrist of gnathopod 2 weakly lobed, broad, extended, outer ramus of uropod 3 only as long as peduncle, some sternal gills bifid . . . . . Falklandella

#### Sternophysinx Holsinger and Straskraba

Figures 5, 11, Map 18

Sternophysinx Holsinger and Straskraba, 1973: 70 (Eucrangonyx robertsi Methuen, 1911a, original designation).

Body slender, urosomites sparsely setose dorsally. Rostrum obsolescent, lateral cephalic lobes protruding, rounded, sinus appearing absent in Methuen, 1911a. Eyes absent.

Antennae of medium extension, antenna 1 longer than 2, ratio of peduncular articles = 21:14:10, primary flagellum about as long as or much longer than peduncle, accessory flagellum 2-articulate. Antenna 2 short or ordinary, flagellum almost as long as articles 4-5 of peduncle together, gland cone large.

Ratio of mandibular palp articles = 6:9:9 (filaris = 7:16:14), article 3 weakly falcate, setae = ACDE. Inner lobes of labium faint, causing gape. Maxillae variously setose medially, inner plate of maxilla 1 subrectangular to ovate, with 2 apical setae, outer plate with 9-7 spines, palp ordinary. Inner plate of maxilla 2 with short oblique row of facial setae. Maxilliped dactyl about as long as article 3.

Coxae short, broader than long or as broad as long, coxa 1 trapezoidal, coxa 4 unlobed, posterior margin scarcely concave. Gnathopods large, hands elongate, ovate or pyriform, palms very oblique, poorly defined, spinose, spines simple, dactyls long, gnathopod 2 larger than 2, wrist short, weakly lobed, wrist of gnathopod 2 longer and unlobed or poorly lobed.

Pereopods 5-7 elongate, progressively longer, article 2 moderately expanded, posteroventrally lobate (or not), posteriorly serratosetulate, articles 5-6 often with long thread-like setae; dactyls multisetulose or not on inferior margins.

Rami of uropods 1-2 extending equally or outer rami slightly shortened, all rami marginally spinose, peduncles without basofacial armaments.

Uropod 3 extended, parviramous, inner ramus especially small, outer ramus elongate, article 2 absent or so vestigial as to be hidden among apical spines of article 1. Telson short, emarginate, each lobule with 2+ apical spines, lateral setule pairs apical.

Coxal gills 2-6 narrow, pediculate, 2-articulate. Oostegites narrow. Sternal gills simple.

Relationship.--Differing from its sympatriot Paramelita in the poorly cleft telson, enlarged gnathopod 1; differing from Protocrangonyx and Paracrangonyx in the enlarged gnathopod 1. See Falklandella.

Species.--21 filaris Holsinger and Straskraba, 1973 [917];

22 robertsi (Methuen, 1911a) (Holsinger and Straskraba, 1973) [917];

23 transvaalensis Holsinger and Straskraba, 1973 [917];

South Africa, caves and springs, 3.

#### Falklandella Schellenberg

Figures 9, 11, 14, 16, 18, 20, Map 18

Falklandella Schellenberg, 1931a: 205 (Falklandella obtusa Schellenberg, 1931a, selected by Bousfield, 1977).

Body [?slender]. Rostrum obsolescent, lateral cephalic lobes weak, rounded, weak sinus present. Eyes [?absent].

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 24:12:8, primary flagellum much longer than peduncle, accessory flagellum 1-articulate. Antenna 2, flagellum much longer than peduncle.

Mandibular molar [?tritulative], ratio of palp articles = [?5:13:11], article 3 [?weakly falcate, setae = ?ADE]. Inner lobes of labium absent. Maxillae fully setose medially, inner plate of maxilla 2 [?ovate], with 7 medial setae, outer plate with 11 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped [?medially spinose].

Coxae ordinary, coxa 1 subretangular, coxa 4 lobate. Gnathopods of medium size, alike in the sexes, wrists lobate, gnathopod 1 larger than 2, wrist short, hand slightly enlarged, weakly pyriform, palm very oblique, slightly defined, setose, wrist of gnathopod 2 elongate, hand short, rectangular, palm almost transverse, short.

Pereopods 3-4 of female ordinary; male pereopod 3 prehensile, article 5 short and lobate, hand attached to narrow anterior part of wrist, inflated in middle, combed, dactyl almost as long as hand, reverted and folding across comb. Pereopods 5-7 slender, article 2 ovate, somewhat tapering, not lobate.

Pleopods [?ordinary]. Rami of uropods 1-2 extending equally or outer ramus of uropod 2 shortened, all rami marginally spinose, basofacial armaments [unknown]. Uropod 3 not extended, very short, outer ramus uniarticulate, scarcely longer than peduncle, spinose, inner ramus about half as long as outer, moderately spinose. Telson short, broader than

long, apically emarginate, armed with 2 apical setules (type) or 3 on each lobe.

Coxal gills 2-6, "flat". Oostegites narrow. Sternal gills mostly bifid, though simple on sternite 7, or bifid only on middle sternites.

Relationship.--Like Sternophysinx but wrist of gnathopod 2 lobate, some sternal gills bifid, outer ramus of uropod 3 very short.

Species.--33 cuspidata Schellenberg, 1931a [831F];

34 obtusa Schellenberg, 1931a [831F];

Falkland Islands, freshwater, ?emergent hypogean, 2.

#### Crangonyctids

Crangonyctoids with sternal gills present or absent; coxal gill 2 simple; urosomites free or coalesced; gnathopods of various sizes, palmar spines usually dense and bifid; uropod 3 dispariramous, inner ramus present or absent; telson cleft or entire.

#### Key to the Genera of Crangonyctids

1. Inner ramus of uropod 3 absent. . . . . Stygobromus  
Inner ramus of uropod 3 present . . . . . 2
2. Outer ramus of uropod 3 elongate . . . . . Crangonyx and Paleogammarus  
Outer ramus of uropod 3 short . . . . . Bactrurus

#### †Paleogammarus Zaddach (FOSSIL)

Paleogammarus Zaddach, 1864: 10 (Paleogammarus sambiensis

Zaddach, 1864, monotypy).--Stebbing, 1906: absent.--Hurley, 1973: 215.--Holsinger, 1977c: 255.

Theoretical genus, poorly described, possibly synonym of Crangonyx. All characters possible described. Body ordinary, urosomites free, with transverse spination. Rostrum weak or absent, lateral cephalic lobes quadrate or subrounded, sinus weak. Eyes present.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 14:10:7, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 ordinary [calceoli unknown].

Labrum, mandibles, labium, maxillae, most of maxilliped [unknown]; maxillipedal palp 4-articulate, dactyl unguiform.

Coxae elongate, coxa 1 rectangular, coxa 4 lobate.

Gnathopods [poorly known].

Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 expanded, ovate, lobate; pereopod 6 longest (not diagnostic). Epimera acuminate.

Pleopods [unknown]. Rami of uropods 1-2 extending evenly or outer rami slightly shortened, rami marginally spinose. Uropod 3 extended, [apparently parviramous], outer ramus 1-articulate, elongate. Telson [unknown].

Coxal gills [unknown]. Sternal gills [unknown]. Oostegites [unknown].

Variants.-- Telson deeply cleft (balticus).

Relationship.--For all practical purposes these fossil species might as well be put in Crangonyx. Unlike all but a few, these species probably have a deeply cleft telson.

Species.--balticus Lucks, 1928 [Baltic amber];

danicus Just, 1974 [Baltic amber];

sambiensis Zaddach, 1864 [Baltic amber];

fossil, Baltic amber, 3 (not counted in world totals).

#### Crangonyx Bate

Figures 17, 19, 21, Maps 11-13

Sperchius Rafinesque, 1820: 6 (Sperchius lucidus Rafinesque, 1820, monotypy, suppressed by Bousfield and Holthuis, 1969).

Crangonyx Bate, 1859b: 240 (Crangonyx subterraneus Bate, 1859b, monotypy).--Stebbing, 1906: 370.--Holsinger, 1972: 28.

Eucrangonyx Stebbing, 1899c: 423 (Crangonyx gracilis S.I. Smith, 1871, selected by Chevreux and Fage, 1925).-- Stebbing, 1906: 388.

†? Paleogammarus Zaddach, 1864: 10 (fossil, see above).

Urosomites free, poorly setose dorsally or naked. Rostrum weak, lateral cephalic lobes subrounded, often weak, sinus weak or absent. Eyes absent or present.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 18:16-18:8-10, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 male often with paddle-shaped calceoli.

Ratio of mandibular palp articles = 6:17:16, article 3 weakly falcate or hammer shaped, setae = ACDE. Inner lobes of lower lip small or obsolescent, gape absent. Maxillae fully to moderately setose medially, inner plate of maxilla 1 with 2-8 apicomedial setae, outer plate with 6-8 spines, palps symmetrical. Inner plate of maxilla 2 with or without oblique facial row of setae, often not medially setose. Outer plate of maxilliped medially setose, article 3 of palp unlobed or weakly lobed, dactyl shorter or as long as 3, with nail.

Coxae ordinary to medium in extension, moderately to poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods various, usually gnathopod 1 dominant, both pairs usually slightly diverse, generally wrist of gnathopod 1 short, of gnathopod 2 slightly longer, poorly lobate or unlobate, hands medium to large, generally ovate, often hammer-like, palms oblique to transverse, densely armed with bifid spines; occasionally gnathopods small or gnathopod 1 smaller than 2.

Article 2 of pereopods 5-7 weakly to moderately expanded, weakly lobate or not, occasionally with large teeth, poorly setose posteriorly, dactyls often multispinose or setose.

Outer rami of uropods 1-2 occasionally slightly shortened, or curled, all rami marginally spinose, peduncle of uropod 1 lacking basofacial armaments. Uropod 3 weakly extended or not, parviramous, outer ramus medium to long, 1-articulate. Telson short to medium, entire, emarginate or cleft 5/8, apices spinose.

Coxal gills 2-7 or 2-6, ovate, pediculate or not. Sternal gills simple or absent. Oostegites broad.

Variants.--Telson occasionally with dorsal spines; outer ramus of uropod 2 occasionally sigmoid or bent outward, reduced and poorly spinose in males (example, anomalus); pleonite 1 occasionally with sternal gills; spines on gnathopodal palms weak and unnotched (some eastern central females of packardi); these spines absent (paxi); gnathopodal wrists elongate (female hobbsi).

Relationship.--Differing from Phreatogammarus in the parviramous uropod 3; from Neoniphargus and its allies in the non-mittenform gnathopods; from Austrogammarus, Paramelita, Pseudocrangonyx, Bogidiellids and their allies in the dense bifid spination of the gnathopodal palms; additionally from Bogidiellids in the presence of sternal gills on most of the species, any other species without sternal gills being clearly recognized by the dense palmar spination or geographic contiguity to Crangonyxes; from Allocrangonyx in simple coxal gill 2 and simple outer ramus of male uropod 3.

Species.--See Holsinger, 1972;

- 1 alpinus Bousfield, 1963b [188];
- 2 anomalus Hubricht, 1943 [164];
- 3 antennatus Cope and Packard, 1881 (Shoemaker, 1942a) [164];
- 4 arsenjevi (Derzhavin, 1927b, 1930a) [024];
- 5 chlebnikovi Borutzky, 1928 [044];
- 6 dearolfi Shoemaker, 1942a [164];
- 7 ermannii (Milne Edwards, 1840) (Bate, 1862) [dubious] [013];
- 8 floridanus Bousfield, 1963a [172];
- 9 forbesi (Hubricht and Mackin, 1940) (Bousfield, 1958) [174];
- 10 gracilis S.I. Smith, 1871 (Shoemaker, 1933a) (Bousfield, 1958) [165];
- 11 grandimanus Bousfield, 1963a [175];
- 12 hobbsi Shoemaker, (in Ellis, 1941) [172];
- 13 minor Bousfield, 1958 [152];

- 14 obliquus (Hubricht and Mackin, 1940) [172];
- 15 occidentalis Hubricht and Harrison, 1941 (often subspecies of richmondensis) [188];
- 16 packardi S.I. Smith, 1888 (Weckel, 1907) [164];
- 17 paxi Schellenberg, 1942 (Holsinger and Skalski, 1980) [079];
- 18 pseudogracilis Bousfield, 1958, 1973 [152] [755-124];
- 19 richmondensis Ellis, 1940 (Bousfield, 1973) [169]; r. laurentianus Bousfield, 1958 (Holsinger, 1972) [152, 174];
- 20 rivularis Bousfield, 1958 [165N];
- 21 serratus (Embody, 1910) [169];
- 22 setodactylus Bousfield, 1958 (Holsinger, 1972) [174];
- 23 shoemakeri Hubricht and Mackin, 1940 (Holsinger, 1972) [169];
- 24 subterraneus Bate, 1859b (= vej dovskyi Stebbing, 1899c) (Chevreux and Fage, 1925) (Straskraba, 1962) (Hoffman, 1962) [080];
- Palaearctic, scarce (4); Nearctic, epigeal and hypogean, abundant (23 and 1 dubious species and 1 subspecies).

#### Bactrurus Hay

Figures 18-21, Map 12

Bactrurus Hay, 1902b: 430 (Crangonyx mucronatus Forbes, 1876, original designation.--Hubricht and Mackin, 1940: 200.--Shoemaker, 1945: 24.--Holsinger, 1972: 73; 1977: 265.

Body ordinary to subvermiform. Rostrum obsolescent, lateral cephalic lobes rounded, sinus weak. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 19:15:5, flagellum much longer than peduncle, accessory flagellum 2-articulate. Antenna 2 lacking calceoli.

Labrum [?broader than long, entire, subrounded]. Mandibular molar small but triturative, ratio of palp articles = 5:13:14, article 3 weakly falcate, setae = ADE. Inner lobes of labium small. Maxillae moderately setose medially, inner plate of maxilla 1 broadly ovate, with about 5 apicomedial setae, outer plate with 7 spines, palps [?symmetric], 2-articulate. Inner plate of maxilla 2 with oblique facial row of setae. Both plates of maxilliped small, palp large, dactyl almost as long as 3.

Coxae short, broad, scarcely overlapping, weakly setose, coxa 1 ovatotrapezoidal, coxa 4 unlobed (posterior margin simply concave). Gnathopods large, wrists short, weakly lobed, hands ovate or hammer-shaped,



palms oblique, similar, densely armed with bifid spines, gnathopod 1 as large or slightly larger than 2; female gnathopods slightly reduced.

Article 2 of pereopods 5-7 weakly expanded, alike, weakly lobate posteroentrally, poorly setose posteriorly.

Rami of uropods 1-2 extended evenly, marginally spinose, peduncles naked basofacially. Uropod 3 not extended, short, parviramous, inner ramus scale-like, outer ramus short, flabellate, 1-articulate, often strongly spinose. Telson elongate or of ordinary length, weakly cleft or emarginate, strongly spinose or setose apically.

Coxal gills 2-6 ovate, some pediculate. Sternal gills simple. Oostegites moderately expanded.

Variants.--Telson of male very long and cylindrical, about 8-9 times as long as wide (mucronatus); sternal gills occasionally on pleonite 1.

Relationship.--Like Crangonyx but outer ramus of uropod 3 not longer than peduncle, anterior coxae very short, body subvermiform, outer plate of maxilliped medially spinose (setose in Crangonyx) and males lacking paddle-shaped calceoli.

Species.--brachycaudus Hubricht and Mackin, 1940 [174];

hubrichti Shoemaker, 1945 [174];

mucronatus (Forbes, 1876) (Shoemaker, 1945) [174];

middle Nearctic, hypogean, 3.

#### Stygobromus Cope

Figures 2, 9, 11, 17, 18, 20, 21, Maps 13-17, 46

Stygobromus Cope, 1872: 422 (Stygobromus vitreus Cope, 1872, monotypy).--Holsinger, 1974c: 2.--G.S. Karaman, 1974e: 103.

Synurella Wrzesniowski, 1877: 403 (Synurella polonica Wrzesniowski, 1877, monotypy, = Gammarus ambulans Friedrich Muller, 1846).--Stebbing, 1906: 368.--G.S. Karaman, 1974a: 85.

Goplana Wrzesniowski, 1879: 299 (Goplana polonica Wrzesniowski, 1879, monotypy, = Gammarus ambulans Friedrich Muller, 1846).

Boruta Wrzesniowski, 1888: 264 [not seen]; 1890: 639 (Boruta tenebrarum Wrzesniowski, 1888, original designation).--Stebbing, 1906: 367.

Apocrangonyx Stebbing, 1899c: 422 (Crangonyx lucifugus Hay, 1882b, original designation).--Stebbing, 1906: 370.--Holsinger, 1969b: 2.

Stygonectes Hay, 1902b: 430 (Crangonyx flagellatus Benedict, 1895, original designation).--Holsinger, 1967a: 17.

(Eosynurella) Martynov, 1931a: 531 (no type-species).

Synpleonia Creaser, 1934: 1 (Synpleonia clantoni Creaser, 1934, monotypy).

Lyurella Derzhavin, 1939: 44 (Lyurella hyrcana Derzhavin, 1939, monotypy).

Diasynurella Behning, 1940a: 37, 43 (Diasynurella wachushtii Behning, 1940a, original designation).

Body ordinary to subvermiform, urosomites free, partially or fully coalesced, dorsally weakly setose or naked. Rostrum weak to absent, lateral cephalic lobes subrounded or quadrate or obsolescent, sinus present, poorly developed or absent. Eyes weak or absent.

Antennae elongate, antenna 1 longer than 2 (except in male of one species), ratio of peduncular articles = 25:17-21:10-17, primary flagellum longer than peduncle, accessory flagellum 2+ articulate. Antenna 2 male often with calceoli. Ratio of mandibular palp articles = 5:13:11, article 3 weakly falcate to linear, setae = (ABC)DE. Inner lobes of labium weakly developed or absent, gape absent. Maxillae well to moderately setose medially, inner plate of maxilla 1 moderately setose apicomediaally, outer plate with 7 spines, palps symmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped setose or spinose medially.

Coxae of medium extension or shortened, poorly setose ventrally, coxa 1 rectangular, coxa 4 lobate or not. Gnathopods various, usually gnathopod 1 larger than 2, both pairs usually slightly diverse, generally wrist of gnathopod 1 short, of gnathopod 2 slightly longer, poorly lobate or not lobate, hands large to small, generally ovate, often hammer-like, palms oblique to transverse, densely armed with bifid spines; occasionally gnathopods small or gnathopod 1 smaller than 2.

Article 2 of pereopods 5-7 poorly to moderately expanded, weakly lobate or not lobate, poorly setose posteriorly; dactyls spinose or not.

Rami of uropods 1-2 evenly extended or one or more outer rami shortened, marginally spinose, peduncle of uropod 1 lacking basofacial armament. Uropod 3 not extended, short, uniramous or aramous, ramus if present shorter than peduncle, 1-articulate. Telson elongate, or of medium length to short, often narrow, entire or weakly incised, apically spinose.

Coxal gills 2-7 or 2-6, ovate, pediculate or not, 2-articulate or not. Sternal gills bifurcate, simple or absent. Oostegites narrow or broad, occasionally poorly setose.

Variants.--Calceoli paddle-shaped (many species formerly placed in Synurella); calceoli short (many species formerly placed in Stygobromus); calceoli absent (many species of all component genera); uropod 1 often sexually dimorphic, one sex with small distal process on peduncle; inner ramus of male uropod 1 extended (derzhavini); pereopod 7 longer or shorter than pereopod 6; setae on inner plate of maxilla 1 occasionally reduced to 2; female gnathopod 2 occasionally very thin and like Eulimnogammarids; mandibular palp article 3 occasionally shortened; ramus of uropod 3 absent (hyrcana); pleonite 1 occasionally with sternal gills; outermost apical spine of telson deflected laterally, this spine with 1-3 small distal tines (tenuis group); antenna 2 longer than 1, penultimate flagellar article enlarged and arcuate (terminal male of tenuis); palm of either gnathopod with notch (4 species, see Holsinger, 1977).

Relationship.--Like Crangonyx but outer ramus of uropod 3 shorter than peduncle or absent.

Species.--See Holsinger, 1966, 1967a, 1969, 1972, 1974, G.S. Karaman, 1974e, \* = species formerly in Synurella;

- 1 abditus Holsinger, 1978 [164];
- 2 ackerleyi Holsinger, 1978 [164];
- 3A alabamensis\* (Stout, 1911) (= americana Mackin, 1935);  
3B a. occidentalis Holsinger, 1967a [172];
- 4 alleghehiensis (Holsinger, 1967a) [162]
- 5A ambulans\* (Friedrich Muller, 1846 (= glacialis S. Karaman, 1929b)  
(= hadzii S. Karaman, 1929b) (= jugoslavica S. Karaman, 1929b)  
(= polonica Wrzesniowski, 1879) (= recurvus Grube, 1861)  
(= schafernae S. Karaman, 1929b) (= balcanica Borutzky, 1929)  
(= bispinosa Schellenberg, 1937b) (= jurinaci Grochowski, 1904),  
5B a. subterraneus S. Karaman, 1931a (= jurinaci Grochowski, 1904)  
(= kolombatovici S. Karaman, 1931a), 5C a. taurica Martynov, 1931b,  
5D a. tenebrarum (Wrzesniowski, 1890) [060];
- 6 apscheronia\* Derzhavin, 1945b (G.S. Karaman, 1974a) [066];
- 7 araeus (Holsinger, 1969b) [169];
- 8 arizonensis Holsinger, 1974c [182];
- 9 balconis (Hubricht, 1943) (Holsinger, 1966) [185];
- 10 barodyi Holsinger, 1978 [164];
- 11 barri (Holsinger, 1967a) [174];
- 12 barryi Holsinger, 1978 [164];
- 13 behningi\* (Birstein, 1948b) [066];
- 14 bifurca\* (Hay, 1882b) [172]
- 15 bifurcatus (Holsinger, 1967a) [185];
- 16 biggersi Holsinger, 1978 [164];
- 17 borealis Holsinger, 1978 [162];
- 18 bowmani (Holsinger, 1967a) [174];
- 19 carolinensis Holsinger, 1978 [164];
- 20 chamberlaini\* (Ellis, 1941) [169];
- 21 clantoni (Creaser, 1934) [174];
- 22 coeca\* (Dobreanu and Manolache, 1951) (Carausu et alia, 1955) [083];

- 22C coloradensis Ward, 1977 [182];  
23 conradi (Holsinger, 1967a) [164];  
24 cooperi (Holsinger, 1967a) [164];  
25 culveri Holsinger, 1978 [164];  
26 cumberlandus Holsinger, 1978 [164];  
27 dejectus (Holsinger, 1967a) [185];  
28 dentata\* (Hubricht, 1943) [164];  
29 dershavini\* (Behning, 1928b, 1928a) [061];  
30 dicksoni Holsinger, 1978 [164]  
31 donensis\* (Martynov, 1931a) [061];  
32 elatus (Holsinger, 1967a) [174];  
33 elliotti Holsinger, 1974c [188]  
34 emarginatus (Hubricht, 1943) [164];  
35 ephemerus (Holsinger, 1969b) [169];  
36 estesi Holsinger, 1978 [164];  
37 exilis Hubricht, 1943 [164];  
38 fecundus Holsinger, 1978 [164];  
39 fergusoni Holsinger, 1978 [164];  
40 finleyi Holsinger, 1978 [164];  
41 flagellatus (Benedict, 1895) (= bowersii Ulrich, 1902) [184];  
42 franzi Holsinger, 1978 [164];  
43 gracilipes (Holsinger, 1967a) [164];  
44 gradyi Holsinger, 1974c [188];  
45 grahami Holsinger, 1974c [188];  
46 grandis Holsinger, 1978 [164];  
47 hadenoecus (Holsinger, 1966) [185];

- 48 harai Holsinger, 1974a [188];
- 49 hayi (Hubricht and Mackin, 1940) [169];
- 50 heteropodus Hubricht, 1943 [174];
- 51 hoffmani Holsinger, 1978 [164];
- 51H holsingeri Ward, 1977 [182];
- 52 hubbsi Shoemaker, 1942b [188];
- 53 hyrcana (Derzhavin, 1939) (Ruffo, 1972) [066];
- 54 indentatus (Holsinger, 1967a) [169];
- 55 inexpectatus Holsinger, 1978 [164];
- 56 interitus Holsinger, 1978 [164];
- 57A intermedius\* (Dobreanu, Manolache and Puscariu, 1952) (Carausu et alia, 1955), (= hrabei\* Straskraba, 1962), 57B i. montenegrina\* (G.S. Karaman, 1974a) [083];
- 58 iowae Hubricht, 1943 [176];
- 59 jakutana\* (Martynov, 1931a) (including arctica and elegans) [019];
- 60 johanseni\* (Shoemaker, 1920a) [158];
- 61 kenki Holsinger, 1978 [169];
- 62 lacicolus Holsinger, 1974c [188];
- 63 leensis Holsinger, 1978 [164];
- 64 longidactylus\* (S. Karaman, 1929b) [088];
- 65 longipes (Holsinger, 1966) [185];
- 66 lucifugus (Hay, 1882b) [174];
- 67 mackenzei Holsinger, 1974c [188];
- 68 mackini Hubricht, 1943 [164];
- 69 meschtscherica\* (Borutzsky, 1929) [066];
- 70 minutus Holsinger, 1978 [164];
- 71 montanensis Holsinger, 1974c [182];

- 72 montanus (Holsinger, 1967a) [174];
- 73 morrisoni (Holsinger, 1967a) [164];
- 74 mundus (Holsinger, 1967a) [169];
- 75 mysticus (Holsinger, 1974c) [188];
- 76 nanus Holsinger, 1978 [164];
- 77 nortoni (Holsinger, 1969b) [164];
- 78 obrutus Holsinger, 1978 [169];
- 79 obscurus Holsinger, 1974c [182];
- 80 onondagaensis (Hubricht and Mackin, 1940) [174];
- 81 oregonensis Holsinger, 1974c [188];
- 82 osellai\* (Ruffo, 1972) [062];
- 83 ozarkensis (Holsinger, 1967a) [174];
- 84 parvus (Holsinger, 1969b) [164];
- 85 pecki (Holsinger, 1967a) [185];
- 85P pennaki Ward, 1977 [182];
- 86 philareti\* (Birstein, 1948b) [071];
- 87 phreaticus Holsinger, 1978 [169];
- 88 pizzinii (Shoemaker, 1938, 1942a) [169];
- 89 pollostus Holsinger 1978 [164];
- 90 pseudospinosus Holsinger, 1978 [164];
- 91 pusillus (Martynov, 1930) [052];
- 92 putealis (Holmes, 1908a) [176];
- 93 puteanus Holsinger, 1974 [182];
- 94 redactus Holsinger, 1978 [164];
- 95 reddelli (Holsinger, 1966) [185];
- 96 russelli (Holsinger, 1967a) [185];

- 97 sheldoni Holsinger, 1974c [188];  
 98 sierrensis Holsinger, 1974c [188];  
 99 smithi Hubricht, 1943 [172];  
 100 sparsus Holsinger, 1978 [164];  
 101 spinatus (Holsinger, 1967a) [164];  
 102 spinosus (Hubricht and Mackin, 1940) [164];  
 103 stadukhini\* (Derzhavin, 1930a) [014];  
 104 stegororum Holsinger, 1978 [164];  
 105 stellmacki (Holsinger, 1967a) [164];  
 106 subtilis (Hubricht, 1943) [174];  
 107 tahoensis Holsinger, 1974c [188];  
 108 tenuis (S.I. Smith, 1874), 108B t. potomacus Holsinger 1967a [169];  
 109 tritus Holsinger, 1974c [182];  
 110 vitreus Cope, 1872 (Shoemaker, 1942a) [164];  
 111 wachushtii\* (Behning, 1940a) [066];  
 112 wengerorum Holsinger, 1974c [188];

Palearctic [14] mostly Nearctic, epigeal but mostly hypogean,  
 115 and 7 additional subspecies.

#### Pseudocrangonyctids

Crangonyctoids with sternal gills present; coxal gill 2 simple; urosomites free; gnathopods not mittenform, palmar spines simple; uropod 3 dispariramous, inner ramus absent; telson weakly cleft or apically notched.

#### Key to the Genera of Pseudocrangonyctids

Outer ramus of uropod 3 with 2 articles . . . . . Pseudocrangonyx  
 Outer ramus of uropod 3 with 1 article. . . . . Procrangonyx

#### Pseudocrangonyx Akatsuka and Komai

Figures 8, 9, 11, 18, 20, (22) Map 22

Pseudocrangonyx Akatsuka and Komai, 1922: 120 (Pseudocrangonyx shikokunis Akatsuka and Komai, 1922, here selected).

Niphargonyx Derzhavin, 1927b: 177 (Niphargonyx bohaensis  
Derzhavin, 1927b, monotypy).

Body vermiform, body and urosomites weakly setose dorsally. Rostrum obsolescent, lateral cephalic lobes scarcely to strongly protuberant, rounded or weakly mammilliform, sinus obsolescent to moderate. Eyes absent or vestigial (bohaensis).

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 23:20:13, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 often with thickened peduncle in male, flagellum about as long as article 5 of peduncle.

Mandibular molar obsolescent, forming weak knob, not triturative, lacking seta, ratio of palp articles = 6:12:18, article 3 curved linear, setae = (A)DE. Inner lobes of lower lip weakly developed or absent, moderate gape present. Maxillae weakly setose medially, inner plate of maxilla 1 ovate, with 5 (3-8) apicomedial setae, outer plate with 6-7 spines, palp 2-articulate, [?palps symmetric]. Inner plate of maxilla 2 with oblique facial row of setae (poorly shown on type). Plates of maxilliped somewhat reduced in size, outer medially spinose and setose, dactyl shorter than 3 but elongate, unguiform, with nail (not shown in type).

Coxae short, broader than long, scarcely contiguous or discontinuous, anterior coxae as short as posterior coxae, coxa 4 unlobed. Gnathopods large, hands elongate, ovate, or pyriform, palms very oblique, poorly defined, spinose, spines simple (or bifid), dactyls long, gnathopod 1 larger than 2 (or not smaller than 2), wrist short, lobed, wrist of gnathopod 2 longer and unlobed.

Pereopods 3-4 ordinary though article 2 slightly dilated. Pereopods 5-7 slightly elongate, weakly longer progressively, article 2 ovatolinear, unexpanded, unlobate; dactyls short, often with more than one inferior setule.

Outer rami of uropods 1-2 shortened, marginally spinose or not, inner rami marginally spinose, peduncle of uropod 1 with basofacial or ventrofacial spine(s). Uropod 3 extended, uniramous, ramus elongate, moderately setospinose, with short article 2. Telson of ordinary length but very narrow (thus appearing elongate), apex scarcely notched or telson cleft halfway, each small lobe with long spine and 1-2 other setules, lateral setule pairs apicad.

Coxal gills 2-6, medium broad, pediculate. Oostegites slender. Sternal gills simple.

Notes.--Palmar spines of gnathopods bifid (asiaticus, coreanus), perhaps true of other species but most illustrations show simple spines; sternal gills generally on pereonal sternites 2-4 or 2-5 or 2-6; inner ramus of uropod 2 with distal spines in male (coreanus); lobes of maxilla 2 broadened (kyotonis); variability of telson and uropod 3 (asiaticus, see Ueno, 1966).

Species.--1 asiaticus Ueno, 1934a [031];

2 bohaensis (Derzhavin, 1927b) [024];



- 3 camtschaticus Birstein, 1955 [013];  
 4 coreanus Ueno, 1966 [024];  
 5 kyotonis Akatsuka and Komai, 1922 [027];  
 6 levanidovi Birstein, 1955 [[024];  
 7 manchuricus Oguro, 1938 [031];  
 8 shikokunis Akatsuka and Komai, 1922 [028];  
 9 yezonis Akatsuka and Komai, 1922 [026];  
 boreal east Asia and Japan, hypogean, 9.

Procrangonyx Schellenberg

Map 22

Procrangonyx Schellenberg, 1934b: 217 (Eucrangonyx japonicus Ueno, 1930, monotypy).  
Eocrangonyx Schellenberg, 1937c: 37 (same type-species).

Body slender, [?vermiform], urosomites weakly setose dorsally. Rostrum obsolescent, lateral cephalic lobes ragged-mammilliform. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 22:18:9, primary flagellum much longer than peduncle, accessory flagellum 2-articulate. Antenna 2 with article 4 of peduncle somewhat thickened, flagellum not much longer than article 5.

Mandibular incisor [?toothed], molar obsolescent, simple, lacking seta, ratio of palp articles = 5:11:14, article 3 weakly falcate (more in form of sickle), setae = DE. Inner lobes of labium [?poorly developed, slight gape]. Maxillae weakly setose medially, inner plate of maxilla 1 ovate, with 4 apicomедial setae, outer plate with 7 spines, palp 2-articulate, [?palps symmetric]. Inner plate of maxilla 2 with weak facial row of setae (4 setae). Plates of maxilliped somewhat reduced in size, outer medially spinose and setose, dactyl shorter than 3 but elongate.

Coxae of medium size ("moderate"), other data absent [coxa 5 said to be excavate behind, perhaps error for coxa 4]. Gnathopods large, hands elongate, ovate, palms very oblique, poorly defined, spinose (apparently spines simple) dactyls long, gnathopod 1 larger than 2, wrist short and strongly lobed, wrist of gnathopod 2 longer and unlobed.

Pereopods 3-4 ordinary, though article 2 slightly dilated. Pereopods 5-7 progressively longer, article 2 "long and broad" [other data absent].

Pleopods [?ordinary]. Outer rami of uropods 1-2 slightly shortened, all rami marginally spinose, uropod 1 with 2 ventrofacial spines. Uropod 3 extended, uniramous, ramus elongate, moderately setospinose, 1-articulate. Telson of ordinary length but very narrow (thus appearing elongate), apex scarcely notched, each small lobe with long spinule and 1-2 other setules, lateral setule pairs apicad.

Coxal gills [2-6], slender, ovate, unstalked. Oostegites {?slender}. Sternal gills [presumed to be present by affinity with Pseudocrangonyx].

Relationship.--Like Pseudocrangonyx but article 2 on outer ramus of uropod 3 absent.

Species.--10 japonicus (Ueno, 1930) [027];

Japan, Tokyo, waterworks underground stream pipe, 1.

Austroniphargids

Sternal gills absent; coxal gill 2 simple; urosomites coalesced; gnathopods not mittenform, large, alike, palmar spines simple; uropod 3 dispariramous, parviramous; telson deeply cleft.

Key to the Genera of Austroniphargids

- Inner rami of pleopods ordinary, peduncle of uropod 3 lobate. . . . . Sandro
- Inner rami of pleopods 1-articulate, peduncle of uropod 3 ordinary. . . . . Austroniphargus

Austroniphargus Monod

Figures 8, 13, Map 54

*might be a crangonyx-like form*

Niphargopsis Monod, 1925: 40 [homonym to Niphargopsis Chevreux, 1922, Amphipoda] (Niphargopsis bryophilus Monod, 1925, original designation by virtue of words "forma typica").

Austroniphargus Monod, 1925: 48 [postscript, new name]; Schellenberg 1937c: 38.

Body smooth, urosomites coalesced. Rostrum short; lateral cephalic lobes projecting, subrounded. Eyes absent.

Antennae elongate, antenna 1 longer than antenna 2, articles of peduncle progressively shorter (16:12:10); accessory flagellum 2-articulate. Antenna 2 ordinary but article 1 grossly swollen.

Mandibular palp slender, article 3 linear, bearing E setae, article 2 shorter than article 3, article 1 very short. Labium without inner lobes, outer lobes not gaping. Maxillae not medially setose (apparently with medial "hairs"), inner plate of maxilla 1 with 2 apical setae, outer with several (about 7) toothed spines; right and left palps asymmetric, left with setae, right with spines. Both plates of maxilla 2 narrow, inner lacking oblique facial row of setae. Both plates of maxilliped of medium size, palp scarcely elongate.

Coxae of moderate length, coxa 1 not enlarged nor produced, coxa 4 unlobed posteriorly. Gnathopods large, alike, article 5 short, strongly lobed, article 6 trapezoidal, expanding towards apex, palm oblique, palm scarcely extended beyond defining spines.

Pereopods 5-7 subequal to each other, article 2 weakly expanded, not lobate.

Pleopods with multiarticulate ordinary outer rami, inner rami 1-articulate. Uropods 1-2 of female ordinary, rami subequally extended, with dorsal and distal spines, but males of certain species with modified uropod 2, rami thick, bearing only apical spines, inner ramus with unusual 2-articulate sculptured spine; basofacial spine of uropod 1 [apparently absent]. Uropod 3 slightly exceeding uropod 1, parviramous, peduncle short, unmodified, inner ramus scale-like, outer elongate, with short article 2, article 1 sublanceolate. Telson short, broad, cleft 40 percent of its length, with dorsal and numerous distal spines. Gills and oostegites [unknown].

Variants.--Austroniphargus petiti differing from type-species in absence of sexual dimorphism on uropod 2 (among other characters).

Relationship.--See Sandro.

Species.-- 82 bryophilus Monod, 1925 [919];

83 petiti Monod, 1925 [919];

Madagascar, 2600 m altitude, forest streams, probably hypogean normally; 2.

Sandro Karaman and Barnard

Figure 17, Map 54

Sandro G.S. Karaman and J.L. Barnard, 1979: 141 (Austroniphargus starmuhlneri Ruffo, 1960a, original designation).

Body smooth, urosomites coalesced. Rostrum and lateral cephalic lobes [unknown]. Eyes absent.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles = [unknown], accessory flagellum 1-articulate. Antenna 2 ordinary but article 1 grossly swollen.

Ratio of mandibular palp articles = 8:10:13, article 3 linear, setae = DE, but setae sparse and mostly near apex. Inner lobes of labium small, fleshy, well marked. Maxillae without medial setation (with medial hairs only), inner plate of maxilla 1 elongate-triangular, with 2 apical setae, outer plate with about 7 toothed spines (5 showing in illustration), palps asymmetric (left narrow and setose, right stout and spinose). Plates of maxilla 2 narrow, lacking medial and facial setae. Both plates of maxilliped of medium size.

Coxae elongate, coxa 1 not dilated, coxa 4 lobate. Gnathopods of medium size, alike, wrist short, strongly lobed, hand trapezoidal, expanding apicad, palm weakly oblique, palm exceeding defining spines.

Pereopods 5-7 alike, of medium length, article 2 weakly expanded, weakly lobate, weakly setose posteriorly, posterior margins convex or weakly sinuous.

Rami of uropods 1-2 extending subequally, marginally spinose, basofacial armaments [unknown]. Uropod 3 [?of medium extension], parviramous, peduncle with large apicolateral lobe, outer ramus elongate, moderately setose, article 2 short. Telson elongate, narrow, cleft three fourths, dorsally and distally spinose strongly.

Coxal gills [?2-6], broadly ovate, pedicles [unknown]. Oostegites [unknown].

Relationship.--Allied to Austroniphargus but differing in the presence of inner lobes on the labium, the shorter accessory flagellum, the longer coxae, the lobed coxa 4, the large lobe on the peduncle of uropod 3 and the normally developed pleopods.

Species.--84 starmuhlneri Ruffo, 1960a [919];

Madagascar, forest torrent but probably hypogean emergent, 1.

#### Allocrangonyctids

Sternal gills absent; coxal gill 2 bifid; urosomites free; gnathopods not mittenform, palmar spines dense and bifid; uropod 3 dispariramous, inner ramus present; telson poorly cleft.

#### Allocrangonyx Schellenberg

Figures 9, 18, Map 12

Allocrangonyx Schellenberg, 1937c: 33 (Niphargus pellucidus Mackin, 1935, original designation).--Holsinger, 1971: 318.

Urosomite 2 with dorsolateral spine each side. Rostrum obsolescent, lateral cephalic lobes subrounded. Eyes absent.

Antennae strongly extended, antenna 1 longer than 2, ratio of peduncular articles = 25:20:11, primary flagellum as long as peduncle, accessory flagellum 2-articulate. Calceoli absent.

Ratio of mandibular palp articles = 8:16:16, article 2 scarcely falciform, setae = ABCDE. Inner lobes of labium large and fleshy; maxillae not medially setose, inner plate of maxilla 1 narrowly ovate, with one apical seta, outer plate with 9 spines, palps [?symmetric], 2-articulate, only with apical setae. Inner plate of maxilla 2 much narrower than outer, lacking facial and medial setae, outer plate with apicolateral brow bearing several disjunct or enlarged setae. Outer plate of maxilliped elongate, dactyl weakly unguiform.

Coxae of medium size, weakly setose, coxa 1 scarcely expanded distally, coxa 4 weakly lobate. Gnathopods large, diverse, wrists short, lobate only on gnathopod 2, hand of gnathopod 1 trapezoidal, apically expanded, palm almost transverse; hand of gnathopod 2 larger than on gnathopod 1, ovate, palm oblique; some spines on palms simple, small, others bifid, densely packed.

Article 2 of pereopods 5-7 moderately expanded, lobate, posterior margins weakly convex, serratosetulate; dactyls with superior armaments in form of setule or spinule groups, occasionally also inferior.

Outer rami of uropods scarcely shortened, all rami marginally spinose, ~~basofacial armaments on peduncles absent.~~ Uropod 3 greatly extended, parviramous, in female with small article 2 on outer ramus, in male with 3-16 articles. Telson short, broad, weakly cleft, gaping, lobes apically spinose.

Coxal gills 2-6, ovate, gill 2 grossly bilobed. Oostegites slender. Sternal gills absent.

Relationship.--Somewhat unusual maxilla 2 coincidentally like that of North African Pseudoniphargus, reminiscent of almost similar condition in several genera of Niphargids (like Pontoniphargus). Differing from Crangonyctids in absence of sternal gills or lack of bifid palmar spines on gnathopods, loss of coxal gill 7, less strongly so in loss of medial setae on maxillae, shortness of telson, strong domination by gnathopod 2, multiarticulate outer ramus of male uropod 3. Differing from Niphargids in bifid gill 2, dense palmar spination on gnathopods (instead of thinner setules), not so strongly hammer-like gnathopods and stronger diversity between the pairs.

Species.--A hubrichti Holsinger, 1971 [174];

P pellucidus (Mackin, 1935) (Holsinger, 1971) [174];  
see also Holsinger, 1972;

Nearctica, Arbuckle Mountains and Ozark Plateau in Oklahoma and Missouri, USA, hypogean, 2.

## II. Bogidiellids

Sternal gills absent, coxal gill 2 simple; urosomites free; gnathopods not mittenform, palmar spines simple; uropod 3 variable, aequiramous or dispariramous; telson poorly cleft to entire.

Maxillae generally not setose medially (but this also occurs in several Austrogammarid genera).

Phylogeny probably a mixture of descendents from various Crangonyctoids. Earlier classificatory emphasis on vermiform bodies, reduced pleopods, reduced number of brood plates or gills and geniculate character of brood plates now shown to be unwarranted by discovery of numerous intergradational species between normal and specialized conditions.

### Key to the Genera of Bogidiellids

- |    |                                |                         |
|----|--------------------------------|-------------------------|
| 1. | Uropod 3 uniramous. . . . .    | <u>Pseudingolfiella</u> |
|    | Uropod 3 biramous . . . . .    | 2                       |
| 2. | Uropod 3 parviramous. . . . .  | <u>Paracrangonyx</u>    |
|    | Uropod 3 magniramous . . . . . | 3                       |

3. Uropod 1 uniramous. . . . . Bollegidia  
 Uropod 1 biramous . . . . . 4
4. Outer rami of pleopods 1-articulate . . . . . Kergueleniola  
 Outer rami of pleopods multiarticulate. . . . . 5
5. Coxae shorter than broad, often discontinuous  
 or barely touching . . . . . 6  
 Coxae longer than broad, several coxae strongly overlapping. . . . . 8
6. Inner rami of pleopods multiarticulate, coxal  
 gills 5 pairs, mouthparts reduced. . . . . Parabogidiella  
 Inner rami of pleopods 1-articulate, coxal  
 gills 4 pairs or fewer, mouthparts ordinary . . . . . 7
7. Mandibular incisor ordinary, molar weakly to  
 strongly tritulative, not spinose or  
 poorly spinose . . . . . Bogidiella  
 Mandibular incisor with large excavate callosity,  
 molar not tritulative, strongly spinose. . . . . Afridiella
8. Coxae 1-4 unlobed, inner rami of pleopods  
 multiarticulate. . . . . Artesia  
 Coxae 1-4 bilobed, inner rami of pleopods  
 1-articulate . . . . . Spelaeogammarus

Spelaeogammarus da Silva Brum

Map 18

Spelaeogammarus da Silva Brum, 1975: 125 (Spelaeogammarus bahiensis da Silva Brum, 1975, here selected).

Body slightly slender. Lateral cephalic lobes protruding, triangular, sinus [?present]. Eyes absent.

Antennae elongate, antenna 1 slightly longer than antenna 2, ratio of peduncular articles = 16:12:8, primary flagellum about as long as peduncle, accessory flagellum 3-articulate.

Labrum weakly concave apically. Mandibular molar weakly tritulative, spine row sparse, ratio of palp articles = 4:13:10, article 3 linear-tapering, with one E-seta. Inner lobes of labium [unknown]. Maxillae not medially setose, inner plate of maxilla 1 ovatotriangular, with 3 apical setae, outer plate with 7 spines, palps slender, symmetrical, thin, sparsely setose apically. Inner plate of maxilla 2 lacking facial row of setae, other medial setae absent. Plates of maxilliped small, outer medially setose, palp strong, dactyl longer than 3, with weak nail.

Coxae long, poorly setose, strongly overlapping, coxa 4 poorly lobed, coxa 5 very large, longer than coxa 4, bilobed, coxa 6 smaller than 5, bilobed, coxa 7 small, unlobed. Gnathopods medium to large, gnathopod 1 larger than 2, wrist short, strongly lobed, hand elongate, palm oblique, elongate, spinose, dactyl long, gnathopod 2 with medium wrist, poorly lobed, hand smaller than in gnathopod 1, palm oblique, short, dactyl short.

Article 2 of pereopods 5-7 weakly expanded, scarcely lobate or not; dactyls short; articles 5-6 of pereopod 7 with long anterior setae.

Inner rami of pleopods elongate but 1-articulate, outer rami slightly longer than inner, 4-articulate. Uropods 1-2 ordinary, rami extending

subequally, weakly spinose marginally, uropod 1 with numerous basofacial or ventromarginal spines. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous. Telson short, emarginate apically, with apical and midlateral spines.

Coxal gills 3-5. Oostegites [?].

Relationship.--Probably in pool ancestral to Bogidiella; with well developed inner rami of pleopods and well developed coxae, especially coxa 5. Differing from Artesia in the fewer gills, better developed mandible and maxillae, poorly cleft telson, uniarticulate inner rami of pleopods, bilobed coxae 5-6. Like Crangonyx but uropod 3 magniramous, sternal gills absent, and inner ramus of pleopods uniarticulate.

Species.--81 bahiensis da Silva Brum, 1975 [927];

Bahia, Brazil, cave, 1.

#### Artesia Holsinger

Maps 5, 6

Artesia Holsinger, 1980b: 38 (Artesia subterranea Holsinger, 1980b, original designation).

Body subvermiform, weakly setose dorsally, urosomites sparsely spinulose. Rostrum obsolescent, lateral cephalic lobes protruding, sharply triangular, sinus absent (head truncate below lateral lobes). Eyes absent.

Antennae elongate, antenna 1 scarcely longer than 2, ratio of peduncular articles = 25:15:12, primary flagellum longer than peduncle, accessory flagellum 1-articulate.

Mandibular molar small, not triturative, with seta, ratio of palp articles = 4:16:12, article 3 rectilinear, setae = E. Labium with broad partly fused inner lobes widely separating outer lobes. Maxillae not medially setose, inner plate of maxilla 1 naked, outer plate with 7 thin, simple spines (almost setae), palp small, thin, scarcely exceeding outer plate, 1-articulate. Maxilla 2 reduced, inner plate very short and narrow, both plates with few apical setae. Plates of maxilliped small, outer medially setose very sparsely, palp strong, dactyl longer than 3.

Middle coxae of medium size, coxa 1 small but coxae 2-5 progressively larger, coxa 5 largest, coxa 6 almost as large as 5, coxa 7 minute and hidden by coxa 6, coxa 4 unlobed, coxae 5-6 weakly lobed. Gnathopods of medium size to large, gnathopod 1 larger than 2, both pairs with short wrists, hands elongate, palms very oblique, long, spinosetose, dactyls long, wrist of gnathopod 1 strongly lobed, of gnathopod 2 weakly lobed.

Article 2 of pereopods 5-6 rectilinear, of pereopod 7 weakly expanded (as in Gammarus), tapering apically, unlobate, articles 5-6 with long anterior setae; dactyls short to medium.

Pleopods both rami multiarticulate. Rami of uropods 1-2 extending equally, lacking marginal spines, peduncle of uropod 1 with several basofacial or ventrolateral spines in tandem. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous. Telson of ordinary length, cleft about two thirds, gaping, lobes spinose apically.

Coxal gills 2-6, pediculate, 2-articulate. Oostegites small and narrow.

Relationship.--Probably in the most primitive pool of Bogidiellids, mainly because pleopods are normal Gammaridean, coxal gills have the normal formula (2-6 or better) and the middle coxae are large. The telson is ordinary. However, molar and maxillae are much reduced. See Spelaeogammarus, Bogidiella, and Phreatogammarus.

Species.--71 subterranea Holsinger, 1980b [185];

Texas, hypogean, San Marcos Well, 1.

### Parabogidiella Holsinger

Map 56

Parabogidiella Holsinger, 1980b: 31 (Parabogidiella americana Holsinger, 1980b, original designation).

Body vermiform. Lateral cephalic lobes protuberant, weakly mammilliform, sinus obsolescent. Eyes absent.

Antennae elongate, antenna 1 slightly longer than 2, ratio of peduncular articles = 21:15:8, accessory flagellum 1-articulate, short primary flagellum much longer than peduncle.

Mandibular molar not tritulative, obsolescent, conical, with one seta, ratio of palp articles = 8:14:15, setae = E. Inner lobes of labium partly fused but mainly appressed, forming wide block between ovate outer lobes (thus gaping). Maxillae not medially setose, inner plate of maxilla 1 ovate, naked, outer plate with 7 thin simple spines, palp short, uniarticulate, with sparse apical setae. Plates of maxilla 2 small, somewhat fused basally, inner much smaller and shorter than outer, each sparsely setose apically. Plates of maxilliped small, outer sparsely setose medially, palp strong, dactyl thick.

Coxae very short, broader than long, widely discontinuous, coxa 1 largest, coxa 4 unlobed. Gnathopods medium to large, gnathopod 1 larger than 2, wrists short and strongly lobate, almost alike, hands elongate, palms very oblique, elongate, sparsely spinose, dactyls elongate.

Pereopods 5-7 progressively greatly longer, article 2 rectilinear, article 6 of pereopod 7 anteriorly setose.

Pleopods biramous, each ramus 3-articulate. Only outer ramus of uropod 2 slightly shortened, rami of both pairs 1-2 with marginal spines, uropod 1 without basofacial spine. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous. Telson small but slightly longer than broad, widely incised about one fourth, each lobe with apical spine, setules and apicolateral spine.

Coxal gills 2-6, ovate, pediculate, 2-articulate. Oostegites [unknown, females unknown].



Relationship.--Differing from Bogidiella in the fully biramous pleopods, weak molar, reduced maxilla 2 and equal gnathopodal wrists. More or less like Spelaeogammarus and Artesia in pleopods but differing from them in small discontinuous coxae, equal wrists of gnathopods each with strong lobe.

Species.--75 americana Holsinger, 1980b [185];

Texas, wells, hypogean, 1.

Bogidiella Hertzog

Figures 5, 22, Maps 18-21

Bogidiella Hertzog, 1933: 226 (Bogidiella albertimagni Hertzog, 1933, monotypy).--Coineau 1968: 195.--Ruffo, 1973: 49.

Jugocrangonyx S. Karaman, 1933b: 45 (Jugocrangonyx skopljensis S. Karaman, 1933b, monotypy).

Body vermiform, weakly setose dorsally. Rostrum obsolescent, lateral cephalic lobes subrounded, varying from strongly protuberant to almost truncate. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 20:15:5-10, accessory flagellum 1-4 articulate, primary flagellum about as long as or longer than peduncle.

Mandibular molar strong and triturative or weak and almost smooth (type), ratio of palp articles = 4:12:10, article 3 linear, setae = E. Labium with small inner lobes forming broad gape for outer lobes. Maxillae not medially setose, inner plate of maxilla 1 short, ovate, with few setae mostly terminal, outer plate with 7 spines, palp small, 2-articulate (but see below), weakly setose apically. Plates of maxilla 2 small, short, not medially or facially setose (or with one mediomarginal seta). Plates of maxilliped small, outer medially setose very sparsely, palp strong.

Coxae very short, broader than long, poorly setose, often discontinuous, coxa 4 unlobed. Gnathopods of medium size to large, various, but in male type-species of equal size or gnathopod 1 slightly larger than 2, wrists short to medium respectively, strongly to moderately lobed respectively, hands elongate, large in gnathopod 1, palms very oblique but dissimilar, more strongly oblique and longer on gnathopod 1 than on gnathopod 2, palms crenulate, setose or spinose and poorly defined, gnathopod 1 often much enlarged.

Pereopods 3-4 usually with article 2 dilated and with lenticular Hertzog's organ (spherical or ovate inclusion). Pereopods 5-7 progressively elongate, article 2 thin, linear to ovate, with Hertzog's organ; dactyls simple; article 6 of pereopod 7 often setose anteriorly.

Pleopods uniramous or with partially to strongly reduced uniarticulate inner ramus, rarely modified (see tyrrhenica below). Uropods 1-2 ordinary or rarely modified, generally with equally extending rami usually lacking marginal spines, uropod 1 occasionally with basofacial spine on peduncle. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous. Telson short, broad, weakly cleft to emarginate to entire, with 1-3 apicolateral spines and one setule on each side.

Coxal gills 4-6, (or 3-7 in tyrrhenica), simple, or pediculate and articulate (Mexico). Oostegites 3-5 or 2-5, very thin, and straight; or thick and geniculate, setae mostly terminal, often very dense.

Variants.--Plates of maxilliped weak or well developed; mandibular molar often reduced in size and triturative surface weakened (type and bredini); inner lobes of lower lip severely reduced in some species or situated as appendages to medial edges of inner lobes; gnathopod 2 often very stout, with especially short and strongly lobed wrist, palm of gnathopod 2 often very weak, palm crenulate or not; dactyl of pereopod 7 occasionally setose on inferior margin; outer rami of uropods 1-2 elongate or weakly shortened or rarely on uropod 1 reduced to a scale in male, with inner ramus hyaline and curled into tube (holsingeri); occasional species with 1-articulate palp of maxilla 1, possibly articulation overlooked; most species with inner ramus of pleopods vestigial but brasiliensis and tyrrhenica with inner ramus well developed, 1-articulate, occasionally with terminal blade; outer ramus of pleopods usually with 3 articles but brasiliensis with 2; inner rami of pleopods 1-2 with apical blade and whip respectively (tyrrhenica).

Relationship.--The basic Bogidiellid characterized by absence of gills on coxae 6-7. Differing from Spelaeogammarus in the stronger reduction of the inner rami on the pleopods and the very small coxae.

Species.--1 albertimagni Hertzog, 1933 (= denticulata Mestrov, 1961) (= balearica Dancau, 1973a) [085, 090];

aprutina Pesce 1980 [098];

2 arganoi Ruffo and Vigna Taglianti, 1973 [197];

3 brasiliensis Siewing, 1953 [927];

4 bredini Shoemaker, 1959 [491H];

5 chappuisi Ruffo, in Ruffo and deBoutteville, 1952 (= minotaurus Ruffo and Schiecke, 1976) [092];

6 dalmatina S. Karaman, 1953b [087];

7 glacialis S. Karaman, 1959b [088];

8 hebraea Ruffo, 1963 [049];

9 helenae Mateus and Maciel, 1967 [114];

10 holsingeri Ruffo and Vigna-Taglianti, 1973 [198];

11 ichnusae Ruffo and Vigna-Taglianti, 1975 [102];

12 lindbergi Ruffo, 1958b [036];

- 13 longiflagellum S. Karaman, 1959b [088];  
 14 martini Stock, 1978b [491H];  
 15 michaelae Ruffo and Vigna-Taglianti, 1977 [198];  
 16 neotropica Ruffo, 1952a [927];  
 17 niphargoides Ruffo and Vigna-Taglianti, 1977 [198];  
 18 orchestipes Ruffo and Vigna-Taglianti, 1977 [198];  
 19 pasquini Ruffo and Vigna-Taglianti, 1977 [198];  
 20 ruffoi Birstein and Levuschkin, 1968 [036];  
 21 sbordonii Ruffo and Vigna-Taglianti, 1973 [198];  
 22 semidenticulata Mestrov, 1961 [087];  
 23 skopljensis (S. Karaman, 1933b) [110];  
 24 tabascensis Villalobos, 1960 [198];  
 25 tyrrhenica Schiecke, 1978 [098Q];  
 26 vandeli Coineau, 1968 [102];  
 27 vomeri Ruffo and Vigna-Taglianti, 1977 [198];  
 Palearctica, Neotropica [13]; interstitial; 27.

Afridiella Karaman and Barnard

Figures 8, 22, Maps 19, 54

Afridiella Karaman and Barnard, 1979: 158 (Bogidiella somala Ruffo, 1970b original designation).

Body [?subvermiform], urosomites [?free]. Rostrum obsolescent, lateral cephalic lobes [?subrounded, sinus present]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 23:22:12, accessory flagellum 2-articulate, primary flagellum slightly shorter than peduncle.

Labrum [?entire, rounded]. Mandibular incisor weakly toothed, connected to large excavate callus, molar small, conical, not triturative with strong comb and long seta, ratio of palp articles = 7:12:6, article 3 linear, setae = E. Labium [?almost gaping, inner lobes fused together]. Maxillae not medially setose. Inner plate of maxilla 1 onion-shaped, with 2 apical setae, outer plate with 7 spines, palp apically slender, sparsely setose. Inner plate of maxilla 2 lacking facial and medial setae. Plates of maxilliped small, outer medially setose very sparsely, palp strong.

Coxae short, but longer than broad, coxa 4 unlobed, coxa 5 [?as long as 4 and rather large]. Gnathopods large, gnathopod 1 scarcely larger than 2, wrists short to medium respectively, strongly to moderately lobed respectively, hands elongate, slightly larger on gnathopod 1, palms very oblique, lined with short setae, poorly defined, somewhat longer on gnathopod 1 than on gnathopod 2, dactyls elongate.

Pereopods 3-4 article 2 not dilated. Article 2 of pereopod 5 almost rectilinear, weakly expanded on pereopods 6-7, unlobate, dactyls short; article 6 of pereopods 5-7 anteriorly setose.

Pleopods with vestigial inner ramus, outer ramus short, 3-articulate. Rami of uropods 1-2 extending equally, without marginal spines, peduncle of uropod 1 with basofacial or ventrolateral spines. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous. Telson short, broad, scarcely emarginate, with distal and apicolateral spine on each side.

Coxal gills 4-6 ovate. Oostegites small, geniculate, dense setae confined apically.

Relationship.--Differing from Bogidiella in the excavate mandibular callosity, the strongly spinose molar, elongate palp article 1 of the mandible, slightly enlarged coxae.

Species.--41 somala (Ruffo, 1970b) [903];

Somalia, hypogean, 1.

Bollegidia Ruffo

Figure 22, Maps 18, 19, 54

Bollegidia Ruffo, 1974b: 405 (Bollegidia capensis Ruffo, 1974b, original designation).

Body [?subvermiform], weakly setose dorsally. Rostrum obsolescent, lateral cephalic lobes [unknown] and sinus [unknown]. Eyes absent.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles = 21:16:9, accessory flagellum 2-articulate, primary flagellum as long as peduncle. Antenna 2 ordinary.

Labrum [unknown]. Mandibular molar [apparently not triturative and poorly spinose], ratio of palp articles = 11:12:15, article 3 linear, setae = DE. Inner lobes of labium fused together, forming block widely separating outer lobes (thus gaping). Maxillae not medially setose, inner plate of maxilla 1 broad and short, naked, outer plate with 8 [?] spines, palp 1-articulate, bearing only 2 apical setae. Plates of maxilla 2 of ordinary shape, bearing only sparse terminal setae. Plates of maxilliped especially small, outer plate with only one medial seta, palp strong, dactyl longer than 3.

Coxae short, broader than long, coxa 4 unlobed. Gnathopods of medium size, gnathopod 1 slightly larger than 2, wrists short to medium respectively, moderately to weakly lobed respectively, hands elongate, large, palms oblique but similar, of moderate length, sparsely setose, dactyls only moderately elongate.

Article 2 of pereopods 5-7 rectangular, unexpanded, pereopod 7 much longer than 5-6 and with elongate dactyl, dactyl of pereopods 5-6 short; article 6 not strongly setose.

Pleopods sexually dimorphic, uniramous or aramous, rami only 1-2 articulate; thus, pleopods 1-2 of female lacking ramus, pleopod 3 with 1-articulate ramus; pleopod 1 of male with 2-articulate ramus, pleopods 2-3 with one articulate ramus. Uropod 1 uniramous, peduncle and ramus each with one seta. Uropod 2 biramous, peduncle naked, outer ramus with only apical spines, inner ramus partially hyaline, curving into cylinder, with apical seta. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous, each with many apical spines, one of these greatly elongate. Telson short, about as broad as long, weakly tapering, with 2 main apical spines plus 2 setules.

Coxal gills 2-6, ovate. Oostegites 3-4, bud-like, setae sparse, thick.

Relationship.--Differing from Bogidiella in the uniramous uropod 1, narrower telson, and sexually dimorphic pleopods with extreme reduction.

Species.--31 capensis Ruffo, 1974b [743];

32 sootai (Coineau and Rao, 1972) [662F];

South Africa and Andaman Islands, beach interstitial, 2.

#### Paracrangonyx Stebbing

Figures 6, 8, 16, 20, 23, 48, Map 8

Paracrangonyx Stebbing, 1899c: 422.--1906: 369 (Crangonyx compactus Chilton, 1882, original designation).

Body subvermiform, naked dorsally. Rostrum small, lateral cephalic lobes obsolescent, broadly rounded, no sinus. Eyes absent.

Antennae of medium extension, antenna 1 longer than 2, ratio of peduncular articles = 22:15:9, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 with very short 4-articulate flagellum.

Labrum weakly emarginate. Mandibular molar forming long bulbous plaque but apparently poorly tritulative or not tritulative, ratio of palp articles = 8:16:15, article 3 weakly falcate, setae =DE. Inner lobes of labium weak, partly fused, forcing gape on outer lobes. Maxillae not medially setose, inner plate of maxilla 1 ovate, with 2 apical plumose setae, outer plate with 7 spines, palps [symmetrical], 2-articulate. Inner plate of maxillae 2 without medial and facial setae (hairs present). Plates of maxilliped small, outer medially setospinose, palp strong, dactyl as long as 3.

Coxae short, broader than long, scarcely contiguous, none lobed, setae weak. Gnathopods of medium size, hands of equal width, elongate, palms oblique, almost identical, without row of palmar spines, wrist of gnathopod 2 short, weakly lobed, of gnathopod 2 longer and unlobed.

Pereopods 5-7 short, 5 scarcely shorter than 6-7, article 2 rectilinear, dactyls short, article 6 weakly setospinose.

Pleopods uniramous, ramus with 3-6 articles. Rami of uropods 1-2 extending subequally, moderately spinose, spines short. Uropod 3 slightly extended, parviramous, outer ramus slightly elongate, weakly spinose, article 2 short. Telson longer than broad, entire, subrectangular, apex armed with 2 short spines.

Coxal gills [?]. Oostegites narrow.

Relationship.--Differing from Kergueleniola and all other Bogidiellids in the parviramous uropod 3; Pseudingolfiella carries uropod 3 reduction further to uniramous condition.

Species.--43 compactus (Chilton, 1882, 1894) [937];

New Zealand, South Island, wells, 1.

#### Kergueleniola Ruffo

Figures 5, 6, 8, 9, 11, 16, 17, 20, 47, Map 54

Kerguelenella Ruffo, 1970a: 45 (homonym, Gastropoda) (Kerguelenella macra Ruffo, 1970a, monotypy).

Kergueleniola Ruffo, 1974a: 507 (new name, same type-species).

Body [?subvermiform]; urosomites [?free]. Rostrum [?obsolescent; lateral cephalic lobes and sinus unknown]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 20:14:9, accessory flagellum 1-articulate, primary flagellum much longer than peduncle.

Labrum [?broader than long, entire, rounded]. Mandibular molar acetabularian in form, triturative but cusps few, ratio of palp articles = 5:10:8, palp article 3 weakly sickle-linear, setae = BDE. Inner lobes of labium [unknown]. Maxillae not medially setose, inner plate of maxilla 1 ovate, with one apical seta, outer plate with 6 spines, palp ordinary but sparsely setose. Inner plate of maxilla 2 shorter than outer, with one giant medial seta, plates otherwise sparsely setose apically. Plates of maxilliped small, outer sparsely setose medially, palp strong, dactyl slightly longer than 3, stout.

Coxae very short, broader than long, coxa 4 unlobed, [?coxae discontinuous]. Gnathopods identical (except basis), of medium size, wrist of medium length, poorly lobed, hand elongate, palm very oblique, sparsely spinose, elongate, dactyl long.

Pereopods 3-4 basis greatly elongate. Article 2 of pereopods 5-7 rectilinear; [setae of article 6 on pereopod 7 apparently absent or sparse].

Pleopods biramous, each ramus elongate, 1-articulate. Rami of uropods 1-2 extending equally, lacking marginal spines, tapering, weakly spinose apically, peduncular armaments very sparse. Uropod 3 extended, magniramous, rami elongate, 1-articulate, almost aequiramous, tapering and poorly spinose apically. Telson very short and broad, cleft halfway, almost gaping, each lobe with 3 apical setules.

Coxal gills 2-6, small, ovate, [some possibly 2-articulate]. Oostegites [unknown].

Relationship.--Differing from Bogidiella and relatives in the fully biramous pleopods; thus, like Artesia, Spelaeogammarus and Parabogidiella, but differing from them in the poorly lobate wrist of gnathopod 1.

Species.--61 macra (Ruffo, 1970a) [851];

Kerguelen Island, from stomach of freshwater fish [probably hypogean].

#### Pseudingolfiella Noodt

Figures 5, 6, 8, 9, 13, 23, 48, Maps 18, 54

Pseudingolfiella Noodt, 1965: 27 (Ingolfiella chilensis Noodt, 1959, original designation).

Body vermiform, urosomites weakly setose dorsally. Rostrum absent, lateral cephalic lobes obsolescent, sinus obsolescent. Eyes absent.

Antennae short, antenna 1 slightly longer than 2, ratio of peduncular articles = 20:12:8, accessory flagellum 2-articulate, primary flagellum shorter than peduncle. Antenna 2 stout.

Labrum [longer than broad, entire, rounded = soyeri]. Mandibular molar not triturative (or such area small and nodular), forming large tubercle, ratio of palp articles = 5:10:7, article 3 linear, setae = DE or D only, very sparse. Labium [with inner and outer lobes fully fused, thus inner lobes absent, apices of outer lobes very widely separated, = soyeri]. Maxillae not medially setose, inner plate of maxilla 1 ovate, naked, outer plate with 7 spines, palp sparsely setose, article 1 elongate. Plates of maxilla 2 small, partly fused at bases, inner plate much shorter than outer, each with sparse apical setae only. Plates of maxilliped small, outer plate with one medial seta, palp strong, dactyl almost as long as 3, strongly curved, with large nail.

Coxae extremely short, very small, widely discontinuous, coxa 2 largest, coxa 4 unlobed, coxa 5 weakly bilobed but not much smaller than coxa 4. Gnathopods small, gnathopod 1 not larger than gnathopod 2, wrists short, weakly lobate, hands elongate, ovate, palms very oblique, elongate, identical, weakly setose and minutely crenulate, dactyls elongate (with conspicuous nails but this is not generic character).

Pereopods 5-7 short, slightly longer progressively, article 2 thin, almost rectilinear, unexpanded; article 6 poorly setose.

Epimera generally absent, pleopods attached directly to segment without shield. Pleopods greatly reduced, aramous or bearing one vestigial ramus, weakly dimorphic sexually, usually female pleopods 1-2 or 1-3 without ramus, male pleopods 1 or 1-2 without ramus, ramus when present extremely minute and bearing one seta, peduncles with or without seta.

Uropods 1-2 small, rami extending equally in female or outer ramus shortened especially in males. Rami naked in female except for one apical tube-seta, possibly one ramus absent in female of type on uropod 2; shortened outer ramus of male uropods 1-2 in type forming hyaline cylindrical

channel or unmodified in other species. Uropod 3 short (though exceeding uropod 1 because urosomites scarcely shorter than their appendages), uniramous, ramus with 2 subequal articles or articles fused together (type) but marked by acclivity and spines at apex of article 1, article 2 with subapical setal group. Telson small but longer than broad, entire, truncate, trifid (with subtended pair of spinal invaginations each bearing spine), otherwise with 2 pairs of subdistal setules.

Coxal gills 2-6, ovate, weakly pediculate. Oostegites [unknown].

Variants.--Outer ramus of uropod 2 scale-like in female but about half as long as inner ramus in male (soyeri).

Relationship.--Differing from Bogidiella in the reduction of the ramus on the pleopods to a vestige or in its total loss. Telson elongate.

Species.-- 71 chilensis (Noodt, 1959) [921];

72 soyeri Coineau, 1977 [851];

Chile and Kerguelen, anchialine springs, 2.

### III. Gammaroids

Sternal gills absent; coxal gill 7 present; gnathopods lacking densely packed and bifid palmar spines.

Occasionally coxal gill 7 absent but taxa identifiable by tympanic male calceoli or affinities to plesiomorphic taxa. Confined to Holarctica.

Taxa with fused urosomites outside of Baikal (such as Austroniphargids) placed in Crangonyctoids.

Paraleptamphopus, with tympanic calceoli in male and occurring in southern hemisphere exceptional, perhaps descendent from extremely primitive ancestor to Crangonyctoids. Taxa with paddle-shaped calceoli put in Crangonyctoids.

Probably coxal gill 7 absent in many species and therefore Gammaroids not absolutely distinguishable from marine Hadzioid groups; several marine taxa also with coxal gill 7 present.

Gammaroids are therefore holarctic freshwater species apart from Niphargids.

#### Key to the Groups of Gammaroids

1. Coxal gill 7 present. . . . . 2  
    Coxal gill 7 absent . . . . .13
2. Antenna 1 of Gammarus form. . . . . 3  
    Antenna 1 of Pontogammarus form . . . . .Pontogammarids
3. Article 2 of pereopod 7 unexpanded, lacking posteroventral  
    tooth and not evenly convex posteriorly . . . . . 4  
    Article 2 of pereopod 7 either with tooth, or expanded,  
    or evenly convex posteriorly. . . . .10
4. At least one pair of gnathopods in either sex furnished  
    with peg spines on palms . . . . . 5  
    Peg spines on gnathopodal palms absent . . . . .6



5. Gnathopods of both sexes alike, bearing peg spines . . . Anisogammarids  
Palm of gnathopod 1 lacking peg spines. . . . . Bathyceradocids
6. Gnathopods of predatorial, Acanthogammarin form. . . . . Acanthogammarids  
Gnathopods not of predatorial form. . . . . 7
7. Either pereopod 3 of filtrative form or uropod 1  
shortened and armaments reduced . . . . . 8  
Pereopod 3 not of filtrative form and uropod 1 not  
shortened, its armaments ordinary . . . . . 9
8. Body not pigmented. . . . . Sarothrogammarids  
Body pigmented. . . . . Gammarids (in part)
9. Telson entire . . . . . Gammarellids  
Telson cleft . . . . . Gammarids (in part)
10. Article 2 of pereopods 5-7 almost evenly  
expanded, posterior margins almost evenly convex. . . . . 11  
Article 2 of pereopods 5-7 diverse. . . . . 12
11. Article 2 of pereopod 7 twice as long as wide . . . . . Metohiids  
Article 2 of pereopod 7  
less than twice as long  
as wide . . . . . Pontogammarids (in part) and Dikerogammarids (in part)
12. Article 2 of pereopod 7 with sharply extended  
posteroventral angle. . . . . Fluviogammarids  
Article 2 of pereopod 7 expanded but  
lacking sharp corner. . . . . Dikerogammarids (in part)
13. Article 2 of pereopod 7 broadly  
expanded. . . . . Gammaroporeiids  
Article 2 of pereopod 7 not expanded. . . . . 14
14. Uropod 3 magniramous, pleosomites transversely  
carved into teeth posterodorsally . . . . . Mesogammarids  
Uropod 3 parviramous, pleosomites smooth . . . . . Eoniphargids

#### Gammarids

Antenna 1 of normal Gammarus form, article 2 more than half as long as article 1, latter not thickened, primary flagellum longer than peduncle; gnathopods not of Acanthogammarid form, lacking peg spines; pereopods 3-4 not of filtrative form; article 2 of pereopod 7 unexpanded, lacking sharp protrusion posteroventrally; uropod 1 normal; telson cleft; coxal gill 7 present; body pigmented.

The following key includes some extrinsic genera, Corophiomorphus, Echinogammarus (including Chaetogammarus), Eulimnogammarus, and Tadzhikistania just to show how the Gammarid group grades into later groups.

#### Key to the Genera of Gammarids,

##### Echinogammarids and Relatives

1. Inner ramus of uropod 3 more than 0.40 times as  
long as outer ramus . . . . . 2  
Inner ramus of uropod 3 less than 0.33 times as  
long as outer ramus . . . . . 22

2. Article 2 on outer ramus of uropod 3 ordinary . . . . . 3  
Article 2 on outer ramus of uropod 3 vestigial or absent. . . . . 13
3. Gnathopod 1 weakly dominant . . . . . 4  
Gnathopod 1 not dominant. . . . . 9
4. Dactyls of pereopods 5-7 more than twice as long as article 3,  
body with a few dorsal teeth. . . . . Metapallasea  
Dactyls of pereopods 5-7 not more than twice as long as  
article 3, body lacking dorsal teeth. . . . . 5
5. Article 2 of antenna 1 half as long as  
article 1 . . . . . Leptostenus (in part)  
Article 2 of antenna 1 slightly shorter than  
article 1 . . . . . 6
6. Peduncle of uropod 3 elongate, accessory flagellum  
1-articulate. . . . . Baikalogammarus  
Peduncle of uropod 3 not elongate, accessory flagellum  
3+ articulate . . . . . 7
7. Body with weak median carina throughout. . . . . Carinogammarus  
Body with median carina only on pleon or carina absent. . . . . 8
8. Gnathopod 1 weakly dominant . . . . . Heterogammarus  
Gnathopod 1 not dominant. . . . . Gammarus
9. Article 2 on antenna 1 half as long as  
article 1 . . . . . (part) Leptostenus  
Article 2 on antenna 1 slightly shorter than  
article 1. . . . . 10
10. Pereonites and pleosomites each divided into dorsal  
compartment with 2 lateral compartments projecting at  
right angles. . . . . Palicarinus  
Dorsal teeth of body simple or absent . . . . . 11
11. Article 3 of antenna 2 expanded and bearing ventral  
tooth . . . . . Derzhavinella  
Article 3 not greatly expanded, lacking ventral  
tooth . . . . . 12
12. Both articles 2 and 3 of antenna 1 longer than  
article 1 . . . . . Sowinskya  
Article 3 of antenna 1 not longer than  
article 1 . . . . . Gammarus
13. Body lacking distinct dorsal teeth. . . . . 14  
Body bearing distinct dorsal teeth. . . . . 15
14. Telson ordinary, deeply cleft . . . . . Poekilogammarus (part)  
Telson short, emarginate or entire. . . . . Pallasiola (part)
15. Median dorsal body carina absent. . . . . 16  
Median dorsal body carina present . . . . . 17
16. Article 2 of pereopods 5-7 diverse, weakly expanded,  
slightly setose . . . . . Pallasiola (part)  
Article 2 of pereopods 5-7 evenly thin, unsetose . . . . . Parapallasea
17. Article 2 of antenna 1 half of article 1. . . . . 18  
Article 2 of antenna 2 nearly as long as article 1. . . . . 19
18. Urosomal teeth not dominant, gnathopods small . . . . . Dorogammarus  
Urosomal teeth dominant, gnathopods large . . . . . Coniurus
19. Teeth on pleonite 3 dominant. . . . . Carinurus  
Teeth on pleonite 3 not dominant. . . . . 20

20. Accessory flagellum 1-articulate, head with dorsal teeth,  
some teeth of head and body secondarily spiniferous . . . . .Brandtia  
Accessory flagellum 2+ articulate, secondary  
spines or processes absent . . . . . 21
- 21a. Rostrum present, no dorsolateral teeth  
sharp. . . . . Boeckaxelia  
b. Rostrum weak, dorsal teeth median and  
vertebral. . . . . Eucarinogammarus  
c. Rostrum absent, some dorsolateral body  
sharp. . . . . Pallasea
22. Article 2 on outer ramus of uropod 3 present and  
well developed . . . . . 23  
Article 2 on outer ramus of uropod 3 absent or  
vestigial. . . . . 25
23. Gnathopod 1 dominant. . . . . Corophiomorphus  
Gnathopod 1 not dominant . . . . . 24
24. Pereopod 3 of filtrative form . . . . . Echinogammarus  
Pereopod 3 not of filtrative form . . . . . (Chaetogammarus)
25. Gnathopod 1 dominant, coxa 1 reduced. . . . . Eulimnogammarus  
Gnathopod 1 not dominant, coxa 1 ordinary. . . . . 26
26. Body ornamented (besides spines), accessory flagellum  
1-articulate. . . . . Gmelinoides  
Body smooth (besides spines) accessory flagellum  
well developed. . . . . Tadzhikistania

Key to the Genera of the Brandtia Group

1. Article 2 of outer ramus on uropod 3 present or vestigial. . . . . 2  
Article 2 of outer ramus on uropod 3 absent. . . . . 4
2. Accessory flagellum 3+ articulate. . . . . Carinogammarus  
Accessory flagellum 1-articulate . . . . . 3
3. Article 1 of antenna 2 as long as article 1, uropod  
3 variramous, its peduncle elongate . . . . . Baikalogammarus  
Article 1 of antenna 2 slightly more than half as long  
as article 1, uropod 3 parviramous, peduncle ordinary. . . Gmelinoides
4. Dorsal body tooth domination mostly on urosome,  
article 2 on antenna 1 about half as long as article 1. . . . . 5  
Dorsal body tooth domination clearly not on urosome, article 2 on  
antenna 1 much more than half as long as article 1. . . . . 6
5. Gnathopod 1 dominant, large. . . . . Coniurus  
Gnathopod 1 feeble, not dominant . . . . . Dorogammarus
6. Article 2 of pereopod 7 sharply extended posteroventrally . . . . . 7  
Article 2 of pereopod 7 unextended . . . . . 8
7. Pereonal projections above coxae spur-like,  
dorsal humps smooth . . . . . Hakonboeckia  
Pereonal projections above coxae hump-like, dorsal  
humps spinose or cuspidate . . . . . Spinacanthus
8. Telsonic cleft short, hands on gnathopods widely expanded . . Boeckaxelia  
Telsonic cleft long, hands on gnathopods poorly expanded . . . . . 9
9. Accessory flagellum ordinary, teeth on pleonite 3 dominant . . Carinurus  
Accessory flagellum 1-articulate, teeth on pleonite  
3 not dominant . . . . . Brandtia

Gammarus J.C. Fabricius

Figures 2, 6, 10, 16, 17, 43, Maps 23-37

Gammarus J.C. Fabricius, 1775: 418 (Cancer pulex Linnaeus, 1758, selected by Latreille, 1810, ICZN Official name 1307 of 1957).

--Stebbing, 1906: 460.

Pepredo Rafinesque, 1817: 41 (Pepredo potamogeti Rafinesque, 1817, monotypy, ?= Gammarus fasciatus Say, see Bousfield and Holthuis, 1969).--Tzvetkova, 1975a: 36

Lepleurus Rafinesque, 1820: 7 (Lepleurus rivularis Rafinesque, 1820, monotypy, = Gammarus minus Say, 1818, by neotypy of Bousfield and Holthuis, 1969).

Rivulogammarus S. Karaman, 1931d: 60 (Cancer pulex Linnaeus, 1758, selected by Gurjanova, 1951) (also homonym to Rivulogammarus Dorogostaiivsky, 1917, see Fluviogammarus Dorogostaiivsky, 1917).

(Fluviogammarus) S. Karaman and G. Karaman, 1959b: 206 (Carinogammarus triacanthus Schaferna, 1923b, here selected) (also = homonym to Fluviogammarus Dorogostaiivsky, 1917).

Mucrogammarus J.L. Barnard and Gray, 1968: 220 (Gammarus mucronatus Say, 1818, original designation).

Lagunogammarus Sket, 1971b: 6 (Gammarus zaddachi Sexton, 1912, original designation).--Tzvetkova, 1975a: 45.

Body ordinary or occasionally segments carinate posteriorly anterior to urosome, urosomites spinose and often humped but not fully pegged or carinate. Lateral cephalic lobes subrounded or quadrate or with sharp corners, sinus present. Eyes present or rarely absent.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles about 16:12:8, primary flagellum much longer than peduncle, accessory flagellum 2+ articulate, usually 4+.

Ratio of mandibular palp articles about 5:16:13, article 3 clavate or weakly falcate, setae = A(BC)DE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with 11 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of medium length, poorly setose, coxa 1 rectangular, coxa 4 lobate, coxa 5 much shorter than coxa 4. Gnathopods medium to large, weakly diverse, wrists medium to short, weakly lobate or not lobate, hands longer than wrists, usually hand of gnathopod 2 as large as 1, occasionally larger, but occasionally much narrower or shorter, palm of gnathopod 1 more oblique than palm of gnathopod 2 (exceptions occur), palms with one or more midspines (rarely absent on gnathopod 2), female gnathopods smaller or thinner than in male.

Pereopods 5-7 not elongate, but slightly longer progressively, article 2 weakly expanded or not, diverse, poorly or moderately setose posteriorly, posteroventral corners of 5 and 6 often weakly produced.

Rami of uropods 1-2 evenly extended, dorsally spinose, peduncle of uropod 1 typically lacking facial spine, or with facial spines. Uropod 3 extended, magniramous, parviramous to variramous, inner ramus more than 40 percent as long as outer ramus, outer ramus 2-articulate. Telson of

ordinary length, deeply cleft, lobes tapering, spinose and setose apically and often spinose or setose basolaterally.

Coxal gills 2-7, broadly expanded, gill of segment 2 often pediculate. Oostegites broad or narrow.

Variations.--Body carinate (roeselii, annandalei; article 2 on outer ramus of uropod 3 vestigial (annandalei).

Species.--See Karaman and Pinkster, 1977;

- 1 abscisus G.S. Karaman, 1973j [068];
- 2 acalceolatus Pinkster, 1971 [135];
- 3 accolae G.S. Karaman, 1973j [068];
- TBC ✓ 4 acherondytes Hubricht and Mackins, 1940 (Holsinger, 1972) [174c];
- 5 aequicaudus (Martynov, 1931b) (= plumicornis Costa, 1853, 1857, = tunetanus Simon, 1885 (ICZN rule), = eduardi Vecchi, 1931) (Stock, 1967a) [339];
- 6 agrarius G.S. Karaman, 1973j (Karaman and Pinkster, 1977) [068];
- TB 6A albimanus G.S. Karaman, 1968c [087];
- 7 angulatus Martynov, 1930b [052];
- 8 angusticoxalis Martynov, 1935b ?[045] (localities not found on map);
- 9 annandalei (Monod, 1924) [135];
- 10 annulatus S.I. Smith, 1873 (Bousfield, 1973) [254];
- 11 araxenus Derzhavin, 1938 [066];
- 12 arduus G.S. Karaman, 1975f [006];
- 13 argaeus Vavra, 1905, (= brachyurus Vavra, 1905 (G.S. Karaman and Pinkster 1977b) [068];
- 14A balcanicus Schaferna, 1923b (G.S. Karaman, 1966b, 1977g) (= konjicensis Schaferna, 1923b) (= pavlovici S. Karaman, 1929b) (= montanus S. Karaman, 1929b) (= istrianus S. Karaman, 1931c) (= klisanus S. Karaman, 1931d) (= neretvanus S. Karaman, 1931d) (= plancici S. Karaman, 1931d) (= dacicus Dobreanu and Manolache, 1933) (= occidentalis S. Karaman, 1935c) (= pannonicus S. Karaman, 1935c) (= bilecanus G.S. Karaman, 1964) (= stankoi G.S. Karaman, 1974f), 14B b. tatrensis (S. Karaman, 1931c) (Straskraba, 1953), 14D b. orientalis S. Karaman, 1934a, 14E b. spinulatus Martynov, 1935b, 14G b. anatoliensis Schellenberg, 1937e, 14H b. alarodius Derzhavin, 1938, 14I b. talyschensis Derzhavin, 1939,

14J b. turcomanicus Birstein, 1945b, 14K b. burduri S. Karaman and G. Karaman, 1959b [005];

15 barnaulensis Schellenberg, 1937e [040];

batei Boeck, 1861 (dubious) [236];

17 bergi Martynov, 1930a (Karaman and Pinkster, 1977) [058];

18 birsteini Karaman and Pinkster, 1977 (= brachyurus Birstein, 1935, homonym) (G.S. Karaman, 1975g) [069]; b. oligochaetus Birstein, 1935 [042];

19 bosniacus Schaferna, 1923b (G.S. Karaman, 1975c) [087];

20 bousfieldi Cole and Minckley, 1961 (Cole, 1970b) [164];

21 brevicornis (Martynov, 1935b) [036];

22 breviramus Bousfield and Elwood, 1971 [164];

23 bucharensis Martynov, 1935b [042];

24 camylops Leach, 1814a [239];

25A caucasicus Martynov, 1932, 25B c. batumicus Martynov, 1932, 25C c. sotshensis Martynov, 1932 [066];

caudisetus Viviani, 1805 (dubious) [093];

26 chevreuxi Sexton, 1913 (Chevreux and Fage, 1925) [352E]

chilensis Nicolet, 1849 (dubious) [765];

27 chostensis Martynov, 1932 [066];

circinnatus Viviani, 1805 (dubious) [348];

crassimanus Viviani, 1805 (dubious) [348];

28 crenulatus Karman and Pinkster, 1977 [089];

29 crnicornis Stock, 1966, 1967a [352];

30 crispus Martynov, 1932 [066];

31 daiberi Bousfield, 1969, 1973 [169E];

dubius Johnston, 1828 (dubious) [239];

dubius Herrick, 1887 (homonym), not in Stebbing, 1906 [172];

✓ 32 duebeni Liljeborg, 1852 (Tzvetkova, 1975a) [250], d. celticus  
Stock and Pinkster, 1970 [239];

33 dulensis S. Karaman, 1929b (G.S. Karaman, 1973j) [090];

edwardsi Bate, 1862 (dubious) [242];

34 effultus G.S. Karaman, 1975f [068];

✓ 35 fasciatus Say, 1818 (Bousfield, 1973) [170];

flabellifer Stimpson, 1856b (probably Anisogammarus) [398];

37 fontinalis Costa, 1883 (Stebbing, 1906) [102];

38A fossarum Koch, 1835 (= delebecquei Chevreux and de Guerne, 1892)  
(= danubialis S. Karaman, 1931c) (= andubialis S. Karaman, 1931c)  
(= subterranea S. Karaman, 1931c) (= cantor G.S. Karaman, 1973j)  
Goedmakers, 1972); 38B f. bodanicus Schellenberg, 1934c (G.S.  
Karaman, 1976e) [005];

39 frater Karaman and Pinkster, 1977 [089];

40 gauthieri (S. Karaman, 1935a) (Pinkster, 1977) [133];

41 goedmakersae G.S. Karaman and Pinkster, 1977b [006];

42 gracilis Martynov, 1935b (homonym) [066];

43 gregoryi Tattersall, 1924 [953];

? TB 43E halilicae G.S. Karaman, 1969f [087];

heteroclitus Viviani, 1805 (dubious) [348];

44 hirsutus (Martynov, 1935b) (including hirsutissimus) [036];

✓ 45 hyaelloides Cole, 1976 [185];

46 ibericus Margalef, 1951a (Pinkster, 1971) (Goedmakers, 1974) [111];

47 inberbus Karaman and Pinkster, 1977 [058];

48 inaequicauda Stock, 1966, 1967a (= campylops of Sars, 1895, not  
Leach, 1814a) [237];

49 insensibilis Stock, 1966, 1967a [352];

50 italicus Goedmakers and Pinkster, 1977 [098];

51 jenneri Bynum and Fox, 1977 [365E];

- 52 kamtschaticus Tzvetkova, 1972b, 1975a [013E];
- 53A kesslerianus Martynov, 1931b (= salygyrus Martynov, 1931b), [071];  
53B k. weneri S. Karaman, 1934a [068];
- 54 kischineffensis Schellenberg, 1937e (= chisinauensis Dobreanu and Manolache, 1939) (Jazdzewski and Mansvelt, 1973) [005];
- 56 komareki Schaferna, 1923b (G.S. Karaman, 1969a), k.imertinus Birstein, 1933, k. persicus S. Karaman, 1934a [005];
- 58 korbuensis Martynov, 1930b (= forma reducta) [near 052];
- 59 koshovi Bazikalova, 1946 [051];
- 60 laborifer Karaman and Pinkster, 1977 [068];
- ✓ 61 lacustris Sars, 1863 (= robustus S.I. Smith, 1875b) (= jeruslanensis Behning, 1921) (scandinavicus S. Karaman, 1931c) (= bolkayi S. Karaman, 1934b) (= stoliczkae S. Karaman, 1934a) (= wigrensis Micherdinski, 1959) (Cole, 1970b; Pinkster, 1972; Jazdzewski, 1975a) [000];
- 62 laticoxalis Karaman and Pinkster, 1977 [049];
- 63 lawrencianus Bousfield, 1956, 1973 [260];
- 64 linnaeus Smith, 1874 (= lacustris Smith and Verrill, 1871, = homonym) (?= lacustris) (Bousfield, 1958; Cole, 1970b) [165 + 162];
- 65 locusta Linnaeus, 1758 (Stock, 1967a) [355];
- longicornis Viviani, 1805 (homonym) (dubious) [348];
- lychnidensis Schellenberg, 1943d (G.S. Karaman, 1977f) [139];
- 66 macedonicus G.S. Karaman, 1976a, 1977f [139];
- 67 matienus Derzhavin, 1938 (= stagnalis Derzhavin, 1938, homonym) [066];
- TB ✓ 68 microps Pinkster and Goedmakers, 1975 [135];
- ✓ 69 minus Say, 1818 (= purpurascens [sic] Hay 1902b) (= propinquus Hay, 1902a) (= elki Reimer, 1969) (= tenuipes Shoemaker, 1940) (Holsinger, 1972), m. pinicollis Cole, 1970a [174];
- 70 mladeni G.S. Karaman and Pinkster, 1977b [068];
- 71 monspeliensis Pinkster, 1972 [108];
- 72 mucronatus Say, 1818 (Barnard and Gray, 1968) [362E];
- multifasciatus Bate, 1862 (dubious) [254];



- mutilus Abildgaard, 1789 (Stebbing, 1906) (dubious) [244];
- 74 nekkensis Uchida, 1935 [031];
- 76 nipponensis Ueno, 1940b [029];
- nolens Johnston, 1828 (dubious) [239];
- 77 nudus Martynov, 1931b [071];
- 78 obnixus G.S. Karaman and Pinkster, 1977b [068];
- 79 oceanicus Segerstrale, 1947 (Bousfield, 1973) [250];
- 80 ocellatus Martynov, 1930a (including minor) [058];
- 81 ochridensis (Schaferna, 1926) (= echiniformis S. Karaman, 1929b)  
(= abyssalis S. Karaman, 1931d) (Schellenberg, 1943b),  
G.S. Karaman, 1977f [139];
- 82 osellai Karaman and Pinkster, 1977 [068];
- 83 palustris Bousfield, 1969, 1973 [364];
- parechiniformis G.S. Karaman, 1977f [139];
- 84 pavo G.S. Karaman and Pinkster, 1977b [068];
- ✓ 85 pecos Cole and Bousfield, 1970 [1185];
- 86 pellucidus Gurjanova, 1930, 1951 (= angustatus Martynov, 1930b,  
including obensis) [010];
- peloponnesius Guerin, 1832 [confounded] [088];
- 87 pljakici G.S. Karaman, 1964 [087];
- podurus Abildgaard, 1789 [dubious] [236];
- ✓ 88 pseudolimnaeus Bousfield, 1958 (Cole, 1970b) [170];
- 89 pseudosyriacus Karaman and Pinkster, 1977 [038];
- 90A pulex Linnaeus, 1758 (Pinkster, 1970, 1972; Jazdzewski, 1975b; Karaman  
and Pinkster, 1977) (= salinus, = sibiricus, = subneglectus, = grimmi,  
all Semenovsky, 1880) (= kossinensis Alpatov and Kozmina, 1926)  
(= jeruslanensis Behning, 1921) (= subaequalis, = bianchii, = compressus,  
= zarudnyi, all Martynov, 1935b) (= polymorphus Helfer, 1914)  
(= zachariasi Garbini, 1895a), 90B p. arauensis Pinkster, 1972, 90C  
p. cognominis G.S. Karaman and Pinkster, 1977, 90D p. extensus  
Martynov, 1931a, 90E p. gallicus S. Karaman, 1931c, 90F p. karae  
Birula, 1937, 90G p. koreanus Ueno, 1940b, 90H p. polonensis Karaman

and Pinkster, 1977, 90I p. sobaegensis Ueno, 1966, 90J p. sovinskyi Pliginskij, 1930 [001];

91 rambouseki S. Karaman, 1931c (G.S. Karaman, 1973j) [088];

redmanni Bate, 1862 [dubious] [486];

92 roeselii Gervais, 1835 (Chevreux and Fage, 1925, Jazdzewski, 1975b, G.S. Karaman and S. Pinkster, 1977b) (= tetracanthus Garbini, 1902) (= triacanthus Schaferna, 1923b) (= vardarensis, meridionalis, semiarmatus, all S. Karaman, 1929b) (= montenigrinus, nisiae, graecus, strumica and prespensis, all S. and G.S. Karaman, 1959b) [085];

93 rouxi Pinkster and Goedmakers, 1975 [135];

94 salinus Spooner, 1947 (homonym) (Tzvetkova, 1975a) [240];

savii Milne Edwards, 1830 (dubious) [353];

95 setosus Dementieva, 1931 (= spetsbergensis Vosseler, 1889 by 50-year rule, ICZN) (= sovinskii Gurjanova, 1951) (Tzvetkova, 1975a) [210];

solidus G.S. Karaman, 1977f [139];

7B? 96 spelaeus Martynov, 1931b [071c];

97S spinipalmus (Chen, 1939) [031];

spinipes Johnston, 1829 (dubious) [239];

98 stankokaramani G.S. Karaman, 1976b, 1977f [139];

99 stojicevici (S. Karaman, 1929b) (S. and G.S. Karaman, 1959b) [087];

100 subtypicus Stock, 1966, 1967a [339E];

101 suifunensis Martynov, 1925 (Ueno, 1940b, 1940a) (close to Echinogammarus) [024];

102A syriacus Chevreux, 1895 (Pinkster and Karaman, 1977) [038];

102B s. subaequalis Birstein, 1948a [036];

103 taliensis Shen, 1954, [1953];

104 tauricus Martynov, 1931b [071];

105 teletzkensis Martynov, 1930b [052];

✓ 107 tigrinus Sexton, 1939 (Bousfield, 1973) [250 755];

✓ 109 troglophilus Hubricht and Mackin, 1940 (Cole, 1970b) [174];

truncatus Viviani, 1805 [dubious] [348];

110 truncatus (Martynov, 1935b) [homonym] (including montanus, homonym) [042];

111 turanus (Martynov, 1935b) (including coxalis, excisus, karabasicus, kujlukensis, subnivalis) [042];

112 uludagi G.S. Karaman, 1975f [006];

unguiserratus Costa, 1853, 1857 (dubious) [346];

113 varsoviensis Jazdzewski, 1975a [080];

TB 114 vignai Pinkster and Karaman, 1978 [068];

115 wautieri Roux, 1967 (Pinkster, 1972) [107];

116 wilkitzkii Birula, 1897 (= karaefluminis Birula, 1937) (Tzvetkova, 1975a) [220];

117 zaddachi Sexton, 1912 (= sarsi Reid, 1943) (= ochlos Reid, 1946) (Tzvetkova, 1975a) [240]

Fossil species.--See Hurley, 1973;

alsaticus van Straelen, 1924, 1931 [Tongrian, Lower Oligocene, Alsace];

fluviatilis Milne Edwards, 1840 [homonym] [Pleistocene, Scotland];

oeningensis Heer, 1865 [Sarmatian, Miocene, South Germany];

o. var. minimus Petunnikov, 1914 [Lower Miocene, USSR, doubtful taxon];

praecyrius Derzhavin, 1941 [Miocene, Caucasus];

retzi Maikovsky, 1941 [Sanoissian, Lower Oligocene, Alsace];

sp. Forster, 1888, 1892 [Tongrian, Lower Oligocene, Alsace];

sp., Mieg, Bleicher and Fliche, 1890, 1892 [Lower Oligocene, Alsace].

Holarctic, streams, springs, lakes, caves, seas, 120 and 20 dubious; [marine 12, Nearctic 15]; and 34 additional subspecies; 5 fossil species.

Sowinskya Derzhavin

## Map 4

Sowinskya Derzhavin, 1948: 283 (Sowinskya macrocera Derzhavin, 1948, original designation).

Body somewhat slender, urosomites weakly setose dorsally. Rostrum small, lateral cephalic lobes strongly quadrate, sinus large.

Antennae elongate, antenna 1 scarcely longer than 2, ratio of peduncular articles and both flagella = 14:18:16:36:15, accessory flagellum multiarticulate. Antenna 2 elongate.

Labrum weakly concave distally. Ratio of mandibular palp articles = 5:12:15, article 3 falcate, setae = A(B)CDE Inner lobes of labium vestigial, weak gape present. Maxillae moderately setose medially, inner plate of maxilla 1 ovatotriangular, mostly setose medially, outer plate with [?5 or 7] spines, palp 2-articulate, [?symmetric]. Inner plate of maxilla 2 apparently setose medially but facial setae absent. Inner and outer plates of maxilliped small, of same size, medial edge of outer plate [?spinose but weakly], palp very large, article 3 weakly lobate.

Coxae of medium size, almost glabrous, coxa 1 rectangular and somewhat shortened (like Eulimnogammarus), coxa 2 slightly tapering, coxa 4 weakly lobate. Gnathopods large, of Gammarus form, wrist of 1 shorter than 2, poorly lobate, hands large, palm of 1 much more oblique than of 2, [?palms lacking large spines].

Article 2 of pereopods 5-7 thin, rectilinear, unlobate, only weakly and sharply produced on pereopod 5 at posteroventral corner, posterior margins scarcely setulate.

Rami of uropods 1-2 [?apparently extending equally, apparently spinose and setose marginally, uropod 1 apparently unarmed basofacially]. Uropod 3 [unknown]. Telson short, fully cleft, apices tapering, setulate apically.

Coxal gills [?2-6], ovate, pediculate. Oostegites narrow.

Variants.--Apparently peduncle of uropod 2 setose.

Relationship.--like Echinogammarus, but maxillipedal plates short and article 3 of antenna 1 elongate.

Species.--macrocera Derzhavin, 1948 [332]; Caspian Sea, 73 m, 1.

Derzhavinella Birstein

Derzhavinella Birstein, 1938: 180 (Derzhavinella macrochelata Birstein, 1938, monotypy).--Birstein and Romanova, 1968: 278.

Body slender, urosomites naked. Rostrum absent, lateral cephalic lobes scarcely protruding in front of rostrum, rounded, then marked by deep ventral sinus. Eyes tiny.

Antennae elongate, antenna 1 slightly longer than 2, ratio of peduncular articles = 28:28:20, primary flagellum longer than peduncle, accessory flagellum 4-articulate. Antenna 2 bizarre, articles 3-4 broad,

thick or palmate, or produced, gland cone enlarged and produced downward, article 5 slender, rectangular, flagellum about as long as articles 4-5 of peduncle together.

Labrum [entire, subrounded]. Ratio of mandibular palp articles = 4:23:12, article 3 weakly falciform, setae = [ABCDE, probably, figure confusing]. Labium with feeble inner lobes. Maxillae medially setose, inner plate of maxilla 1 ovato-rectangular, fully setose medially, outer plate with [10] spines, palps [symmetric], 2-articulate. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped [medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, unlobed], "normal."

Coxae short but weakly overlapping, poorly setose, coxa 1 quadrate, coxa 4 lobate. Gnathopods large, hammer-like, wrists short, weakly lobate, hands large, broad, palms weakly to moderately oblique, defined by large spines, gnathopod 1 smaller than 2, with dactyl overlapping palm, gnathopod 2 with dactyl fitting palm.

Article 2 of pereopods 5-7 poorly expanded, ovato-rectangular, unproduced, or article 2 of pereopod 5 scarcely produced posteroventrally.

Outer rami of uropods 1-2 scarcely shortened, rami lacking dorsal spines, inner rami with 1-2 long dorsal setae, peduncle of uropod 2 with few long setae, of uropod 1 without basofacial armament. Uropod 3 slightly extended, variramous, inner ramus almost reaching halfway along article 1 of outer ramus, with very long setae, outer ramus of medium length, with vestigial article 2, generally setose. Telson of ordinary length, deeply cleft, lobes tapering, strongly setose apically.

Coxal gills [2-7, ovate]. Oostegites [broad].

Variants.--Article 2 of mandibular palp heavily setose.

Relationship.--Bizarrely characterized by the unusual antenna 2, gnathopods and uropods 1-2 (which are somewhat similar to those of Neogammarus).

Species.--macrochelata Birstein, 1938 [332]; Caspian Sea, 15 m, 1.

#### Heterogammarus Stebbing

Heterogammarus Stebbing, 1899c: 429; 1906: 494 (Gammarus sophianosi)

Dybowsky, 1874, designated by Stock, 1969a.--Bazikalova, 1945: 251.

Baikal. Article 2 of antenna 1 slightly shorter than article 1, article 3 shorter than article 2, accessory flagellum 5+ articulate. Peduncle of antenna 1 as long as or longer than peduncle of antenna 2 (Gammarus).

Coxae 1-4 glabrous. Gnathopods of Gammarus form (type).

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 not expanded, broad, subpyriform, unproduced posteroventrally, posterior margins almost evenly convex (type).

Uropod 3 elongate, moderately setose, setae plumose, variramous, inner ramus more than 0.5 times as long as outer ramus, article 2 on outer ramus

ordinary (type) to reduced. Telson ordinary, almost fully cleft, moderately spinose.

Only urosome dorsally spinose.

Transfers.--ignotus (Dybowsky) like Heterogammarus but inner ramus of uropod 3 scarcely 0.33 times as long as outer; (transferred to Corophiomorphus); bifasciatus (Dybowsky), tenuis Bazikalova like Heterogammarus but with weakly expanded and posteroventrally protuberant article 2 on pereopods 5-7 as in Fluviogammarus but differing from that genus in presence of article 2 on outer ramus of uropod 3 (transferred to Eurybiogammarus).

Relationship.--Differing from Gammarus and Poekilogammarus in weakly dominant gnathopod 1. See Eulimnogammarus.

Species.--capellus (Dybowsky, 1874), c. sowinskii Bazikalova, 1945;

?incertus Sowinsky, 1915;

sophianosii (Dybowsky, 1874), s. scirtes (Dybowsky, 1874);

Baikal, 2 species and 1 probable species and 2 additional subspecies.

#### Leptostenus Bazikalova

Leptostenus Bazikalova, 1945: 133 (Gammarus leptocerus Dybowsky, 1874, original designation).

Baikal. Eyes of irregular form. Article 2 of antenna 1 half as long as article 1, article 3 slightly shorter than article 2, flagellum hugely elongate, accessory flagellum 4-articulate, weakly elongate.

Coxae 1-4 [?glabrous]. Gnathopods of Gammarus form but wrists apparently elongate, occasionally gnathopod 1 weakly dominant.

Pereopods 3-4 [?not fossorial]. Article 2 of pereopods 5-7 unexpanded, moderately setose posteriorly.

Uropod 3 elongate, densely setose, setae plumose, magniramous, article 2 on outer ramus elongate. Telson elongate, fully cleft, weakly spinose.

Pleon dorsally spinose.

Relationship.--Like Gammarus and Heterogammarus but article 2 of antenna 1 only half as long as article 1. See Ommatogammarus.

Species.--leptocerus (Dybowsky, 1874); Baikal, 1.

Poekilogammarus Stebbing

Figure 34

- Poekilogammarus Stebbing, 1899c: 428; 1906: 477 (Gammarus pictus Dybowski, 1874, here selected).--Bazikalova, 1945: 160.
- Onychogammarus Sowinsky, 1915: 94 (Poekilogammarus pictoides Sowinsky, 1915, here selected). Valid subgenus.
- (Rostrogammarus) Bazikalova, 1945: 171 (Poekilogammarus rostratus Sowinsky, 1915, here selected). Valid subgenus.
- (Bathygammarus) Bazikalova, 1945: 176 (Abysogammarus semenkewitschi Sowinsky, 1915, here selected). Valid subgenus.
- (Gymnogammarus) Sowinsky, 1915: 254 (Gymnogammarus macrurus Sowinsky, 1915, here selected). Valid subgenus.

Baikal. Rostrum absent (type) to moderately developed.

Article 2 of antenna 1 shorter than article 1, article 3 as long as article 1, accessory flagellum greatly elongate (type) or as few as 4-articulate.

Coxae 1-4 [?glabrous]. Gnathopods of Gammarus-form, neither dominant.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 scarcely expanded, posteroventral corner not distinctly projecting, posterior margins setose.

Uropod 3 not exceeding elongate uropod 1, heavily setose, setae plumose, peduncle elongate, magniramous, article 2 on outer ramus absent. Telson ordinary, deeply cleft, moderately setose.

Body segments smooth or obscurely knobbed (type), urosomites dorsally setose or spinose, weak dorsal spines or setae occasionally on other segments.

Relationship.--Differing from Gammarus in the absence of article 2 on the outer ramus of uropod 3.

Key to the Subgenera of Poekilogammarus

(partly after Bazikalova, 1945)

1. Uropod 3 one third as long as body . . . . . Gymnogammarus  
    Uropod 3 less than one third as long as body . . . . . 2
2. Uropods 1-2 bearing elongate setae . . . . . 3  
    Uropods 1-2 lacking elongate setae . . . . . 4
3. Article 2 of pereopods 5-7 short and broad  
    (rostrum large) . . . . . Rostrogammarus  
    Article 2 of pereopods 5-7 long and narrow . . . . . Bathygammarus
4. Rostrum strong\*, body smooth, antenna 2 slightly  
    elongate, usually longer than peduncle of antenna 1 . . . Onychogammarus  
    Rostrum weak to absent, body vaguely knobbed,  
    antenna 2 not elongate . . . . . Poekilogammarus

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 \*not consistent with diagnosis by Bazikalova.

Species.--Capital initial signifying subgenus;

- O. araneolus (Dybowsky, 1874), O. a. ephippiatus (Dybowsky, 1874),  
O. a. quinquefasciatus (Dybowsky, 1874);
- O. crassimanus Sowinsky, 1915;
- O. curvimanus Sowinsky, 1915;
- O. curvirostris Bazikalova, 1945;
- O. jedorensis Bazikalova, 1945;
- O. longipes Bazikalova, 1945;
- B. lydiae (Bazikalova, 1935), 1945;
- G. macrurus Sowinsky, 1915;
- O. megonychoides Bazikalova, 1945;
- O. megonychus Sowinsky, 1915;
- R. orchestes (Dybowsky, 1874);
- O. pictoides Sowinsky, 1915;
- P. pictus (Dybowsky, 1874);
- O. rectirostris Bazikalova, 1945;
- R. rostratus Sowinsky, 1915, R.r. brevirostris Bazikalova, 1945,  
R.r. longirostris Bazikalova, 1945, R.r. amblyops Bazikalova, 1945;
- B. semenkewitschi (Sowinsky, 1915), B.s. unguisetosus Sowinsky, 1915;
- P. sukaczewi Sowinsky, 1915;
- R. talitrus (Dybowsky, 1874);
- Baikal, 18 species and 6 subspecies.

#### Carinogammarus Stebbing

Carinogammarus Stebbing, 1899c: 429; 1906: 501 (Gammarus  
cinnamomeus Dybowsky, 1874 designated by Bazikalova,  
1945).--Bazikalova, 1945: 194; 1975a: 31.

Baikal. Antennae of Gammarus form, article 2 slightly shorter than article 1, article 3 slightly shorter than article 2, accessory flagellum 3+ articulate.



Coxae 1-4 almost glabrous. Gnathopods in male of Gammarus form, but in female with gnathopod 1 [?dominant, and gnathopod 2 of Eulimnogammarid form].

Pereopods 3-4 moderately fossorial but articles 4-5 not inflated. Article 2 of pereopods 5-6 pyriform, of pereopod 7 expanded but not ventrally lobate, posterior margins weakly setose.

Uropod 3 exceeding uropod 1, variramous, setae plumose outer ramus with article 2. Telson ordinary, deeply cleft, moderately spinose.

Body with weak median carinae, urosomites weakly humped and spinose, pleonites 1-3 weakly armed.

Remarks.--Other species recently removed by Bazikalova (1975a) to Echiurops differed on heavy coxal and pereopodal setation. By their transferral to Echiurops, Bazikalova (1975a) implies they had also the Pontogammarid antenna 1. These species are pulchellus, rhodophthalmus and seidlitzii.

Relationship.--Like Heterogammarus but body with dorsal carina.

Species.--cinnamomeus (Dybowsky, 1874) (Bazikalova, 1975a); Baikal 1.

#### Eucarinogammarus Sowinsky

Figures 31, 32

Eucarinogammarus Sowinsky, 1915: 249 (Gammarus wagi Dybowsky, 1874, here selected).--Bazikalova, 1945: 192.

Baikal. Rostrum absent, posteroventral corner of head weakly protruding. Peduncle of antenna 1 elongate, article 2 more than two thirds as long as article 1, article 3 shorter than article 2, accessory flagellum 5+ articulate. Flagellum on antenna 2 very short, peduncle thickened.

Coxae 1-4 glabrous. Gnathopods enlarged, equal or gnathopod 1 scarcely dominant, of Acanthogammarid form, wrists weakly elongate, lobate, not Eusirid, hands elongate, broadened, palms strongly oblique, not spinose; or gnathopods of Gammarus form as in Carinogammarus as shown by Bazikalova (1975a). Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 not expanded, not setose posteriorly.

Uropod 3 exceeding uropod 1, almost magniramous, setae numerous and plumose, forming perimetral fan, but rami not paddle-shaped, article 2 on outer ramus vestigial. Telson ordinary, deeply cleft, moderately spinose.

Pereon and pleosome with thick and erect tooth crest in form of vertebrae, urosomites with moderate humps, weakly setospinose.

Relationship.--Differing from Acanthogammarus in lack of rostrum, ordinary telson, shorter article 3 of antenna 1 and special form of dorsal teeth. Differing from Carinogammarus in the vertebral back of the body (we do not agree with Bazikalova, 1975a, on fusing Eucarinogammarus with Carinogammarus).

Species.--wagi (Dybowsky, 1874), w. pallidus Dorogostaisky, 1922; Baikal, 1 species and 1 subspecies.

Baikalogammarus Stebbing

Baikalogammarus Stebbing, 1899c: 425 (Gammarus pullus Dybowsky, 1874, original designation); 1906: 416.--Bazikalova, 1945: 61.

Baikal. Article 2 of antenna 1 as long as article 1, article 3 more than half as long as article 2, accessory flagellum 1-articulate, primary flagellum much longer than peduncle. Antenna 2 of male elongate, articles 4-5 of peduncle especially large, of female small.

Coxae 1-4 glabrous.

Gnathopod 1 dominant in female, neither gnathopod dominant in male, female gnathopod 2 with elongate wrist and rectangular hand, palms of both pairs weakly oblique. Male gnathopods enlarged, Gammarus-like, wrists short, hands ovate, palm of gnathopod 1 strongly oblique, of gnathopod 2 weakly oblique.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 moderately expanded, weakly to strongly lobate ventrally, posterior margins weakly setose.

Uropods 1-2 spinose. Uropod 3 variramous, outer ramus with ordinary article 2, peduncle elongate.

Telson ordinary, cleft more than halfway, weakly spinose.

Body untoothed, pleonites 2-6 sparsely setose or spinose.

Relationship.--Like Heterogammarus but accessory flagellum uniarticulate.

Species.--pullus (Dybowsky, 1874); Baikal, 1.

Palicarinus, new genus

Type species.--Gammarus puzyllii Dybowsky, 1874 (here selected).

Baikal. Head with obscure lateral carinae. Article 2 of antenna 1 slightly shorter than article 1, article 3 shorter than article 2, accessory flagellum 5-7.

Coxae 1-4 glabrous. Gnathopods generally of Gammarus-form, gnathopod 2 weakly dominant, wrists short, weakly lobate, hands ordinary, palms oblique, with major spines.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 unexpanded, elongate, bearing few long posterior setae.

Uropod 3 exceeding uropod 1, weakly setose, variramous, article 2 on outer ramus ordinary.

Telson ordinary, fully cleft, moderately spinose.

Pereonites and pleosomites each divided into dorsal compartment with concave posterior margin, with 2 lateral compartments at right angles to dorsal, separation effected by pair of low, alate, outwardly directed lateral carinae; urosomal carinae tubercular, spinose.

Relationship.--Like Parapallasea but telson fully cleft, article 2 on outer ramus of uropod 3 well developed, article 2 of pereopods 5-7 with several long setae, accessory flagellum much shortened, dorsal tooth pattern distinctive. Like Gammarus but body teeth compartmented.

Species.--puzyllii (Dybowsky, 1874), p. carinulata (Dorogostaivsky, 1922); Baikal, 1 species and 1 subspecies.

#### Metapallasea Bazikalova

Metapallasea Bazikalova, 1959: 518 (Metapallasea galinae Bazikalova, 1959 here selected).

Baikal. Head and antennae [not fully described]. Accessory flagellum 3-6 articulate.

Anterior coxae glabrous or weakly setose. Coxa 5 anterior lobe subsharp. Gnathopod 1 strongly dominant, wrist short, weakly lobed, hand slightly expanded, palm oblique, with sparse major spines, gnathopod 2 more slender, wrist weakly elongate, not lobed, hand narrow basally, expanding distally, palm slightly oblique, major spines sparse.

Pereopods 3-4 [?not fossorial]. Article 2 of pereopods 5-6 unexpanded, weakly pyriform, of pereopod 7 scarcely expanded, posteroventral corner weakly protuberant, of pereopods 5-7 with few short posterior seta. Dactyls of pereopods 5-7 more than twice as long as article 3 (Pallasea).

Uropod 3 [?exceeding uropod 1], moderately setose, parviramous, article 2 on outer ramus ordinary.

Telson elongate, cleft more than two thirds, moderately spinose.

Pereonite 7 and pleonite 1 each with weak pair of dorsolateral recumbant teeth, pleon weakly setose dorsally.

Relationship.--Differing from Pallasea and Gammarus in the elongate dactyls of pereopods 5-7, the elongate, deeply cleft telson, strong domination of gnathopod 1, and from Pallasea in the presence of article 2 on the outer ramus of uropod 3.

Species.--galinae Bazikalova, 1959; Baikal, 1.

#### Pallasea Bate

Figures 3, 19, 20, 26, 29, 45

Pallasea Bate, 1862: 200 (Oniscus cancellus Pallas, 1767, monotypy.--Stebbing, 1906: 374.--Bazikalova, 1945: 137.

Pallasiella Sars, 1895b: 505 (new name, type-species same).

Dybowskia Garjajeff, 1901:31 (Dybowskia viridis Garjajeff, 1901, here selected) (homonym, Mollusca).

Pentagonurus Sowinsky, 1915:68 (Pallasea dybowskii Stebbing, 1899c, monotypy). Valid subgenus senior to Homalogammarus.

(Homalogammarus) Bazikalova, 1945: 146 (Gammarus brandtii Dybowsky, 1874, here selected). Synonym of Pentagonurus.

(Propachygammarus) Bazikalova, 1945: 152 (Dybowskia dryshenkoi Garjajeff, 1901, here selected). Valid subgenus.

Nomenclature.--Type-species by monotypy, Oniscus cancellus Pallas, as cited by Bate (1862) but Bazikalova contends Bate's identification of that species belongs with Pallasea cancelloides (Gerstfeldt) in which case Pallasea is a confounded genus; however, we would prefer to retain Pallasea as a valid genus and assume Bate intended the true cancellus to be type regardless of his misidentification; one hopes to maintain stability by this action.

Baikal. Head usually with cheek tooth or anteroventral tooth. Articles 1-3 of antenna 1 equally long (type) or articles 2 and 3 progressively shorter than article 1, accessory flagellum 5+articulate (type) or 3+articulate, rarely exceeding 7-articulate.

Coxae 1-4 glabrous. Gnathopods generally of Gammarus-form, gnathopod 2 slightly dominant, wrists short, weakly lobate, hands ordinary, palms oblique, bearing major spines.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 unexpanded, not setose posteriorly, article 2 weakly pyriform (type) or article 2 of pereopod 7 weakly expanded, not (type) or lobate ventrally, article 2 of pereopods 5-7 setose posteriorly.

Uropod 3 not (type) or slightly exceeding uropod 1, magniramous to variramous, almost parviramous, setae [?plumose], article 2 on outer ramus absent. Telson short, weakly setulose, cleft halfway, emarginate or entire.

Pereon with (type) middorsal tooth crest, with lateral teeth just above coxae, and often one or more pairs (type) of extra bilateral dorsal teeth, pleosomal with dorsal tooth crest, or carina, with (type) bilateral pairs of teeth or not, urosomites with (type) or without middorsal tooth crest, spines absent.

Relationship.--Differing from Gammarus, Metapallasea, Pallicarinus and Leptostenus in the absence of article 2 on the outer ramus of uropod 3. Differing from Poekilogammarus and Pallasiola in the distinct dorsal body teeth.

Subgenera of Pallasea, see diagnoses below

Subgenus Propachygammarus: Eyes absent; front part of body broadened; pleosomal bilateral teeth, if present, erect. Probably valid genus.

Subgenus Pallasea: Eyes present; body cylindrical; pleosomal bilateral teeth, if present, recumbant; pereonal bilateral teeth or keel sharp.

Subgenus Pentagonurus (= Homalogammarus): Eyes present; body cylindrical; pleosomal bilateral teeth, if present recumbant; pereonal bilateral teeth or keel blunt.

Species.--Capital letter designating subgenera; H = Pentagonurus (= Homalogammarus), P = Pallasea, Y = Propachygammarus;

P. baikali Stebbing, 1899c, P. b. inermis Sowinsky, 1915,  
P. b. nigromaculata Dorogostaisky, 1922;

Y. bicornis Dorogostaisky, 1930;

H. brandti (Dybowsky, 1874), H. b.tenera Sowinsky, 1915,  
H. b. flaviceps Dorogostaisky, 1922;

P. cancelloides (Gerstfeldt, 1858);

P. cancellus (Pallas, 1767), P. c. gerstfeldti (Dybowsky, 1874),  
P. c. angarensis Dorogostaisky, 1917;

H. dawydowi (Sowinsky, 1915);

Y. dryshenkoi (Garjajeff, 1901);

H. dybowskii (Stebbing, 1899c), H. d.angarensis Dorogostaisky,  
1917 [homonym];

P. grubei (Dybowsky, 1874), P. g. arenicola Dorogostaisky, 1922;

P. kessleri (Dybowsky, 1874), P. k. europaeus (Dybowsky, 1874);

Y. lamellispinis Bazikalova, 1945;

Y. meissneri (Bazikalova, 1935), 1945;

H. meyeri (Garjajeff, 1901);

H. viridis (Garjajeff, 1901);

Baikal, 14 species and 9 subspecies.

Pallasiola, new genus

Figure 6, Map 38

Type-species: Pallasea cancelloides var. quadrispinosa Sars, 1867, here selected [Pallasiella Sars, 1895, presumably new name for Pallasea and not available].

Baikal. Head with (type) or without weak cheek tooth. Article 2 on antenna 1 slightly shorter than article 1, article 3 shorter than article 2, accessory flagellum 2-articulate.

Coxae 1-4 glabrous. Gnathopods subequal or gnathopod 2 weakly dominant, wrists short, weakly lobate, hands ordinary to weakly expanded, palms oblique, lacking major spines.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-6 not expanded, elongate, weakly pyriform, of pereopod 7 weakly expanded, unlobate ventrally, of pereopods 5-7 setose posteriorly.

Uropod 3 scarcely exceeding uropod 1, variramous, moderately setose, article 2 on outer ramus vestigial.

Telson short, emarginate or entire, poorly armed.

Body untoothed or weakly carinate, or pleonites 1-2 each bearing small pair of dorsolateral sharp, recumbant teeth, urosome naked.

Relationship.--Differing from Pallasea in the lack of well developed median carina, severe reduction of accessory flagellum, and loss of major spines on palms of gnathopods, apart from defining spines. Differing from Gammarellus in the unequal rami of uropod 3, reduced accessory flagellum, unpleated gills, narrow coxae 3-4, poor cephalic sinus, strongly setose article 2 of pereopods 5-7 and the absence of marginal spines on the rami of uropods 1-2.

Species.--quadriscopiosa (Sars, 1867, 1895b) (= laevis Ekman, 1923 [297F]) (Schellenberg, 1942) (Segerstrale, 1958), q. brevispinosa Nybelin and Oldevig, 1944 [149];

glacial lakes of Palearctica, 1 species and 1 doubtful subspecies.

#### Parapallasea Stebbing

##### Figure 19

Parapallasea Stebbing, 1899c: 429; 1906: 497 (Gammarus lagowskii Dybowski, 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 182. Pleuracanthus Garjajeff, 1901: 40 (Pleuracanthus niger Garjajeff, 1901, here selected) [homonym, Coleoptera].

Baikal. Head lacking cheek tooth or with vestigial cheek hump. Article 2 of antenna 1 almost as long as article 1, article 3 shorter than article 2, accessory flagellum 5+ articulate (20-articulate, much longer than in Pallasea).

Coxae 1-4 glabrous. Gnathopods generally of Gammarus-form, gnathopod 2 slightly dominant, wrists medium, weakly lobate, hands ordinary, palms oblique, bearing major spines.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 unexpanded, not posteriorly setose, article 2 much more elongate than in Pallasea.

Uropod 3 exceeding uropod 1, variramous, strongly setose, article 2 on outer ramus vestigial.

Telson short, cleft more than halfway, lobes gaping.

Pereon and pleosome lacking dorsomedial teeth, bearing pairs of bilateral dorsal teeth, urosome with spinose pairs of teeth, occasionally with median carina, pereon with lateral humps just above coxae.

Relationship.--Differing from Pallasea in the absence of a middorsal tooth crest, from Propachygammarus in the variramous uropod 3 and from Pallasiola in the thin, unsetose article 2 of pereopods 5-7.

Species.--borowskii (Dybowsky, 1874), b. abyssalis

(Dybowsky, 1874), b. dichrous (Dybowsky, 1874),

b. wosnessenskii Dorogostaisky, 1922;

lagowskii (Dybowsky, 1874);

nigra (Garjajeff, 1901);

[puzyllii Dybowsky removed to Palicarinus];

Baikal, 3 species and 3 subspecies.

#### Brandtia Bate

Figures 17, 33, 35

Brandtia Bate, 1862: 129 (Gammarus latissimus Gerstfeldt, 1858, monotypy, = Gammarus latus Dybowsky, 1874).--Stebbing, 1906: 395.--Bazikalova, 1945: 67.

Said by Bazikalova to be a subgenus of Spinacanthus, but if true the priority is misconstrued by Bazikalova.

Baikal. Head with spines superimposed on humps or teeth, rostrum erect. Antennae ordinary. Article 2 of antenna 1 scarcely more than half as long as article 1, article 3 shorter than article 2, accessory flagellum 1-articulate.

Anterior coxae glabrous. Coxa 4 ordinary. Gnathopods of Gammarus-form.

Pereopods 3-4 not fossorial. Article 2 of pereopod 5 weakly expanded, pyriform, posterior margin sinuous, poorly setose, posteroventral corner weakly but sharply extended, of pereopods 6-7 expanded, not ventrally lobate, moderately setose.

Uropod 3 magniramous to variramous, setae plumose, article 2 on outer ramus absent. Telson ordinary. All pereonites and pleonites 1-3 with similar erect middorsal hump often bearing large spines or projections (but sometimes entire body glabrous), urosome with weak, nonspinose humps. Pereonites with lateral humps above coxae.

Remarks:--Differing from Carinurus in the reduced accessory flagellum.

Species.--latissima (Gerstfeldt, 1858);

l. acera (Dybowsky, 1874);

l. dicera (Dybowsky, 1874);

l. extima Dorogostaisky, 1930;

l. intermedia Dorogostaisky, 1930;

l. lata (Dybowsky, 1874);

l. latior (Dybowsky, 1874);

l. polyspina Dorogostaisky, 1930;

Baikal, 1 species and many morphs.

#### Carinurus Sowinsky

##### Figure 29

Carinurus Sowinsky, 1915: 276 (Gammarus solskii Dybowsky, 1874, monotypy).--Bazikalova, 1945: 93.

Baikal. Head with or without dorsal serrations superimposed on humps, rostrum weak to well developed, straight to weakly erect.

Antennae ordinary. Article 2 of antenna 1 half or slightly more than half as long as article 1, article 3 slightly shorter than article 2, accessory flagellum 4+ articulate.

Anterior coxae glabrous. Gnathopods of Gammarus-form.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 slightly expanded, posterior margin flat; setose.

Uropod 3 magniramous to variramous, setae plumose, article 2 on outer ramus absent. Telson of ordinary length, cleft slightly more than halfway, cleft forming slot.

Pereonites with low to medium sized middorsal humps, rounded or weakly castelliform, truncate or weakly bifid, hump on pereonite 7 often enlarged, hump on pleonite 3 always much enlarged, smooth, bifid, sharp or retrorse, humps on pleonites 1-2 usually enlarged also, urosomite 1 with or without hump. Pereonites with lateral hump just above coxae.

Relationship.--Differing from Spinacanthus and Brandtia in the absence of dorsal body spines and from those genera plus Dorogammarus in the dominance of dorsal teeth solely on the pleon or posterior pereon.



Species.--bazikalowi G.S. Karaman, 1977b;  
belkini (Garjajeff, 1901) (erroneous spelling =balkirii);  
bicarinatus Bazikalova, 1935;  
bifrons G.S. Karaman, 1977b;  
microphthalmus Sowinsky, 1915;  
obscurus Dorogostaisky, 1922;  
platycarinus (Sowinsky, 1915);  
reissneri (Dybowsky, 1874);  
solskii (Dybowsky, 1874);  
werestschagini Bazikalova, 1935;  
 Baikal, 10.

Dorogammarus Bazikalova

Dorogammarus Bazikalova, 1945: 88 (Axelboeckia castanea Dorogostaisky, 1930, monotypy).

Baikal. Head rugose, rostrum large, weakly erect. Antennae ordinary. Article 2 of antenna 1 less than half as long as article 1, article 3 scarcely shorter than article 2, accessory flagellum 3-articulate.

Anterior coxae [?glabrous]. Gnathopods [like Boeckaxelia in Dorogostaisky's aspect view] but according to Bazikalova (perhaps female only?) feeble, of miniaturized and poorly expressed Gammarus-form.

Pereopods 3-4 not fossorial. Article 2 of pereopod 5 pyriform, weakly expanded on pereopods 6-7, possibly setose posteriorly [Bazikalova's drawing perhaps unfinished, see Dorogostaisky, 1930].

Uropod 3 small, variramous but inner ramus short, setae sparse and possibly not plumose, article 2 on outer ramus absent. Telson short, deeply cleft, poorly setulose.

All pereonites and pleonites 1-3 with middorsal hump, almost becoming truncate on several segments, urosomite 1 with large and sharp hump. Pereonites with lateral humps just above coxae.

Relationship.--Differing from Boeckaxelia in the larger urosomal hump, the deeper cleft of the telson, the smaller and unexpanded gnathopods, much shortened article 2 of antenna 1.

Scarcely differing from Coniurus except in the enfeebled gnathopods and the much shorter article 2 of antenna 1, and the much larger humps of the pereon.

Species.--castanea (Dorogostaisky, 1930); Baikal, 1.

Boeckaxelia Schellenberg

Ctenacanthus Garjajeff, 1901: 16 (homonym, Pisces) (Ctenacanthus ruber Garjajeff, 1901, here selected).

Boeckaxelia Schellenberg, 1940b: 43 (Gammarus carpenteri Dybowsky, 1874, original designation).

Baikal. Head weakly rugose, rostrum large, not erect or weakly erect. Antennae ordinary. Article 2 of antenna 1 longer than half of article 1, article 3 longer than article 2, accessory flagellum 5+ articulate.

Anterior coxae glabrous. Coxa 4 ordinary. Gnathopods 1-2 almost identical, with short lobate wrists, expanded hands only 1.3 times as long as wide, palms scarcely oblique.

Pereopods 3-4 weakly fossorial, articles 4-5 strongly setose posteriorly, setae short. Article 2 of pereopods 5-7 slightly expanded, posterior margin flat, setose.

Uropod 3 variramous, setae [?plumose], article 2 on outer ramus absent. Telson short, broad, cleft only about one third, cleft forming slot.

All pereonites and pleonites 1-5 with low middorsal hump in form of weakly bifid, almost truncate castellae. Pereonites with lateral humps just above coxae.

Relationships.--Differing from Brandtia, Carinurus and Spinacanthus in the more widely expanded hands of the gnathopods and the short cleft of the telson.

Species.--carpenteri (Dybowsky, 1874); c. elegans Dorogostaisky, 1930; c. profundalis Bazikalova, 1945;

potanini (Dorogostaisky, 1922);

rubra (Garjajeff, 1901);

Baikal, 3 species and 2 subspecies.

Coniurus Sowinsky

Figures 32, 35

Coniurus Sowinsky, 1915: 372 (Coniurus palmatus Sowinsky, 1915, selected by Bazikalova, 1945).--Bazikalova, 1945: 117.

Baikal. Head smooth, rostrum small, straight. Antennae ordinary. Article 2 of antenna 1 half as long as article 1, article 3 scarcely shorter than article 2, accessory flagellum 2+ articulate.

Anterior coxae often setose anteriorly but mostly glabrous ventrally. Gnathopod 1 dominant, enlarged, palm broad, slightly oblique on gnathopods 1-2 or occasionally oblique on gnathopod 2, hand often expanded on both gnathopods, wrist short and lobate on gnathopod 1, more elongate and scarcely lobed on gnathopod 2.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-6 pyriform, not expanded, weakly setose posteriorly, of pereopod 7 expanded, not lobate ventrally, moderately setose posteriorly.

Uropod 3 short, magniramous to variramous, setae plumose, article 2 on outer ramus absent. Telson ordinary, deeply cleft.

Pereonites and pleonites 1-3 with weak dorsal midhump, urosomites 1-2 with strong, erect dorsal tooth.

Relationship.--Gnathopods somewhat similar to those of Boeckaxelia; genus differing from Boeckaxelia in dominance of dorsal teeth on urosomites and in diversity of article 2 on pereopods 5-7.

Species.--palmatus Sowinsky, 1915;

radoszkowskii (Dybowsky, 1874);

wadimi Sowinsky, 1915;

Baikal, 3.

#### Gmelinoides Bazikalova

Map 48b

Gmelinoides Bazikalova, 1945: 65 (Brandtia fasciata Stebbing, 1899c, monotypy, = Gammarus zebra Dybowsky, 1874, not Rathke, 1843).

Baikal. Head smooth, rostrum medium to small, straight. Antennae ordinary. Article 2 of antenna 1 slightly more than half as long as article 1, article 3 slightly shorter than article 2, accessory flagellum 1-articulate.

Anterior coxae scarcely setose. Gnathopods of Gammarus-form, gnathopod 1 hand scarcely larger than gnathopod 2.

Pereopods 3-4 [?not fossorial]. Article 2 of pereopods 5-6 broadly to narrowly pyriform, of pereopod 7 expanded, unlobate ventrally, densely setose posteriorly.

Uropod 3 parviramous, setae plumose, article 2 on outer ramus short to vestigial. Telson slightly elongate, fully cleft, well setose-spinose apically, apices pointed.

Some posterior pereonites, and pleonites 1-3 with weak middorsal crest formed of tubercles or rugae, urosomites with spinose dorsal humps.

Relationship.--Scarcely distinct from Gmelina; perhaps slight dominance of gnathopod 1 in Gmelinoides distinctive. Close to Carinogammarus but accessory flagellum small.

Species.--fasciata (Stebbing, 1899c);

fasciatoides (Gurjanova, 1930a), 1951 [074];

Baikal and Yenisei Delta, 2.

Echinogammarus Stebbing

Figures 3, 4, 19, 41, Maps 39-45, 47a, 47b

- Echinogammarus Stebbing, 1899c: 428 (Gammarus berilloni Catta, 1878, selected by Chevreux and Fage, 1925).--Stebbing, 1906: 479.  
Chaetogammarus Martynov, 1924a: 31 (Gammarus tenellus Sars, 1896 = homonym, = Gammarus ischnus Stebbing, 1899c, selected by Stock, 1968).  
Ostiogammarus S. Karaman, 1931: 61 (Gammarus berilloni Catta, 1878, selected by Stock, 1968: 19).  
(Marinogammarus) Schellenberg, 1937g: 270 (Gammarus marinus Leach, 1815, monotypy).--Tzvetkova, 1975c: 80.  
(Homoeogammarus) Schellenberg, 1937g: 272 (Gammarus simoni Chevreux, 1894, here selected).  
(Parhomoeogammarus) Schellenberg, 1943d: 2 (Gammarus lusitanus Schellenberg, 1943d, monotypy).

Body ordinary or occasionally carinate posteriorly, anterior to urosome, urosomites spinose and often humped but not fully pegged or carinate. Rostrum short, lateral cephalic lobes subrounded or quadrate or with sharp corners. Eyes present or rarely absent.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles about 16:12:8, primary flagellum much longer than peduncle, accessory flagellum 2+ articulate, usually 4+.

Ratio of mandibular palp articles about 5:16:13, article 3 clavate or weakly falcate, setae = A(BC)DE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with 11 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of medium length, poorly setose, coxa 1 rectangular, coxa 4 lobate, coxa 5 much shorter than coxa 4. Gnathopods medium to large, weakly diverse, wrists medium to short, weakly lobate or not lobate, hands longer than wrists, usually hand of gnathopod 2 as large as 1, rarely larger, but occasionally much narrower or shorter, palm of gnathopod 1 always more oblique than palm of gnathopod 2 (exceptions present), palms with one or more midspines (rarely absent on gnathopod 2), female gnathopods smaller or thinner than in male, often Eulimnogammarid.

Pereopods 5-7 not elongate, but slightly longer progressively, article 2 weakly expanded or not, poorly or moderately setose posteriorly, posteroventral corners of 5 and 6 often weakly produced.

Rami of uropods 1-2 evenly extended, dorsally spinose, peduncle of uropod 1 typically lacking facial spine or with facial spines. Uropod 3 extended, parviramous to variramous, inner ramus less than 40 percent as long as outer ramus, outer ramus 2-articulate. Telson of ordinary length, deeply cleft, lobes tapering, spinose and setose apically and often spinose or setose basolaterally.

Gills 2-7, broadly expanded, gill of segment 2 often pediculate. Oostegites broad or narrow.

Variations.--Chaetogammarus-Marinogammarus facies defined by Stock (1968): setae fewer or shorter on one of following parts: urosome, coxae 1-4, epimeral ventral edges, posterior margins of pereopods, especially

article 2 of pereopod 7; inner ramus of uropod 3 reaching halfway along outer ramus (finmarchicus).

Relationship.--Like Gammarus but uropod 3 parviramous; distinctions weak.

Species.--\*=Chaetogammarus and Marinogammarus facies;

- 1 acarinatus (Schaferna, 1923a) (G.S. Karaman, 1970a) (= bosnensis S. Karaman, 1934b) [099];
  - 2 adipatus G.S. Karaman and Tibaldi, 1972c [098];
  - 3 afer Stock, 1974b [131];
  - 4 anisocheirus (Ruffo, 1959b) (Pinkster and Stock, 1970a) [112];
  - 5 annandalei Monod, 1924 [135];
  - 6 ?anomalus (Oldevig 1959) [019] (poorly known species);
  - 7 apfelbecki S. Karaman, 1931d (G.S. Karaman, 1971b) [088];
  - 8 aquilifer Pinkster, 1969, 1973b [112];
  - 9 berilloni (Catta, 1878) (Pinkster, 1969, 1973b) [107];
- "be" berytensis Alouf, 1976 [049];
- 10 bolo Karaman and Tibaldi, 1972c [102];
  - 11 calvus (Margalef, 1956) (Pinkster, 1973b) [114];
  - 12 ?camylops (campylops) Leach, 1814a (Sexton and Spooner, 1940) (Stock and Kant, 1966) (poorly known) [126];
- "ca" cannubinensis Alouf, 1975 [049];
- 13 cari (S. Karaman, 1931b) (= acarinata of Pljakic, 1962b) (G.S. Karaman, 1973c) [087];
  - 14 \*dahli (Stock, 1968) [100];
- ebusitanus (Margalef, 1951b, 1953) (G.S. Karaman, 1977i) [106];
- 15 echinsetosus Pinkster, 1973b [114];
  - 16 eisentrauti (Schellenberg, 1937g) (Stock, 1968) [117F];
  - 17 feminatus Pinkster, 1973b [112];
  - 18 \*finmarchicus (Dahl, 1938) (Tzvetkova, 1975a) [250];

- 19 foxi (Schellenberg, 1928) (Stock, 1968, G.S. Karaman, 1971b, 1972b) [340];
- 20A \*ischnus (Stebbing, 1899c) (= tenellus Sars, 1896, homonym to Dana, 1852a, 20M i. major Carausu, 1943 (Dediu, 1967a) [337 + 085]
- 21A klaptoczi Schaferna, 1908a (= ebusitanus Margalef, 1951b) (Stock, 1978c) [133 and 118];
- 22 lochites (Margalef, 1956) (Pinkster and Stock, 1972) [114];
- 23 longisetosus Pinkster, 1973b [114];
- 24 lusitanus (Schellenberg, 1943d) (Pinkster and Stock, 1972) [114];
- 25 macrocarpus (Stock, 1969a) (Pinkster, 1973a) [114];
- 26 margalefi Pinkster, 1973b [114];
- 27 marinus (Leach, 1815) (incl. var. villosa Sowinsky, 1898a) (Tzvetkova, 1975a) [240];
- 28 meridionalis Pinkster, 1973b [114];
- 29 obtusatus (Dahl, 1938) (Tzvetkova, 1975c) [114];
- 30 obtusidens Pinkster and Stock, 1972 [114];
- 31 \*olivii (Milne Edwards, 1830) (= atlanticus Dahl, 1958) (Stock, 1968) [105];
- 32 pacaudi Hubault and Ruffo, 1956b (Goedemakers and Roux, 1975) [111];
- "pa" palmyrensis Alouf, 1975 [049];
- 33 \*pauxillus (Sars, 1896) (Birstein and Romanova, 1968);  
p. hyrcanus Pjatakova, 1962b [332].
- 34 pinkstersi van Maren, 1973 [098];
- 35 \*piriloti (Sexton and Spooner, 1940) [240];
- 36 \*placidus (Sars, 1896) (Carausu et alia, 1955) [336];
- pseudoaquilifer Platvoet and Pinkster, 1980 [114];
- 37A pungens (Milne Edwards, 1840) (G.S. Karaman, 1969c, 1974d),  
37B p. carinata (Schaferna, 1923a), 37C p. carinata (homonym) (Pljakic, 1962b); 37D p. catalaunicus (Margalef, 1953),  
37E p. minoricensis (Margalef, 1952) [340];
- "ra" rashiini Alouf, 1976 [049];

- 38 roco G.S. Karaman, 1973c, 1974d [098];
- 39 ruffoi Pinkster and Stock, 1970b (G.S. Karaman, 1974d) [098];
- 40 scutarensis (Schaferna, 1923b) (Stock, 1968) (G.S. Karaman, 1969c) [087];
- 41A sicilianus Karaman and Tibaldi, 1972c [104];  
41B s. monomerus Stock, 1978c [117];
- 42 simoni (Chevreux, 1894) (Pinkster and Stock, 1972) [133];
- 43 sowinskyi (Behning, 1914c, 1914a) (= behningi Martynov, 1919, not seen) (Stock, 1968; Jazdzewski, 1975, 1980) [335];
- 44 spinulicornis Pinkster and Stock, 1971 [108];
- 45 stammeri (S. Karaman, 1931c) (= fluminensis Pinkster and Stock, 1970b) (= ?bosnensis S. Karaman, 1934b) (G.S. Karaman, 1974d), s. visualis G.S. Karaman, 1974d [099];

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 1 also provisionally put in acarinatus by G.S. Karaman, 1974f  
 and may be cari.  
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- 46 stocki G.S. Karaman, 1970a, 1974d [105];
- 47 stoerensis (Reid, 1938) (Bousfield, 1973, Tzvetkova, 1975a) [250];
- 48A tabu G.S. Karaman, 1971d; 48B t. mutus Karaman and Tibaldi, 1972c (G.S. Karaman, 1974d) [098 + 108]; 48C t. arcadiensis Alouf, 1975 [049].
- 49 tacapensis (Chevreux and Gauthier, 1924) (including minor) (Pinkster and Stock, 1972) [135];
- 50 tarragonensis Pinkster, 1973b [114];
- 51A thoni (Schaferna, 1923b) (Stock, 1968); 51B t. antalyae G.S. Karaman, 1971b, 51C t. semicarinatus (S. Karaman, 1934b) (Stock, 1968 is uncertain about) [005];
- 52 tibaldii Pinkster and Stock, 1970b [098];
- 53 toletanus (Pinkster and Stock, 1970a, 1972) [114];
- 54 \*trichiatus (Martynov, 1932) [337] also see Dikerogammarus;
- "tr" tripoliensis Alouf, 1976 [049];

55 veneris (Heller, 1865) (= pungentiformis Schaferna, 1920, 1923b)  
 (= beieri S. Karaman, 1930) (= padanus Maccagno and Cuniberti, 1956)  
 (Stock, 1968) (Pinkster and Stock, 1970b) (G.S. Karaman, 1971d) [340];

56 villaticus Mateus, 1974b [114];

57 \*warpachowskyi (Sars, 1894a) (Mordukhai-Boltovskoi, 1969)  
 (Jazdzewsky, 1980) [335];

58 zebrinus Pinkster and Stock, 1971 (Pinkster, 1973b) [114];

West Palearctic freshwaters, marine [8], often amphiatlantic,  
 PontoCaspian [7], 58 species and 10 subspecies.

#### Eulimnogammarus Bazikalova

Figures 17, 29, 30, 31

Eulimnogammarus Bazikalova, 1945: 200 (Gammarus verrucosus  
 Dybowsky, 1874, original designation).

Baikal. Article 2 of antenna 1 as long as or slightly shorter than article 2, article 3 shorter than article 2, accessory flagellum 3+ articulate.

Coxae 1-4 glabrous. Coxa 1 significantly shortened (G.S. Karaman, in litt.). Gnathopods of Eulimnogammarid form (gnathopod 1 only weakly dominant in type).

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 not expanded, not setose posteriorly.

Uropod 3 elongate, strongly setose, variramous, but inner ramus much less than 0.30 times as long as outer ramus, article 2 on outer ramus absent or vestigial. Telson ordinary to short, strongly spinose.

Body untoothed, pleosome and urosome dorsally spinose.

Relationship.--Differing from Echinogammarus and Heterogammarus in the shortened coxa 1.

Species.--?borealis (Sowinsky, 1915);

burkani Bazikalova, 1945;

cruentus (Dorogostaisky, 1930);

cyanoides (Sowinsky, 1915);

czerskii (Dybowsky, 1874);

grandimanus Bazikalova, 1945;

heterochirus Bazikalova, 1945;



lividus (Dybowsky, 1874), l. angarensis (Dorogostaisky, 1917);  
maackii (Gerstfeldt, 1858);  
verrucosus (Gertsfeldt, 1858), v. oligocanthus Bazikalova, 1945;  
viridiformis (Sowinsky, 1915);  
 Baikal, 11 species and 2 subspecies.

Corophiomorphus Bazikalova

Figure 29

(Corophiomorphus) Bazikalova, 1945: 257 (Gammarus sophiae Dybowsky, 1874, here designated).

Baikal. Article 2 of antenna 1 longer than article 1, article 3 much shorter than article 1 (type) accessory flagellum 5+ articulate.

Coxae 1-4 glabrous; [?coxa 1 significantly shortened]. Gnathopods of Eulimnogammarus form.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 unexpanded, often linear, not setose posteriorly.

Uropod 3 elongate, moderately setose, setae [?plumose], variramous, inner ramus less than half as long as outer, article 2 on outer ramus well developed. Telson slightly elongate, almost fully cleft, moderately setospinose.

Pleosome and urosome dorsally spinose.

Relationship.--Differing from Heterogammarus in the pleosomal spination and somewhat shorter inner ramus of uropod 3; from Eulimnogammarus in the well developed article 2 on the outer ramus of uropod 3; from Philolimnogammarus, Eurybiogammarus, Fluviogammarus in the unproduced posteroventral corner of article 2 on pereopods 5-7.

Species.--calceolatus (Sowinsky, 1915);

crassicornis (Sowinsky, 1915);

gracilicornis Bazikalova, 1945;

ignotus (Dybowsky, 1874) [new transfer];

kietlinskii (Dybowsky, 1874) (= intermedius Sowinsky, 1915);

laevis (Sowinsky, 1915);

macrophthalmus Bazikalova, 1945;

pachycerus Bazikalova, 1945;

sophiae (Dybowsky, 1874) (= strenuus Sowinsky, 1915);

stanislavi (Dybowsky, 1874);

tenuipes (Sowinsky, 1915);

Baikal, ll.

#### Sarothrogammarids

One or more of the following characters present: either article 4 or 5 of either pereopod 3 or 4 or both with 10 or more transverse rows (fans) of posterior setae ("filtrative"); or uropod 1 reduced in size or armaments on rami reduced.

Antenna 1 of Gammarus-form; body pigments absent; gnathopod 2 as large as gnathopod 1.

Remarks.--In this group descriptive constraints of the basic diagnosis concerning pereopods 3-4 are removed; they are always described.

#### Key to the Genera of Sarothrogammarids

1. Dorsal spines on rami of uropod 1 absent . . . . . 2  
Dorsal spines on rami of uropod 1 present. . . . . 4
2. Pereopod 3 not filtrative, dorsum of urosome unarmed. . . . . Neogammarus  
Pereopod 3 filtrative, dorsum of urosome spiniferous. . . . . 3
3. Plates of maxilla 2 and maxilliped very broad. . . . . Longigammarus  
Plates of maxilla 2 and maxilliped ordinary . . . . . Rhipidogammarus
4. Pereopod 4 filtrative. . . . . Comatogammarus  
Pereopod 4 not filtrative. . . . . 5
5. Article 2 of pereopods 5-7 strongly setose. . . . . Pectenogammarus  
Article 2 of pereopods 5-7 not strongly setose . . . . . 6
6. Palm of male gnathopod 2 straight, with midpalmar spine,  
telson with apical setae and spines . . . . . 7  
Palm of male gnathopod 2 concave or sinuous, without mid-palmar  
spine, telson with apical spines but no apical setae. . . . . 8
7. Body without pigment, male pereopod 3 of filtrative  
form. . . . . Sarothrogammarus  
Body with pigment, pereopod 3 ordinary . . . . . Echinogammarus
8. Article 2 on outer ramus of uropod 3 well developed. . . . . Lusigammarus  
Article 2 on outer ramus of uropod 3 vestigial . . . . . Tadzhikistania

#### Sarothrogammarus Martynov

Map 46

Sarothrogammarus Martynov, 1935b: 487 (Sarothrogammarus asiaticus Martynov, 1935b, original designation).--Stock, 1971: 106.

Body unpigmented, urosomites dorsally spinose but spines reduced. Lateral cephalic lobes well developed, rounded, or subquadrate, or mammilliform.

Antennae of medium extension, antenna 1 longer than 2, ratio of peduncular articles = 20:12:9, primary flagellum longer than peduncle, accessory flagellum 2-4 articulate. Antenna 2 without calceoli in male.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [toothed, molar triturative, ratio of palp articles = 25:12:9] setae of article 3 = ABCDE. Inner lobes of labium [?present]. Maxillae [?medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with 29 spines], palps asymmetric. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than article 3, unguiform, without nail].

Coxae of ordinary dimensions, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods medium to large, wrists poorly lobate, wrist of male gnathopod 1 of medium length, hand ovate, palm oblique, slightly excavate, without or with midpalmar spine(s), gnathopod 2 like gnathopod 1 but wrist longer, with more transverse rows of armaments than on hand, hands alike, or gnathopod 2 rectangular, palms alike or gnathopod 2 rectangular, palms alike or gnathopod 2 less oblique, weakly excavate or not, with or without mid-palmar spines (or displaced to face of hand); female gnathopods much smaller than in male, wrists more elongate, hands more slender, more rectangular, palms alike, oblique, unspined.

Pereopod 3 of filtrative form in male only. Article 2 of pereopods 5-7 of narrow or pyriform shape, tapering distally, scarcely or not produced posterodistally, poorly setose posteriorly and facially.

Uropod 1 ordinary, rami with dorsal spines, apical spine(s) large, uropod 2 ordinary, outer rami of uropods 1-2 not shortened, uropod 1 lacking basofacial spine. Uropod 3 extended, parviramous, article 2 on outer ramus very weak or vestigial. Telson ordinary to short, deeply or fully cleft, apices tapering, spinose and setose, without or with lateral or basolateral spines.

Coxal gills [2-7], broad. Oostegites [?broad or narrow].

Variants.--Palms lacking midspines (asiaticus females); telson with lateral spines (multipennatus); oostegites narrow (lindbergi).

Relationship.--Differing from Echinogammarus in the lack of body pigment, filtrative male pereopod 3, modified carpus of gnathopod 2 (trapezoidal to linear and with more rows of transverse armaments than hand), and generally in the reduced article 2 on the outer ramus of uropod 3. Differing from Tadzhikistania in the filtrative pereopod 3 of the male, the sinuous or nonconvex posterior margins of article 2 on pereopods 5-7.

See Lusigammarus.

Species.--afghanus (Ruffo, 1958b) [036];

asiaticus Martynov, 1935 [036];

contiguus G.S.Karaman, 1977c [036];

lindbergi G.S. Karaman, 1969d [036];

multipennatus G.S. Karaman, 1969d [036];

trichiatus Stock, 1971 [036];

Asia, Turkestan, Afghanistan, Gazestan, caves and mountain torrents to altitudes of 3000 m, 6.

Tadzhikistania Barnard and Barnard, new genus

Figure 15, Map 24

Type species.--Sarothrogammarus ruffoi G.S. Karaman, 1971a, original designation.

Body unpigmented, urosomites with dorsal spines reduced. Lateral cephalic lobes well developed, rounded, quadrate.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 27:19:12, primary flagellum longer than peduncle, accessory flagellum 3-articulate. Antenna 2 without calceoli in male.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative], ratio of palp articles = 6:15:13, setae of article 3 = ABCDE. Inner lobes of labium [?absent present]. Maxillae [?medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with 7 spines], palps asymmetric. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than article 3, unguiform, without nail].

Coxae of ordinary dimensions, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods medium to large, wrists poorly lobate, wrist of male gnathopod 1 of medium length, hand ovate, palm oblique, straight without midpalmar spine(s), gnathopod 2 like gnathopod 1 but wrist shorter, with as many rows of armaments as hand, hands alike, palms alike, not excavate, without midpalmar spines; female gnathopods much smaller than in male, wrists not more elongate, hands more slender, more rectangular, palms alike, oblique, lacking spines.

Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 of narrow and pyriform shape, tapering distally, scarcely or not produced posterodistally, poorly setose posteriorly and facially.

Uropod 1 ordinary, rami with dorsal spines, apical spine(s) ordinary, uropod 2 ordinary, outer rami of uropods 1-2 not shortened, uropod 1 lacking basofacial spine. Uropod 3 extended, parviramous, article 2 on outer ramus vestigial. Telson ordinary to short, deeply cleft, apices tapering, spinose only, without lateral or basolateral spines.

Coxal gills [?2-7, broad]. Oostegites [?broad narrow].

Relationship.--Like Lusigammarus but article 2 on outer ramus of uropod 3 completely vestigial, not readily visible among apical spines of article 1. The wrist of male gnathopod 2 is not modified. Differing from Echinogammarus in the loss of body pigment, vestigial article 2 on the outer ramus of adult uropod 3, reduced urosomal spination, but pereopods 3-

4 not filtrative (as in Echinogammarus). Differing from taxa in the Metohia group by the sinuous or concave posterior margins on article 2 of pereopods 5-7.

Species.--ruffoi (G.S. Karaman, 1971a) [036];

shadini (Birstein, 1948a) [036];

Tadzhikistan, Afghanistan, high altitude, epigeal, 2.

Lusigammarus Barnard and Barnard, new genus

Map 45

Type species.--(Gammarus guernei Chevreux, 1889, original designation).

Body unpigmented, urosomites dorsally spinose. Lateral cephalic lobes rounded or quadrate.

Antennae elongate, antenna 2 longer than 1, ratio of peduncular articles = 23:15:10, primary flagellum longer than peduncle, accessory flagellum 3-articulate. Antenna 2 without calceoli in male.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative], ratio of palp articles = 5:19:15, setae of article 3 = ABCDE. Inner lobes of labium [?present]. Maxillae [?medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with 29 spines], palps asymmetric. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than article 3, unguiform, without nail].

Coxae of ordinary dimensions, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods medium to large, wrists poorly lobate, wrist of male gnathopod 1 of medium length, hand ovate, palm oblique, excavate, with or without midpalmar spine(s), gnathopod 2 like gnathopod 1 but wrist shorter, with more transverse rows of armaments than on hand, hand more rectangular, palm less oblique, excavate, without mid-palmar spines; female gnathopods much smaller than in male, wrists more elongate, hands more slender, more rectangular, palms alike, oblique, lacking spines.

Pereopod 3 of filtrative form in male only or occasionally female. Article 2 of pereopods 5-7 of narrow or pyriform shape, tapering distally, scarcely or not produced posterodistally, poorly setose posteriorly and facially.

Uropod 1 ordinary, rami with dorsal spines, apical spines ordinary, uropod 2 ordinary, outer rami of uropods 1-2 not shortened, uropod 1 lacking basofacial spine. Uropod 3 extended, parviramous, article 2 on outer ramus moderately developed. Telson ordinary to short, fully cleft, apices tapering, spinose only, with lateral or dorsal spines.

Coxal gills [?2-7] broad, some pediculate and 2-articulate. Oostegites [broad narrow].

Relationship.--Differing from Sarothrogammarus in the absence of apical telsonic setae (bearing spines only), the absence of midpalmar spines on male gnathopod 2 (and often gnathopod 1).

Differing from Echinogammarus in the loss of body pigment, the

filtrative pereopod 3 of the male, and the modified wrist of female gnathopod 2.

Species.--catacumbae (G.S. Karaman and Ruffo, 1977) [104];

guernei (Chevreux, 1889a) (Stock, 1971) [359F];

madeirensis (Dahl, 1958) (Stock, 1971) [357F];

Azores and Madeira, Sicily, springs and brooks, 3.

Comatogammarus Stock

Figures 5, 16, Map 46

Comatogammarus Stock, 1971: 114 (Sarothrogammarus ferghanensis Martynov and Behning, 1948, original designation).

Body [?ordinary, unpigmented, urosomites free], dorsal spines reduced. Rostrum [?small, lateral cephalic lobes well developed, rounded, quadrate, sinus present].

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = ? [ : : ], primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 without calceoli in male.

Labrum [?broader than long, entire, rounded]. Mandibular [?incisor toothed, molar triturative], ratio of palp articles = 5:18:15, setae of article 3 = ABCDE. Inner lobes of labium [?absent]. Maxillae [?medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with ? spines, palps asymmetric]. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than article 3, unguiform, without nail].

Coxae of ordinary dimensions, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods medium to small, alike, wrists poorly lobate, of medium length, hand ovate, palm oblique, straight, with midpalmar spine(s), only on gnathopod 1, gnathopod 2 with trapezoidal wrist with more transverse rows of armaments than on hand; female gnathopods smaller than in male.

Pereopods 3-4 of filtrative form in male but not in female. Article 2 of pereopods 5-7 of narrow or pyriform shape, tapering distally, scarcely or not produced posterodistally, poorly setose posteriorly and facially.

Uropod 1 ordinary, rami with dorsal spines, apical spines immense, uropod 2 ordinary, outer rami of uropods 1-2 shortened, uropod 1 lacking basofacial spine. Uropod 3 extended, parviramous, article 2 on outer ramus moderately vestigial or absent. Telson ordinary to short, fully cleft, apices tapering, spinose and poorly setose, without lateral spines.

Coxal gills 2-7, ovate or pyriform. Oostegites narrow.

Relationship.--Differing from Echinogammarus in the reduced spiny armament on the urosome, loss of body pigment. Differing from Sarothrogammarus, Lusigammarus and Tadzhikistania in the filtrative pereopod 4 of the male.

Species.--ferghanensis Martynov and Behning, 1948 [036];  
Tadzhikistan, cold spring, 3000 m altitude, 1.

Pectenogammarus Reid

Figure 2, Map 45

Gammarus (Pectenogammarus) Reid, 1940: 287 (Gammarus  
[Pectenogammarus] planicrurus Reid, 1940, original designation).

Body unpigmented, urosomites dorsally spinose. Lateral cephalic lobes well developed, quadrate.

Antennae elongate, antenna 1 scarcely longer than 2, ratio of peduncular articles = 22:14:8, primary flagellum longer than peduncle, accessory flagellum 5-articulate. Antenna 2 with calceoli in male.

Labrum [?broader than long, entire, rounded]. Mandibular incisor toothed, molar triturative, ratio of palp articles = 4:11:11, setae of article 3 = ABCDE. Inner lobes of labium [?present]. Maxillae [?medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with ?11 spines, palps asymmetric]. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than article 3, unguiform, with nail].

Coxae of ordinary dimensions, strongly setose, coxa 1 weakly expanded apically, coxa 4 lobate. Gnathopods medium to large, wrists poorly lobate; wrist of male gnathopod 1 of medium length, hand ovate, palm oblique, excavate, with midpalmar spine(s), gnathopod 2 like gnathopod 1 but larger, wrist not modified, with fewer transverse armaments than hand, hand more rectangular, palm less oblique, not excavate, with midpalmar spines; female gnathopods much smaller than in male, wrist of gnathopod 2 more elongate, hands more slender, more rectangular, palms alike, scarcely oblique.

Pereopod 3 of weakly filtrative form in male only. Article 2 of pereopods 5-7 of weakly pyriform shape, tapering distally, scarcely or not produced posterodistally, in male strongly, setose posteriorly, posterior margins convex.

Uropods 1-2 ordinary, but peduncles setose, rami with dorsal spines, apical spine(s) not immense, outer rami of uropods 1-2 not shortened, uropod 1 bearing facial setae. Uropod 3 extended, parviramous, article 2 on outer ramus moderately developed. Telson ordinary to short, fully cleft, apices tapering, setose, also with lateral or basolateral setae.

Coxal gills [?2-7] broad, occasionally pediculate. Oostegites narrow.

Relationship.--Differing from Echinogammarus in the filtrative pereopod 3 of the male, the extreme density of posterior setation on article 2 of pereopods 5-7, combined with dense setation on coxae 1-4.

Species.--planicrurus Reid, 1940 (Kant, et alia, 1968a) [352];

British Isles, western Mediterranean, brackish-cobble seashore, 1.

Neogammarus Ruffo

Figures 9, 23, 41, 44, Map 45

Gammarus (Neogammarus) Ruffo, 1937e: 442 (Gammarus [Neogammarus] festae Ruffo, 1937e, selected by Dahl, 1958).--Stock, 1971: 96.

Body unpigmented, urosomites dorsally naked. Lateral cephalic lobes well developed, sinuous-quadrate.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 19:15:8, primary flagellum slightly longer than peduncle, accessory flagellum 5-articulate. Antenna 2 with calceoli in male.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative,] ratio of palp articles = 5:15:13, setae of article 3 = AB(C)DE. Inner lobes of labium [?absent]. Maxillae medially setose, inner plate of maxilla 1 [?ovate, fully setose medially, outer plate with ? spines], palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of ordinary dimensions, or elongate, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods medium to large, wrists poorly lobate, wrist of male gnathopod 1 of medium length, poorly lobate, hand ovate, palm oblique, excavate, with midpalmar spine(s), gnathopod 2 like gnathopod 1 but wrist shorter, with fewer transverse rows of armaments than on hand, hand more rectangular, larger, palm less oblique, sinuous, with midpalmar spine(s); female gnathopods much smaller than in male, wrists more elongate, hands more slender, more rectangular, palms alike, oblique.

Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 variable, of narrow or pyriform shape, tapering distally, scarcely or not produced posterodistally, poorly setose posteriorly and facially.

Uropod 1 shortened, rami without dorsal spines, apical spine(s) of uropod 1-2 immense, otherwise uropod 2 ordinary, outer ramus of uropod 1 shortened, uropod 1 lacking basofacial spine. Uropod 3 extended, parviramous, article 2 on outer ramus moderately developed. Telson ordinary to short, fully cleft, apices tapering, spinose and setose, also with lateral setae or thin spines.

Coxal gills [?2-7, broad]. Oostegites narrow.

Variants.--Article 2 of pereopods 5-7 rather strongly expanded basally, then narrowed abruptly, thus with posterior margin strongly excavate (festae); uropods 1-2 with occasional seta on peduncle or rami (festae); articles 4-6 of pereopods 5-7 slightly expanded (all species).

Relationship.--Differing from Echinogammarus in the lack of body pigment, the unarmed urosome, lack of dorsal spines on the rami of uropod 1. Like Longigammarus but urosome unarmed and mouthparts normal; like Rhipidogammarus but pereopod 3 not filtrative and urosome naked.

Species.--adriaticus G.S. Karaman, 1973i [345];

festae Ruffo, 1937e (Stock, 1971) [348];

nudus Stock, 1971 [348]; Mediterranean Sea, cobble-brackish seashore, 3.



Longigammarus G.S. Karaman

Figures 8, 9, 19, Map 45

Neogammarus (Longigammarus) G.S. Karaman, 1970b: 125 (Neogammarus [Longigammarus] bruni G.S. Karaman, 1970b, monotypy).--Stock, 1971: 126.

Body unpigmented, urosomites dorsally spinose, spines reduced. Lateral cephalic lobes well developed, quadrate.

Antennae elongate, antenna 1 scarcely longer than 2, ratio of peduncular articles = 22:20:12, primary flagellum longer than peduncle, accessory flagellum 4-articulate. Antenna 2 without calceoli in male.

Mandibular incisor [?toothed], molar triturative, ratio of palp articles = 6:18:16, setae of article 3 = ABCDE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 [?ovate, fully setose medially], outer plate with 11 finely pectinate spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae, outer plate widened. Inner plate of maxilliped widened. Coxae of ordinary dimensions or elongate, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopods medium to large, wrists poorly lobate, wrist of male gnathopod 1 of medium length, hand ovate, palm oblique, excavate, without midpalmar spine, gnathopod 2 like gnathopod 1 but wrist shorter, with more transverse rows of armaments than on hand, hand more rectangular, palm less oblique, not excavate, without midpalmar spines; female gnathopods much smaller than in male, wrists more elongate, hands more slender, more rectangular, palms alike, oblique.

Pereopod 3 of filtrative form in male and female. Article 2 of pereopods 5-7 of narrow form, tapering distally, not lobate posterodistally, poorly setose posteriorly and facially, though with a few stout spines!

Uropod 1 shortened, rami without dorsal spines, apical spine(s) large, uropod 2 ordinary, outer ramus of uropod 1 shortened, uropod 1 lacking basofacial spine.

Uropod 3 extended, parviramous, article 2 on outer ramus poorly developed. Telson of ordinary length, fully cleft, apices tapering, spinose also with lateral spines.

Coxal gills [?2-7], broad. Oostegites narrow.

Relationship.--Like Echinogammarus and Rhipidogammarus but outer plate of maxilla 2 and inner plate of maxilliped broadened; body lacking pigment, rami of uropod 1 lacking dorsal spines.

See Neogammarus.

Species.--bruni G.S. Karaman, 1970b (Stock, 1971) [348];

France, Mediterranean, cobble-brackish seashore, 1.

Rhipidogammarus Stock

Figures 10, 13, 23, 24, Maps 38, 45

Rhipidogammarus Stock, 1971:114 (Gammarus rhipidophorus Catta, 1878, original designation).

Body unpigmented, urosomites free, dorsally spinose but spines reduced in size. Lateral cephalic lobes well developed, quadrate.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 23:19:10, primary flagellum longer than peduncle, accessory flagellum 4-articulate. Antenna 2 without calceoli in male.

Ratio of mandibular palp articles = 6:15:12, setae of article 3 = ABCDE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl [?without nail].

Coxae of ordinary dimensions to elongate, poorly setose, coxa 1 rectangular, coxa 4 weakly lobate. Gnathopods medium, wrists poorly lobate, wrist of male gnathopod 1 of medium length, hand rectangular, palm oblique, excavate, without midpalmar spine(s), gnathopod 2 like gnathopod 1 but wrist shorter, with more transverse rows of armaments on hand, palm without midpalmar spines; female gnathopods scarcely different from male, palms not excavate.

Pereopod 3 of weakly filtrative form in male and to large extent in female. Article 2 of pereopods 5-7 of narrow or pyriform shape, tapering distally, scarcely or not produced posterodistally, poorly setose posteriorly and facially.

Uropod 1 shortened, rami of uropods 1-2 without dorsal spines, apical spine(s) immense, outer rami of uropods 1-2 shortened, uropod 1 lacking basofacial spine. Uropod 3 extended, parviramous, article 2 on outer ramus poorly developed. Telson ordinary to short, deeply cleft, apices tapering, spinose only, also with lateral spines.

Coxal gills [?2-7], ovate. Oostegites narrow.

Variants.--Uropod 3 variramous or parviramous in some species (variicauda).

Relationship.--Differing from Echinogammarus in the loss of dorsal spines on the rami of uropod 1.

See Neogammarus and Longigammarus.

Species.--karamani Stock, 1971 [105];

rhipidophorus (Catta, 1878) (Chevreux and Fage, 1925) [100];

variicauda Stock, 1978a [117];

western Mediterranean, brackish-cobble seashore and interstitial environment to 100 m altitude, 3.

Copy 104

*Strongly groundwater -  
most real stephobond  
gammarids here*

## Metohiids

Of Gammarus-form but article 2 of pereopods 5-7 almost evenly expanded, posterior margins almost evenly convex posteriorly.

Transitional outward from Gammarus lacustris forms such as shown by Ueno (1934b, identified as G. pulex).

See Fluviogammarids to follow.

Key to the Genera of Metohiids

1. Article 2 on outer ramus of uropod 3 ordinary, palps of maxilla 1 asymmetric . . . . . 2  
Article 2 on outer ramus of uropod 3 vestigial or absent, palps of maxilla 1 symmetric (or very weakly asymmetric) . . . . . 4
2. Uropod 3 parviramous . . . . . Ilvanella  
Uropod 3 vari to magniramous . . . . . 3
3. Pleosome with pairs of dorsal teeth, inner ramus of uropod 3 elongate (magniramous) . . . . . Metohia  
Pleosome lacking teeth, inner ramus of uropod 3 short (but variramous) . . . . . Anopogammarus
4. Outer plate of maxilla 1 superspinose, of filtrative form, peduncle of antenna 1 short . . . . . Zenkevitchia  
Outer plate of maxilla 1 with 11 normal spines, not superspinose, peduncle of antenna 1 ordinary . . . . . 5
5. Outer plate of maxilla 2 with lateralmost 3-4 spines untoothed and blade-like . . . . . Fontogammarus  
Outer plate of maxilla 1 with lateralmost 3-4 spines ordinary, densely pectinate, not blade-like . . . . . 6
6. Uropod 3 extended . . . . . Tadzocrangonyx  
Uropod 3 not extended, outer ramus short . . . . . 7
7. Anterior coxae diamond shaped or trapezoidal, spines on maxilla 1 superpectinate . . . . . Typhlogammarus  
Anterior coxae rectangular, spines on maxilla 1 ordinary . . . . . Accubogammarus

Anopogammarus Derzhavin, revised

Map 45

Anopogammarus Derzhavin, 1945b:43 (Anopogammarus birsteini Derzhavin, 1945b, monotypy).--Birstein and Levuschkin, 1970: 1478.

Body smooth (type) or with 4 groups of strong spines on dorsal surface of metasomites (revasi). Rostrum short, lateral cephalic lobes acute. Eyes absent.

Antennae elongate; antenna 1 longer than 2, peduncular articles progressively shorter, primary flagellum elongate, accessory flagellum 4-articulate.

Ratio of mandibular palp articles = 6:19:15, article 3 weakly falcate, setae = BDE. Maxillae fully setose medially, inner plate of maxilla 1

triangular, fully setose medially, outer plate with 11 spines, palps asymmetrically armed, stout, slightly expanded distally, article 1 short. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of moderate length, ventral margins lacking long setae; coxa 1 quadrate, coxa 4 lobate. Gnathopods large, almost identical, but gnathopod 1 scarcely smaller than gnathopod 2, wrists short, lobed, hand Gammarus-like, elongate, palms almost identical, very oblique, long, with one spine near middle.

Pereopods 5-7 of medium length, almost of equal proportions, article 2 alike, scarcely expanded, tapering distally, posterior margin weakly sinuous, or weakly convex, with short setae, posteroventral corner weakly lobate (protuberant).

Rami of uropods 1-2 extending equally, each ramus with marginal spine (possibly one absent in revasi), uropod 1 peduncle with basofacial spine [unknown in revasi]. Uropod 3 not extended, variramous, inner ramus reaching about halfway along article 1 of outer ramus, with few marginal setae or spines, outer ramus 2-articulate (type) or 1-articulate (revasi). Telson of ordinary length, fully cleft, apices tapering, spinose, type with basolateral spines.

Coxal gills 2-7, ovate to adze-shaped. Oostegites very broad.

Relationship.--Differing from Echinogammarus in the very weak lobation of pereopods 5-7; differing from Zenkevitchia in the normal outer plate of maxilla 1 not grossly modified for filtration, in the large palp of maxilla 1, the normally short inner plate of the maxilliped; from Typhlogammarus, Accubogammarus and Fontogammarus in the asymmetric palps of maxilla 1 bearing apical spines and from Metohia in the uncarinate body, variramous (not magniramous) uropod 3. Ilvanella differs from Anopogammarus in the parviramous uropod 3.

Notes.--Anopogammarus revasi was originally described in Zenkevitchia but that genus is to be constrained to species with the mop-like maxilla 1 of filtrative form in which dozens of spines occur on the outer plate and the palp is much reduced.

Species.--birsteini Derzhavin, 1945y [not seen] [066];

revasi (Birstein and Levuschkin, 1970) [066];

Transcaucasus, hypogean, 2.

#### Ilvanella Vigna-Taglianti

Map 45

Ilvanella Vigna-Taglianti, 1971: 39 (Ilvanella inexpectata Vigna-Taglianti, 1971, original designation).

Urosomites weakly setospinose dorsally. Lateral cephalic lobes acute-falcate. Eyes absent.

Antennae elongate, antenna 1 much longer than 2, but peduncle short, ratio of peduncular articles = 25:18:13, primary flagellum much longer than peduncle, accessory flagellum 5-articulate.

Ratio of mandibular palp articles = 8:23:20, article 3 falcate, setae = ACDE. Inner lobes of labium indistinct. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 11 spines, palps 2-articulate, asymmetric. Inner plate of maxilla 2 with oblique row of facial setae.

Coxae of medium size, coxa 1 quadrate, coxa 4 lobate; coxae 1-4 moderately setose ventrally though with naked margins in middle or long asetose gaps. Gnathopods of medium size, sexes alike, wrists of medium length, scarcely lobed, hands rectangular, palms weakly oblique, lined with weakly bifid spines, gnathopod 2 larger than 1.

Pereopods 5-7 of medium length, 6 weakly the longest, article 2 almost identical, moderately expanded, with poorly setose convex posterior margin and very weak, almost pointed posteroventral lobe (corners protuberant).

Outer ramus of uropod 1 shortened, rami of first 2 pairs with marginal spines, peduncle of uropod 2 with basofacial spine. Uropod 3 extended, parviramous, outer ramus elongate, moderately spinose and setose, article 2 short but well distinct. Telson of ordinary length, cleft almost to base, lobes tapering, each with 3 apical spines and 1 lateral spine (and rarely other spines dorsally).

Coxal gills 2-6, ovate, some strongly pediculate. Oostegites narrow.

Relationship.--Differing from other members of its group such as Anopogammarus, Metohia, and Accubogammarus in the parviramous uropod 3; from Fontogammarus, Typhlogammarus and Accubogammarus in the asymmetric palps of maxilla 1; generally distinctive on account of palmar spination. Differing from Echinogammarus in the protuberant posteroventral corner on article 2 of pereopods 5-7 and the evenness of that article on all three pairs of pereopods.

Species.--inexpectata Vigna-Taglianti, 1971 [098]; Elba Island, hypogean, 1.

#### Metohia Absolon

Figures 10, 12, Map 45

Metohia Absolon, 1927: 294 (Metohia carinata Absolon, 1927, original designation).--G.S. Karaman, 1974b: 54.

Body of ordinary shape but pereonite 7 and pleonites 1-3 each with pair of dorsolateral teeth (one on each side only); urosomites setose and spinose dorsally. Lateral cephalic lobes softly subquadrate. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 30:21:15, primary flagellum much longer than peduncle, accessory flagellum 4-5 articulate. Antenna 2 peduncle rather heavily setose.

Ratio of mandibular palp articles = 6:17:16, article 3 falcate, setae = ADE. Inner lobes of labium absent. Maxillae setose medially, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 11 ordinary spines, palps 2-articulate, asymmetric.

Coxae long, coxa 1 subquadrate, coxa 4 lobate; coxae 1-4 poorly setose ventrally, setae either sparse, short or long naked gaps present. Gnathopods of medium size, sexes nearly identical, gnathopod 2 longer than 1, wrists unlobed, wrist of gnathopod 1 of medium-short length, of gnathopod 2 longer, hands ovate, palms oblique but palm of gnathopod 2 more strongly oblique than on gnathopod 1, hand of male gnathopods almost of same width, of female gnathopod 2 narrower than of female gnathopod 1.

Pereopods 5-7 elongate, 5 weakly the shortest, article 2 almost identical, moderately expanded, with poorly setose, convex posterior margin and small, pointed posteroventral lobe (corners protuberant).

Outer ramus of uropod 2 scarcely shortened, all rami with marginal spines, peduncle of uropod 1 [?without basofacial spine]. Uropod 3 extended, almost magniramous, inner ramus reaching M.80 on article 1 of outer ramus, setose, outer ramus also elongate, sparsely setospinose, article 2 small. Telson weakly elongate, cleft to base, lobes tapering, armed with 3-4 apical spines and occasional lateral spine.

Coxal gills 2-7, ovate, some slightly pediculate. Oostegites narrow.

Relationship.--Like Gammarus (especially uropod 3) but article 2 of pereopods 5-7 with protuberant posteroventral corners, anterior coxae more elongate, body with double carina. Differing from Anopogammarus in the longer inner ramus of uropod 3 and the body carina; from Accubogammarus in the presence of article 2 on the outer ramus of uropod 3 and dorsal body teeth.

Species.--carinata Absolon, 1927 [087]; Yugoslavia, caves, 1.

Accubogammarus G.S. Karaman

Figures 25, 45, Map 45

Accubogammarus G.S. Karaman, 1974b: 50 (Typhlogammarus algor G.S. Karaman, 1973e, original designation).

Urosomites setospinose. Lateral cephalic lobes strongly protruding, subacute. Eyes absent.

Antenna 1 elongate, much longer than 2, ratio of peduncular articles = 23:19:13, primary flagellum much longer than peduncle, accessory flagellum 3-articulate. Antenna 2 small, gland cone elongate (Typhlogammarus).

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar tritirative, ratio of mandibular palp articles = 00:00:00, article 3 ?falcate], setae = ABCDE. Inner lobes of labium [?weak]. Maxillae [?setose medially]; inner plate of maxilla 1 [?triangular], with only 5 mostly apicomedial setae, outer plate with 11 spines, very finely pectinate, with up to 38 pectinations (Fontogammarus, Typhlogammarus), palps symmetric, 2-articulate, with apical setae. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae of medium extension, weakly setose ventrally (often with naked gaps), coxa 1 quadrate, coxa 4 lobed. Gnathopods large, weakly subchelate,

wrists short, weakly lobed, hands elongate, with several mid spines, poorly defined, dactyls elongate, gnathopod 2 slightly larger than gnathopod 1.

Pereopods 5-7 alike, pereopod 5 slightly the shortest, article 2 moderately expanded, posterior margin convex, moderately setose, protuberant posteroventrally and subsharp, medial faces of article 2 also setose.

Rami of uropods 1-2 evenly extended, outer rami without marginal spines, peduncle of uropod 1 [?without basofacial spine]. Uropod 3 not extended, very short, magniramous (perhaps actually variramous but outer ramus very short), weakly spined and setose, 1-articulate. Telson short, broad, each apex with one spine and several setules.

Coxal gills 2-7, ovate, anterior members pediculate. Oostegites slender.

Relationship.--Differing from Fontogammarus and Typhlogammarus in strongly pectinate spines on outer plate of maxilla 2; differing from Typhlogammarus also in the much narrower oostegites and large gland cone. See Metohia.

Species.--algor (G.S. Karaman, 1973e) [087]; Yugoslavia, caves, 1.

Tadzocrangonyx Karaman and Barnard

Map 24

Tadzocrangonyx Karaman and Barnard, 1979: 143 (Crangonyx schizurus Birstein, 1948, original designation).

Body ordinary or weakly slender, urosomites sparsely setose dorsally. Lateral cephalic lobes subrounded, anteroventral sinus weak or absent. Eyes absent.

Antennae of moderate extension, antenna 1 longer than 2, ratio of peduncular articles = 21:10:9, primary flagellum slightly longer than peduncle, accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 4:14:11, article 3 falcate, setae = ADE. Inner lobes of labium absent or weakly marked, ungaped. Maxillae medially setose, inner plate of maxilla 1 fully setose medially, outer plate with 9-11 normally sized and serrate spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl [?without in type or] with nail.

Coxae of medium extension, weakly setose ventrally, often with naked gaps, coxa 1 quadrate, coxa 4 lobed. Gnathopods large, strongly subchelate, wrists short, weakly lobed, hands elongate, palms almost alike, lacking spines, strongly oblique, gnathopod 1 slightly the stouter, 2 slightly the longer and with slightly longer wrist.

Pereopods 5-7 alike, pereopod 5 slightly the shortest, article 2 moderately expanded, posterior margin convex, sparsely setulose, weakly protuberant posteroventrally and subsharp, medial faces naked.

Inner rami of pleopods slightly to greatly shortened. Outer rami of uropods 1-2 slightly shortened, all rami dorsally spinose, peduncle of uropod 1 without basofacial spine. Uropod 3 extended, parviramous, outer ramus elongate, 1-articulate. Telson of ordinary length, deeply cleft, lobes weakly tapering, apically spinose.

Coxal gills 2-7, ovate, anterior members pediculate. Oostegites [unknown]. Sternal gills absent.

Variants.--Article 2 of pereopods 5-7 much narrower than in other Metohiids, posterior margins straight but alike (setiferus).

Relationship.--Close to Accubogammarus but with extended uropod 3 bearing elongate outer ramus. Resembling Crangonyx but sternal gills absent, gnathopodal palms lacking bifid spines (except at defining corners), ungaped and deeply cleft telson, higher number of spines on outer plate of maxilla 1 (8-10 against 6-8), slightly elongate articles 2-3 of maxillipedal palp and asymmetric palps of maxilla 1. Differing from Tadzhikistania in the convex posterior margins of article 2 on pereopods 5-7.

Species.--schizurus (Birstein, 1948a) [036];

setiferus (Birstein and Levuskin, 1972) [036];

Middle Asia, Tadzhikistan and Tjan-Shan, high altitude springs and rivers, probably hypogean, 2.

#### Zenkevitchia Birstein

Figures 6, 7, Map 45

Zenkevitchia Birstein, 1940: 51; 1941: 260 (Zenkevitchia admirabilis Birstein, 1940, monotypy.--Birstein and Levuschkin, 1970: 1472.

Urosomites and pleon dorsally setose. Lateral cephalic lobes acute. Eyes absent.

Antennae elongate, antenna 1 longer than antenna 2, but peduncle short, ratio of peduncular articles = 20:12:7, flagellum much longer than short peduncle, accessory flagellum 3-6 articulate.

Ratio of mandibular palp articles = 4:11:9, article 3 weakly falcate, setae = ADE. Inner lobes of labium absent, ungaping. Maxillae setose medially, inner plate of maxilla 1 triangular, fully setose medially, outer plate superspinose, spines forming mop, up to 50 spines of 3 kinds (toothed, pectinate, simple-recurved), palps symmetric, small but article 2 longer than 1. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped very stout, somewhat short.

Coxae long, naked ventrally, coxa 1 weakly expanded apically, coxa 4 lobate. Female gnathopods subchelate, feeble, slightly dissimilar, wrist of gnathopod 1 of ordinary length, poorly lobed, hand rectangular, palm almost transverse, gnathopod 2 narrower but more elongate than gnathopod 1, wrist almost elongate, unlobed, wrist long-rectangular; palm oblique, short. Male gnathopods much larger, gnathopod 2 larger than 1, wrists short, weakly lobate, palms oblique, almost identical, with several mid spines.

Pereopods 5-7 almost identical, of medium length, article 2 alike, expanded, posterior margin convex, posterodistal corner scarcely produced



and quadrangular, posterior margins moderately to weakly setose respectively, dactyls with one inferior setule.

Rami of uropods 1-2 extending equally, without marginal spines, basofacial spine of uropod 1 [unknown]. Uropod 3 slightly extended, parviramous, but inner ramus with one medial seta and outer ramus very short, inner ramus therefore almost half as long as outer ramus, latter setospinose, 1-articulate. Telson short, deeply cleft, lobes tapering, apically spinose.

Coxal gills [?2-6, ovate]. Oostegites [?slender].

Relationship.--Like Anopogammarus but maxilla 1 of super filtrative form, outer plate with up to 50 spines, palps symmetric, article 2 on outer ramus of uropod 3 absent. Like Fontogammarus and Accubogammarus but again maxilla 1 distinctive and peduncle of antenna 1 especially short.

Species.--admirabilis Birstein, 1940 [066]; Caucasus region, springs, caves, 1.

Fontogammarus S. Karaman

Map 45

Fontogammarus S. Karaman, 1931d: 60 (Fontogammarus dalmatinus S. Karaman, 1931d, here selected).--G.S. Karaman, 1965: 81.

Urosomites spinose. Lateral cephalic lobes rounded.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = [?progressively shorter], primary flagellum much longer than peduncle, accessory flagellum 1-articulate.

Ratio of mandibular palp articles = 6:11:10, article 3 weakly falcate, setae = ABDE. Inner lobes of labium [?weakly marked]. Inner plate of maxilla 1 subtriangular, fully setose medially, outer plate with 10 spines, 3-4 lateralmost of these spines untoothed and blade-like, palps symmetric, weak, slightly exceeding apex of outer plate. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae long, lacking long ventral setae; coxa 1 quadrate, coxa 4 lobate. Gnathopods [of Gammarus-form, but very minute details and proportions not described].

Pereopods 5-7 alike, article 2 scarcely expanded, tapering, weakly protuberant at posteroventral corner, weakly setose posteriorly.

Pleopods [?ordinary]. Rami of uropods 1-2 [?extending equally, ?dorsally spinose, without basofacial armaments].

Uropod 3 extended, parviramous (but with sparse medial armament on inner ramus), outer ramus elongate, strongly setose, article 2 small or vestigial. Telson of ordinary length, deeply cleft, lobes tapering, apically and dorsally spinose.

Coxal gills [?2-7, ovate]. Oostegites 2,3,4,5 broad to slender progressively.

Variant.--Urosomal spination obsolescent (krkensis).

Relationship.--Differing from Echinogammarus in the 1-articulate accessory flagellum, the symmetrical palps of maxilla 1, and the weakly protuberant posteroventral corner of article 2 on pereopods 5-7 (but this is scarcely distinct from Echinogammarus). Differing from Accubogammarus in the blade-like outer spines on outer plate of maxilla 1.

Species.--dalmatinus S. Karaman, 1931d [087]; d. krkensis S. Karaman, 1931d [087]. Dalmatia, near Adriatic coast, springs and streams, 1 (with 2 subspecies).

Typhlogammarus Schaferna

Figures 12, 19, 24, 37, 45, Map 45

Typhlogammarus Schaferna, 1907b: 22; 1907a: 186 (Typhlogammarus mrazeki Schaferna, 1907a, monotypy).--S. Karaman, 1932: 221.--G.S. Karaman, 1972a: 21.

Body slender, urosomites spinosetose dorsally. Rostrum obsolescent, lateral cephalic lobes sharply mammilliform, deep. Eyes absent.

Antennae elongate, antenna 1 much longer than 2, ratio of peduncular articles = 24:15:10, primary flagellum much longer than peduncle, accessory flagellum 3-4 articulate. Antenna 2 with article 1 strongly swollen.

Ratio of mandibular palp articles = 6:12:12 (heteropalpus only), article 3 weakly falcate, setae = ADE. Inner lobes of lower lip absent, not gaping. Maxillae medially setose, inner plate of maxilla 1 subtriangular, medial margin partially setose (about 10 setae), outer plate with 11 moderately serrate spines, palps almost symmetric (no giant spines or teeth). Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped [?medially spinose].

Coxae medium-short, poorly setose, with long ventral smooth margins or gaps, anterior members trapezoidal or subangular or diamond-shaped, coxa 4 lobate. Gnathopods large, morphologically alike but gnathopod 2 much larger than gnathopod 1, wrists short, moderately lobed, lobe short but narrow (like tubercle), hands very elongate, ovate, palms very oblique, undefined, with large spines in tandem and tuft-like setular bundles on posterior margins, dactyls long and curved.

Pereopods 3-4 very thin and poorly setose (not fossorial). Pereopods 5-7 alike, elongate, 5 weakly the shortest, article 2 scarcely expanded, tapering, unlobate, posterior margin weakly concave, armed with dense tufts of short setae.

Rami of uropods 1-2 extending equally, outer lacking dorsal spines, peduncle of uropod 1 without basofacial spine. Uropod 3 not extended, rather short, variramous, inner ramus about 60 percent of outer, later setospinose, 1-articulate. Telson short, cleft to base, gaping, lobes tapering, with 1-2 apical spines plus setules and occasionally with dorsolateral spines.

Coxal gills 2-7, ovate. Oostegites broad.

Relationship.--Differing from Echinogammarus in the almost symmetrical palps of maxilla 1, and in this character also from various genera near Metohia except Fontogammarus and Accubogammarus; differing from latter 2

genera and all other genera near Metohia in the unexpanded, unpointed posteroventral corners of article 2 on pereopods 5-7. Differing otherwise from most species of Echinogammarus in the short telson, longer inner ramus of uropod 3, absence of article 2 on outer ramus of uropod 3 and the abnormal anterior coxae. The setal tufts of pereopods 5-7 suggest ancestry remote from Metohia.

Species.--mrazeki Schaferna, 1907a, S. Karaman, 1932,  
G.S. Karaman, 1971a, (= hercegovinensis S. Karaman, 1932),  
m. heteropalpus G.S. Karaman, 1972a [087];

west side of Balkans, caves, springs, wells, (mrazeki and  
heteropalpus subspecies, south and north respectively).  
1 species and 1 additional subspecies.

#### Fluviogammarids

Of Gammarus form but one or more article 2 of pereopods 5-7 with posteroventral corner weakly produced, posterior margins sinuous (but in many genera not all evenly expanded and evenly convex).

Confined to Baikal and therefore nominally the Metohiids of Baikal

#### Key to the Genera of Fluviogammarids.

0. Telson entire, broadly alate. . . . . Koshovia  
Telson cleft, ordinary. . . . . 1
1. Article 2 of pereopods 5-7 alike, posterior borders convex . . . . 2  
Article 2 of pereopods 5-7 not alike or some posterior  
borders sinuous or concave. . . . . 6
2. Gnathopod 2 of Eulimnogammarid form . . . . . Lobogammarus  
Gnathopod 2 not of Eulimnogammarid form . . . . . 3
3. Article 2 on outer ramus of uropod 3  
absent . . . . . Poekilogammarus (part, see Gammarids)  
Article 2 on outer ramus of uropod 3 present. . . . . 4
4. Lobe on article 2 of pereopods 5-7 very long, coxa 5  
with sharp anteroventral lobe . . . . . Odontogammarus  
Lobe on article 2 of pereopods 5-7 weak, coxa 5 with  
blunt anteroventral lobe. . . . . 5
5. Article 2 of antenna 1 longer than article 1, lateral  
cephalic lobes extended . . . . . Ceratogammarus  
Article 2 of antenna 1 shorter than article 1, lateral  
cephalic lobes truncate . . . . . Polyacanthisca
6. Pereonites with sharp ventrolateral points, head with  
large anteroventral cusp . . . . . Hakonboeckia (part)  
Pereonites lacking ventrolateral points, head lacking  
anteroventral cusp. . . . . 7
7. Article 2 on outer ramus of uropod 3 absent, body with  
sparse or many dorsal teeth . . . . . 8  
Article 2 on outer ramus of uropod 3 present, body  
lacking dorsal teeth: . . . . . 9

8. Dorsal body teeth confined to urosome. . . . . Fluviogammarus (part)  
 Dorsal body teeth dispersed among pereon,  
 pleosome and head. . . . . Spinacanthus
9. Antenna 1 thrice as long as body. . . . . Paragarjajewia  
 Antenna 1 less than 1.5 times as long as body. . . . . 10
10. Inner ramus of uropod 3 less than 0.33 times  
 as long as outer ramus. . . . . Philolimnogammarus  
 Inner ramus of uropod 3 more than 0.40 times  
 as long as outer ramus. . . . . 11
11. All appendages elongate, dactyl of maxillipedal  
 palp reduced or vestigial. . . . . Abyssogammarus  
 Appendages ordinary, dactyl of maxillipedal palp ordinary. . . . . 12
12. Gnathopods in male of Eulimnogammarid form . . . . . Eurybiogammarus  
 Gnathopod 2 hand of male as large as  
 that of gnathopod 1 . . . . . Fluviogammarus (theoretical)

Eurybiogammarus Bazikalova

Figures 13, 17, 35

(Eurybiogammarus) Bazikalova, 1945: 225 (Gammarus fuscus  
 Dybowsky, 1874, here designated).

Baikal. Article 2 of antenna 1 as long as or significantly shorter than (type) article 1, article 3 shorter than article 2, accessory flagellum generally 3+ articulate.

Coxae 1-4 glabrous. Coxa 1 often shortened. Gnathopods of male fully Eulimnogammarid.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 weakly expanded, not setose posteriorly, weakly protuberant at posteroventral corner, rounded or blunt on pereopod 5, sharp on pereopods 6-7, posterior margins diverse, occasionally even.

Uropod 3 elongate, variramous, strongly setose, article 2 on outer ramus ordinary to small, inner ramus more than 0.40 times as long as outer ramus (Philolimnogammarus). Telson elongate, moderately setospinose.

Body untoothed, pleosome, urosome and occasionally pereon dorsally spinose.

Relationship.--The basic member of the Fluviogammarus group having article 2 on pereopods 5-7 with produced posteroventral corner; outer ramus of uropod 3 with article 2 and inner ramus not fully reduced.

Species.--abyssalis (Sowinsky, 1915) [new transfer];

affinis (Sowinsky, 1915);

aheneoides Bazikalova, 1945;

aheneus (Dybowsky, 1874), a. setosus (Dybowsky, 1874),  
a. asetus Bazikalova, 1945;

bifasciatus (Dybowsky, 1874) [new transfer];

brachycoxalis Bazikalova, 1945;  
byrkini (Sowinsky, 1915);  
capreolus (Dybowsky, 1874) (= chloris Dybowsky, 1874)  
    (= ibexiformis Sowinsky, 1915);  
epimeralis (Sowinsky, 1915);  
fuscus (Dybowsky, 1874), f. aureus (Dorogostaisky, 1917),  
    f. longicornis Bazikalova, 1945;  
hyacinthinus (Dybowsky, 1874);  
ibex (Dybowsky, 1874), i. atrichus Bazikalova, 1945;  
kusnezowi (Sowinsky, 1915);  
muriniformis Bazikalova, 1945;  
murinus (Dybowsky, 1874);  
parvexi (Dybowsky, 1874);  
parvexiformis Bazikalova, 1945;  
polyarthrus (Dybowsky, 1874) (= longicornis Dybowsky, 1874, homonym);  
proximus (Sowinsky, 1915);  
rachmanowi (Sowinsky, 1915);  
sapharinus (Dybowsky, 1874);  
schamensis (Dybowsky, 1874);  
similis (Sowinsky, 1915);  
stenophthalmus (Dybowsky, 1874);  
tenuis (Bazikalova, 1945) [new transfer];  
toxophthalmus (Dybowsky, 1874);  
ussolzewi (Dybowsky, 1874), u. abyssorum (Dybowsky, 1874);  
violaceus (Dybowsky, 1874) (= microphthalmus Sowinsky, 1915);  
virgatus (Dorogostaisky, 1930);  
Baikal, 29 species and 6 additional subspecies.

Fluviogammarus Dorogostaisky

Fluviogammarus Dorogostaisky, 1917: 317 (Fluviogammarus  
larviformis Dorogostaisky, 1917, monotypy)

Rivulogammarus Dorogostaisky, 1917: 317 (implicated as alternate name  
to Fluviogammarus but no type-species designated).

Baikal. Article 2 of antenna 1 about as long as article 1, article 3 shorter than article 2, accessory flagellum 4+ articulate.

Coxae 1-4 glabrous. Gnathopods in male of Gammarus-form but gnathopod 1 weakly dominant, in female of Eulimnogammarid form.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 weakly expanded, posterior margins deeply sinuous (type) or almost evenly convex, not setose, posteroventral corners protruding strongly and subsharply.

Uropod 3 elongate, moderately setose, setae plumose (type) or ?not, magniramous (type) to parviramous, article 2 on outer ramus absent. Telson elongate, moderately setospinose.

Urosomites 1 and 2 each with recumbant pair of short dorsolateral teeth weakly spinose (type) or teeth very weak or teeth absent.

Relationship.--Like Eurybiogammarus but article 2 on outer ramus of uropod 3 absent, urosome with small teeth. Requiring minute distinction from Fontogammarus.

Species.--?angarensis Bazikalova, 1945;

?brachyurus (Dorogostaisky, 1917);

?intermedius Bazikalova, 1945;

larviformis Dorogostaisky, 1917;

Baikal, 1 and 3 probable species. Questionable species close to Philolimnogammarus.

Paragarjajewia Bazikalova

Paragarjajewia Bazikalova, 1945: 131 (Gammarus petersi  
Dybowsky, 1874, monotypy).

Baikal. Article 2 of antenna 1 slightly more than half as long as article 1, article 3 shorter than article 2, accessory flagellum 5+ articulate, primary flagellum greatly elongate. Antenna 1 thrice as long as body.

Coxae 1-4 [?glabrous]. Gnathopods of Eulimnogammarus-form, gnathopod 1 dominant, Gammarus-like, gnathopod 2 somewhat more slender, wrist elongate, palm much less oblique, palms spinose.

Pereopods 3-4 [?not fossorial]. Article 2 of pereopods 5-7 not expanded, with lateral ridge, posteroventral corners weakly and subsharply protruding.

Uropod 3 exceeding uropod 1, variramous, rami vastly elongate, heavily setose, setae plumose, article 2 on outer ramus elongate. Telson short, cleft slightly more than halfway, moderately setose.

Pleosome and urosome dorsally spinose.

Relationship.--Like Fluviogammarus and Eurybiogammarus but antenna 1 hugely elongate.

Species.--petersi (Dybowsky, 1874); Baikal, 1.

#### Abyssogammarus Sowinsky

Figures 12, 30, 33

Abyssogammarus Sowinsky, 1915: 211 (Gammarus sarmatus Dybowsky, 1874, designated by Bazikalova, 1945).--Bazikalova, 1945: 267.

Baikal. Article 2 of antenna 1 slightly shorter than article 1, article 3 slightly shorter than article 2, accessory flagellum 5+ articulate, elongate.

Dactyl of maxilliped reduced or vestigial.

Coxae 1-4 [glabrous]. Gnathopods of Gammarus form, gnathopod 1 scarcely dominant, wrists of both pairs elongate.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 unexpanded, elongate, naked posteriorly, posteroventral corners sharply and weakly produced.

Uropod 3 not exceeding elongate uropod 1, peduncle elongate, setae plumose, magni to variramous, article 2 on outer ramus slightly elongate. Telson elongate, deeply cleft, strongly spinose.

Posterior pereonites, all pleonites with dorsal or dorsolateral spines. Antennae, pereopods and uropods exceptionally elongate.

Relationship.--Like Eurybiogammarus but appendages greatly elongate and dactyl of maxillipedal palp reduced.

Species.--gracilis Sowinsky, 1915, g. minor Bazikalova, 1945;

sarmatus (Dybowsky, 1874), s. echinatus Bazikalova, 1935, 1945;

schwartzschewskii Sowinsky, 1915;

Baikal, 3 species and 2 additional subspecies.

#### Koshovia Bazikalova

Koshovia Bazikalova, 1975b: 88 (Koshovia mirabilis Bazikalova, 1975b, original designation, sic).

Baikal. Rostrum obsolescent. Eyes absent. Antenna 1 of Gammarus-form, article 2 of peduncle as long as article 1, article 3 nearly 0.8 times as

long as article 2, accessory flagellum 2-3 articulate. Peduncle of antenna 2 scarcely thickened, flagellum not longer than article 5 of peduncle, about 5-articulate.

Coxae 1-4 [?glabrous]. Gnathopods slightly enlarged, weakly Gammarus-like, 1 larger than 2, wrists of medium length, thick but scarcely lobate, palms oblique, palm on gnathopod 1 more oblique than on gnathopod 2, major spines absent.

Pereopods not fossorial. Article 2 of pereopods 5-7 unexpanded, thin, linear, posteroventral points vestigial, with sparse long posterior setae.

Uropod 3 [?exceeding uropod 1], magniramous, article 2 on outer ramus medium to small.

Telson very short and broad, entire, but forming lateral setose wings. Body untoothed, posteriorly thinly setose.

Relationship.--Like Heterogammarus and Abyssogammarus but telson entire and alate.

Species.--mirabilis Bazikalova, 1975b; Baikal, 1.

#### Philolimnogammarus Bazikalova

Figures 12, 13

(Philolimnogammarus) Bazikalova, 1945: 213 (Gammarus viridis Dybowski, 1874, here selected).

Baikal. Article 2 of antenna 1 as long as article 1, article 3 much shorter than article 2, accessory flagellum 3+ articulate.

Coxae 1-4 glabrous. Gnathopods of male fully Eulimnogammarid.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 weakly expanded, not setose posteriorly, weakly protuberant at posteroventral corner, rounded on pereopod 5, sharp on pereopods 6-7, posterior margins diverse, occasionally even.

Uropod 3 elongate, variramous to parviramous, strongly setose, article 2 on outer ramus small or vestigial (type), inner ramus less than 0.33 times as long as outer ramus (Eurybiogammarus). Telson ordinary, deeply cleft, moderately spinose.

Body untoothed, pleosome and urosome dorsally spinose.

Relationship.--Differing from Fluviogammarus in full development of Eulimnogammarid gnathopods and reduction or loss of article 2 on outer ramus of uropod 3.

Species.--cyanellus Bazikalova, 1945;

cyaneus (Dybowski, 1874), c. comatus (Dorogostaisky, 1917);

exiguus Bazikalova, 1945;

immundus Bazikalova, 1945;



inconspicuus Bazikalova, 1945;  
marituji Bazikalova, 1945;  
melanochlorus (Dorogostaisky, 1930);  
minimus Bazikalova, 1975b;  
obsoletus Bazikalova, 1945;  
simpliciformis Bazikalova, 1975b;  
testaceus (Dybowsky, 1874);  
viridis (Dybowsky, 1874), v. canus (Dybowsky, 1874),  
v. olivaceus (Dybowsky, 1874);  
viridulus Bazikalova, 1945;  
vittatus (Dybowsky, 1874);

Baikal, 13 species and 3 additional subspecies.

#### Lobogammarus Bazikalova

Lobogammarus Bazikalova, 1945: 271 (Lobogammarus latus Bazikalova, 1945, original designation).

Baikal. Ocular lobe bluntly extended anteriorly. Article 2 of antenna 1 about 0.6 times as long as article 1, article 3 slightly shorter than article 2, accessory flagellum 7-8 articulate.

Coxae 1-4 glabrous. Gnathopods of Eulimnogammarid form.

Pereopods 3-4 [?not of fossorial form]. Article 2 of pereopods 5-7 expanded, not setose posteriorly, posterior margins evenly convex, posteroventral corners bluntly to subsharply produced.

Uropod 3 [unknown].

Telson elongate, fully cleft, moderately spinose.

Pleosome and urosome dorsally spinose.

Relationship.--Incompletely known as uropod 3 is missing; unlike Fluviogammarus, Abyssogammarus and others above, this species has even or pyriform article 2 of pereopods 5-7 with convex posterior margins and unlike genera below has thin Eulimnogammarid gnathopods.

Species.--latus Bazikalova, 1945;

Baikal, 1.

Spinacanthus Dorogostaisky

## Figure 35

Spinacanthus Dorogostaisky, 1930: 56 (Spinacanthus insularis Dorogostaisky, 1930, original designation).--Bazikalova, 1945: 121.

Baikal. Head with dorsal spines superimposed on teeth, rostrum erect. Antennae ordinary to elongate. Article 2 of antenna 1 much longer than half of article 1, article 3 also elongate, accessory flagellum 2+ articulate.

Anterior coxae glabrous. Coxa 4 with posteroventral cusp. Gnathopods of Gammarus form.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 weakly expanded, somewhat pyriform, posterior margins sinuous, poorly setose, posteroventral corners sharply extended.

Uropod 3 magniramous to variramous, setae plumose, article 2 on outer ramus absent. Telson ordinary, deeply cleft.

All pereonites and pleonites 1-2 with similar erect middorsal hump usually bearing large spines or projections, pleonite 3 mainly bearing dorsal spines, urosome naked. Pereonites with lateral humps above coxae.

Relationship.--Like Fluviogammarus but teeth present anterior to urosome. Merging with Brandtia and treated as a subgenus of Brandtia by Bazikalova (1948, 1959).

Species.--armatus (Dybowsky, 1874), a. ongureni (Garjajeff, 1901);

birsteini (Bazikalova, 1948);

insularis (Dorogostaisky, 1930;

margaritae (Bazikalova, 1959);

parasiticus (Dybowsky, 1874);

Baikal, 5 species and 1 additional subspecies, usually on sponges.

Hakonboeckia Stebbing

## Figure 24

Hakonboeckia Stebbing, 1899c: 425; 1906: 415 (Gammarus strauchii Dybowsky, 1874, original designation).--Bazikalova, 1945: 157.

Baikal. Anteroventral corner of head produced downward, not excavate. Antennae short, article 2 of antenna 1 slightly shorter than article 2, article 3 shorter than article 2, accessory flagellum 2-articulate. "Oral parts feeble." (Bazikalova, 1945)

Coxae 1-4 [?glabrous]. Gnathopod 1 dominant, wrist short, lobate, hands of both pairs broad, not elongate, palms weakly oblique, with few major spines mostly near defining corner, wrist of gnathopod 2 not lobate.

Pereopods 3-4 [?not fossorial]. Article 2 of pereopods 5-7 weakly expanded, tumid, weakly pyriform, posterior margins sinuous, sharply but weakly produced posteroventrally, posterior setae sparse.

Uropod 3 exceeding uropod 1, magniramous, peduncle elongate, moderately setose, setae plumose, article 2 on outer ramus absent.

Telson cleft almost to base (but see Bazikalova, 1945).

Pereonites 1-5 with lateral margins acutely produced as spurs just above coxae, pereonites 6-7 and pleonites 1-3 weakly crested middorsally and posteriorly.

Relationship.--The spurs of the pereonites distinguish this genus in its cluster. Apparently Pallasea (Propachygammarus) meissneri resembles Hakonboeckia in this regard.

Species.--strauchii (Dybowsky, 1874);

Baikal, 1.

#### Polyacanthisca Bazikalova

Polyacanthisca Bazikalova, 1937: 496; 1945: 190

(Polyacanthisca calceolata Bazikalova, 1937, original designation).

Baikal. Head anteriorly truncate. Article 2 of antenna 1 shorter than article 1, article 3 slightly shorter than article 2.

Coxae 1-4 glabrous. Coxa 5 with blunt anteroventral lobe (unlike Odontogammarus). Gnathopods apparently of Gammarus-form.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 scarcely expanded, weakly setose posteriorly, posterior margins evenly convex, posteroventral corners scarcely angular.

Uropod 3 elongate, densely setose, setae plumose, variramous, article 2 on outer ramus ordinary to slightly elongate. Telson elongate, fully cleft, strongly setose.

Pereon and pleosome dorsally spinose, urosome dorsally setose or spinose weakly.

Relationship.--Characterized by the short article 2 of antenna 1, convex posterior margins of article 2 on pereopods 5-7 and normal coxa 5.

Species.--calceolata Bazikalova, 1937; Baikal, 1.

#### Ceratogammarus Sowinsky

##### Figure 33

Ceratogammarus Sowinsky, 1915: 207 (Ceratogammarus dybowskii Sowinsky, 1915, monotypy).--Bazikalova, 1945: 187.

Baikal. Head with ocular lobe extended anteroventrally, often sharp and attenuate. Article 2 of antenna 1 longer than article 1, article 3 as long as article 1.

Coxae 1-4 [?glabrous]. Coxa 5 with blunt anteroventral lobe (unlike Odontogammarus). Gnathopods of modified Gammarus-form, gnathopod 1 strongly dominant, palms elongate, highly oblique, spinose, wrist of gnathopod 1 lobate, of gnathopod 2 elongate and scarcely lobate.

Pereopods 3-4 of weak filtrative form, article 4 with more than 10 tufts of short setae. Article 2 of pereopods 5-7 weakly expanded, not setose posteriorly, posterior margins almost evenly convex, posteroventral corners weakly protuberant, article 2 of pereopod 5 broader than on pereopod 7; dactyls vestigial.

Uropod 3 scarcely exceeding elongate uropod 1, magniramous, moderately to well setose, setae plumose, article 2 on outer ramus small. Telson elongate, fully cleft, moderately to weakly spinose.

Posterior pereonites, all pleonites with dorsal or dorsolateral spines, occasionally with conical protuberances also from which spines emerge.

Relationship.--Differing from Abyssogammarus in extended cephalic lobe; from Polyacanthisca also in the normally elongate article 2 of antenna 1; from Odontogammarus also in the normal coxa 5 and weak lobes on article 2 of pereopods 5-7.

Species.--acerus Bazikalova, 1937, 1945;

cornutus (Sowinsky, 1915);

dybowskyii Sowinsky, 1915;

Baikal, 3.

#### Odontogammarus Stebbing

##### Figure 43

Odontogammarus Stebbing, 1899c: 427; 1906: 456 (Gammarus calcaratus Dybowsky, 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 275.

Baikal. Article 2 of antenna 1 slightly shorter than article 1, article 3 usually longer than article 2, about as long as article 1, accessory flagellum 5+ articulate, elongate.

Coxae 1-4 [?glabrous]. Coxa 5 with sharp anteroventral lobe. Gnathopods of Gammarus-form, either gnathopod weakly dominant, palm of gnathopod 2 often scarcely oblique.

Pereopods 3-4 [?not fossorial]. Article 2 of pereopods 5-7 weakly expanded, not to moderately setose posteriorly, each with large sharp posteroventral tooth, posterior margin occasionally toothed.

Uropod 3 exceeding uropod 1, elongate, variramous, strongly setose, setae plumose, article 2 on outer ramus slightly elongate. Telson elongate, almost fully cleft, moderately spinose.

Body untoothed, urosomites spinose.

Relationship.--Differing from Ceratogammarus and Polyacanthisca in the sharp anterior lobe on coxa 5 and the elongate lobes on article 2 of pereopods 5-7.

Species.--calcaratus (Dybowsky, 1874), c. pulcherrimus  
Dorogostaisky, 1930, c. improvisus Dorogostaisky, 1930,  
c. brevipes Dorogostaisky, 1930;

korotnewi (Sowinsky, 1915);

margaritaceus (Dybowsky, 1874),

m. demianowiczi Dorogostaisky, 1930;

Baikal, 3 species and 4 additional subspecies.

#### Acanthogammarids

Gnathopods of Acanthogammarid form, or weakly so.

#### Key to the Acanthogammarid Group of Genera

1. Body untoothed . . . . . Issykogammarus  
Body toothed . . . . . 2
2. Rami of uropod 3 not paddle-shaped . . . . . 3  
Rami of uropod 3 paddle-shaped . . . . . 6
3. Rostrum small or absent. . . . . 4  
Rostrum well developed . . . . . 5
4. Telson ordinary, dorsal teeth mainly vertebral,  
article 5 of antenna 2 ordinary . . . . . Eucarinogammarus  
Telson short, dorsal teeth mainly lateral  
swellings or with multifid smaller teeth,  
article 5 of antenna 2 swollen apically . . . . . Plesiogammarus
5. Dorsal body teeth with spiniform accessory  
projections, some segments with lateral bulges . . . . . Garjajewia  
Dorsal body teeth smooth, no segments with lateral  
bulges . . . . . Cheirogammarus
6. Rostrum large. . . . . Gammaracanthus  
Rostrum small. . . . . Acanthogammarus

#### Issykogammarus Chevreux

Figures 19, 37, Map 19

Issykogammarus Chevreux, 1908e: 91 (Issykogammarus hamatus  
Chevreux, 1908e, monotypy).

"Baikal." Rostrum weak. Antenna 1 somewhat shortened, peduncle very short, article 2 about half as long as article 1, article 3 shorter than article 2, accessory flagellum 3-articulate.

Coxae 1-4 glabrous, coxa 4 with anteroventral tooth. Gnathopods blended between Gammarus and Acanthogammarus forms, in male gnathopod 2 weakly dominant, gnathopods similar, slightly elongate, wrists elongate, hands not broadly expanded, palms very oblique and weakly spinose in Gammarus fashion; female gnathopods much smaller, almost of Eulimnogammarid

form, wrist of gnathopod 1 short, scarcely lobate.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 unexpanded, sparsely setose posteriorly.

Uropod 3 not exceeding uropod 1, strongly setose, setae plumose, variramous, article 2 on outer ramus small.

Telson elongate, fully cleft, lobes pointed, moderately setose. Body untoothed, pleosome and urosome with dorsal setation.

Relationship.--More or less the basic or plesiomorphic Acanthogammarid with gnathopods not fully developed and body teeth not yet developed. Differing from all other Gammarids in the Acanthogammarus-like gnathopods which can be discerned clearly.

Species.--hamatus Chevreux, 1908e [058];

[Lake] Issy-kul, 1.

#### Eucarinogammarus Sowinsky

See adjacent to Carinogammarus in section IIIA.

#### Plesiogammarus Stebbing

Plesiogammarus Stebbing, 1899c: 426; 1906: 446 (Gammarus gerstaeckeri Dybowsky, 1874 original designation).--Bazikalova, 1945: 134.

Baikal. Rostrum short. Antenna 1 of Gammarus form, article 2 of antenna 1 more than half as long (type) or less than half as long as article 1, article 3 shorter than article 2, accessory flagellum 3+ articulate. Article 5 of antenna 2 thickened distally and carrying circlet of plumose setae, antenna 2 otherwise short.

Coxae 1-4 glabrous. Gnathopods enlarged, gnathopod 2 weakly dominant, wrists short, scarcely lobate, hands either broad and short or elongate (type), palms oblique or almost transverse, type with strongly oblique palm on gnathopod 1, oblique on gnathopod 2, palms lacking major spines.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 not expanded, moderately setose posteriorly.

Uropod 3 exceeding uropod 1, magniramous, aequiramous, strongly setose, article 2 on outer ramus absent. Telson short, cleft about two thirds, strongly setose apically.

Body (type) pereon and pleosome with lateral swellings; other species also with weak dorsal projections, becoming multifid and spiniform on pleon.

Relationship.--Differing from Eucarinogammarus in the unusual antenna 2 and nonvertebral dorsal body teeth. Possibly on ancestral line of Acanthogammarus.

Species.--gerstaeckeri (Dybowsky, 1874); g. brevis Bazikalova, 1975b;

?longicornis Sowinsky, 1915;

?zienkowiczi (Dybowski, 1874);

Baikal, 1 species, 2 probables, 1 additional subspecies.

Cheirogammarus Sowinsky

Cheirogammarus Sowinsky, 1915: 204 (Cheirogammarus inflatus Sowinsky, 1915, monotypy).--Bazikalova, 1945: 199.

Baikal. Rostrum well developed. Article 2 of antenna 2 more than half as long as article 1, article 3 longer than article 2, accessory flagellum 5-articulate.

Coxae 1-4 glabrous. Gnathopods enlarged, equal, or gnathopod 2 slightly dominant, of Acanthogammarid form, wrists short, narrowly lobate, not Eusirid, hands broadly expanded, palms oblique but defined by hump, not spinose.

Pereopods 3-4 of filtrative form, articles 4 and 5 with more than 10 posterior tufts of setae. Article 2 of pereopods 5-6 not expanded, of pereopod 7 scarcely expanded, each with lateral ridge weakly extended and sharp at posteroventral corner, not posteriorly setose.

Uropod 3 not exceeding uropod 1, variramous, setae sparse but several plumose, inner ramus slightly more than half as long as outer, outer lacking article 2. Telson ordinary, cleft slightly more than halfway, sparsely setose apically.

Rear of pereon, pleosome and urosome with mid-dorsal tooth crest.

Relationship.--Differing from Plesiogammarus and Garjajewia in the lack of dorsolateral bulges on the body segments; from Plesiogammarus in the normal antenna 2 and the larger rostrum.

Species.--inflatus Sowinsky, 1915; Baikal, 1.

Garjajewia Sowinsky

Figure 30

Garjajewia Sowinsky, 1915: 291 (Gammarus cabanisi Dybowski, 1874, here selected).--Bazikalova, 1945: 125.

Baikal. Rostrum strong, straight or weakly erect. Antenna 1 very elongate, article 1 elongate, article 2 one third to one half as long as article 1, article 3 shorter than article 2, accessory flagellum 5+ articulate. Article 5 of antenna 2 dorsally serrate.

Coxae 1-4 glabrous. Gnathopods enlarged, gnathopod 1 weakly dominant, of Acanthogammarid form, wrists elongate, broadly and shortly lobed, weakly Eusirid, hands elongate and weakly broadened, palms fully oblique and merging with posterior margins of hands, not spinose.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 not expanded, densely but minutely setose posteriorly, pereopods greatly elongate.

Uropod 3 elongate but not exceeding greatly elongate uropod 1, variramous, inner ramus elongate, setae plumose and dense, article 2 on outer ramus absent. Telson short, cleft less than halfway, cleft forming gape, lobes apically setose.

Pereon, pleosome and urosome with middorsal tooth crest, posterior teeth with spines or spiniform projections; some segments with dorsolateral bulges.

Relationship.--Differing from Cheirogammarus in the subsidiary teeth on main teeth of the body and the lateral bulges on some of the segments; from Plesiogammarus in the normal antenna 2 and large rostrum.

Species.--cabanisi (Dybowsky, 1874) (= rosea Garjajeff, 1901),  
c. dershawini Sowinsky, 1915, c. ninae Bazikalova, 1945;

dogieli Bazikalova, 1935, 1945;

sarsi Sowinsky, 1915;

Baikal, 3 species and 2 additional subspecies.

#### Acanthogammarus Stebbing

Figures 12, 20, 29, 31

Acanthogammarus Stebbing, 1899c: 430; 1906: 508 (Gammarus godlewskii

Dybowsky, 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 102.

Brachyuropus Stebbing, 1899c: 424; 1906: 392 (Gammarus grewingkii Dybowsky, 1874, here selected).--Bazikalova, 1945: 110. Valid subgenus.

Typical subgenus.--Baikal. Rostrum small or erect. Anteroventral corner of head scarcely protruding. Antennae of Gammarus form, article 2 of antenna 1 about as long as article 1, article 3 longer than either articles 1 and 2, accessory flagellum 5+ articulate.

Coxae 1-4 either glabrous or setose. Gnathopods enlarged, equal or gnathopod 1 slightly dominant, of Acanthogammarid form, wrists short to weakly elongate, lobed or not, weakly Eusirid, hands elongate, broadened, palms strongly oblique, not spinose.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 not expanded, moderately setose posteriorly.

Uropod 3 not exceeding uropod 1, peduncle slightly elongate, almost magniramous and aequiramous, outer lacking article 2, not fully paddle-shaped, densely setose in perimetral fan, setae plumose. Telson short to medium, broad to ordinary, cleft less than halfway, cleft forming either slot or gape, if present, weak.

Pereon, pleosome and often urosome with dorsomedial tooth crest, or pleon with bilateral tooth crest, pereonites humped just above coxae, occasionally humps extended as teeth, pleosome with lateral rugae or flanges, urosomites naked.



Brachyuropus.--Uropod 3 reduced in size, parviramous, peduncle short, outer ramus not longer than peduncle; marginal projections of body segments spine-like (typically tubercles or longitudinal keels).

Relationship.--With Gammaracanthus characterized by paddle-shaped rami on uropod 3; differing from Gammaracanthus in the small rostrum.

Species.--A = Acanthogammarus, B = Brachyuropus;

A albus (Garjajeff, 1901);

A brevispinus Dorogostaisky, 1922;

B flavus (Garjajeff, 1901), f. rodionowi Dorogostaisky, 1922, f. curtus Bazikalova, 1945, f. sowinskii Bazikalova, 1945;

A godlewskii (Dybowsky, 1874);

B grewingkii (Dybowsky, 1874);

B korotnewi (Garjajeff, 1901);

? labbei Chevreux, 1903;

A maximus (Garjajeff, 1901);

B nassonowi Dorogostaisky, 1922;

B reicherti (Dybowsky, 1874);

A subbrevispinus Bazikalova, 1945;

A victorii (Dybowsky, 1874), v. maculosus Dorogostaisky, 1930;

Baikal, 11 species and 1 probable species and 4 additional subspecies.

#### Gammaracanthus Bate

Figures 12, 17, 20, 37, Map 49

Gammaracanthus Bate, 1862: 201 (Gammarus loricatus Sabine, 1824, [1821], original designation).--Stebbing, 1906: 507.

Body with strong dorsal teeth and carina, urosomites with dorsal teeth or carina. Rostrum large, lateral cephalic lobe rounded, sinus below this occupied by large tubercle.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 27:21:12, primary flagellum about as long as peduncle, accessory flagellum 4+ articulate. Antenna 2 gland cone very large.

Ratio of mandibular palp articles = 6:16:15, article 3 weakly falciform, setae = ADE. Inner lobes of labium weak, causing gape.

Maxillae partially setose medially, inner plate of maxilla 1 broadly ovate, with about 6 mostly apical setae, outer plate with 7 spines, palps [?asymmetric]. Inner plate of maxilla 2 with facial row of setae (not necessarily oblique).

Coxae of ordinary dimensions, poorly to moderately setose, coxa 1 rectangular, coxa 4 unlobed, posterior margin weakly concave, coxa 5 as long as 4. Gnathopods large, alike, of Acanthogammarus-form, wrists short, strongly lobed, hands attached almost in Eusirid fashion, large, trapezoidal, expanding distally, palms oblique, long, evenly denticulate.

Article 2 of pereopods 5-7 scarcely expanded, weakly tapering, unlobed, posterior margins straight, moderately setose.

Rami of uropods 1-2 marginally spinose, only outer ramus of uropod 2 slightly shortened, uropod 1 peduncle [?with basofacial spine]. Uropod 3 slightly extended, magniramous, almost aequiramous, peduncle elongate, rami strongly setose and flabellate, outer 1-articulate. Telson short, broad, cleft halfway, lobes gaping, tapering, poorly armed.

Coxal gills 2-6, ovate. Oostegites expanded moderately.

Variants.--Pereopod 6 much the longest (relictus); peduncle of uropod 3 setose (relictus); pleosome with lateral flange (relictus).

Relationship.--Like Acanthogammarus but rostrum large.

Species.--12 caspius Sars, 1896 [332];

13 loricatus Sabine, 1824, [1821] = (11 aestuariorum Lomakina, 1952) (Johnson, 1962) [210], (Gurjanova, 1951) [220];

14 l. baicalensis Sowinsky, 1915 [055], 15 l. lacustris Sars, 1867 (= relictus Sars, 1895b) [149];

16 l. ostiorum Lomakina, 1952 [291E];

Arctic Seas, Caspian, ?Baikal, relict glacial lakes, 2 species and 3 additional subspecies.

#### Dikerogammarids

Antennae of Gammarus-form, either article 2 of peduncle significantly longer than half of article 1 or primary flagellum significantly longer than peduncle. Article 2 of pereopod 7 expanded and lobate but lacking short posteroventral corner or accessory flagellum reduced to one article.

#### Key to the Genera of Dikerogammarids

1. Pereopod 7 not expanded or expanded but not lobate. . . . . 2  
Pereopod 7 article 2 expanded and lobate. . . . . 6
2. Accessory flagellum 2+ articulate. . . . . Echinogammarus  
Accessory flagellum 1-articulate. . . . . 3
3. Body unkeeled. . . . . Yogmelina  
Body keeled or knobbed. . . . . 4

4. Body with carination only medial, head lacking  
 vestige of wing tooth . . . . . Gmelina  
 Body with lateral teeth (median teeth present or  
 absent), head with vestigial or strong wing tooth . . . . . 5
5. Body humps in bilateral dorsal lines, head tooth  
 vestigial . . . . . Kuzmelina  
 Body humps both bilateral and median, head tooth giant. . . Axelboeckia
6. Body keeled anterior to urosome . . . . . 7  
 Body unkeeled anterior to urosome . . . . . 8
7. Gnathopod 1 enlarged strongly . . . . . Gmelinopsis  
 Gnathopod 1 not greatly enlarged (minutely) . . . . . Amathillina
8. Gnathopod 1 enlarged. . . . . 9  
 Gnathopod 1 not enlarged . . . . . 11
9. Pereopods 3-7 prehensile . . . . . Iphigenella  
 Pereopods 3-7 simple . . . . . 10
10. Female gnathopod 2 large, antennae short, epimeron  
 3 with strong tooth . . . . . Baku  
 Female gnathopod 2 small, antennae long,  
 epimeron 3 with weak tooth . . . . . Lanceogammarus
11. Urosome with dorsal knobs. . . . . 12  
 Urosome without knobs . . . . . 14
12. Coxae 1-4 and article 2 of pereopod 7 strongly  
 setose. . . . . Turcogammarus  
 Coxae 1-4 and article 2 of pereopod 7 poorly  
 setose or glabrous. . . . . 13
13. Head ordinary . . . . . Dikerogammarus  
 Head giant. . . . . Cephalogammarus
14. Accessory flagellum 1-articulate. . . . . Jugogammarus  
 Accessory flagellum 2+ articulate . . . . . 15
15. Article 2 of pereopod 6 lobate. . . . . Shablogammarus<sup>1</sup>  
 Article 2 of pereopod 6 not lobate. . . . . 16

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<sup>1</sup>and see Stenogammarus macrurus of Carausu, 1943  
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16. Article 2 of pereopod 7 with ventral lobe . . . . . Akerogammarus  
 Article 2 of pereopod 7 expanded but  
 without ventral lobe. . . . . Echinogammarus warpachowskyi

Yogmelina Karaman and Barnard

Yogmelina Karaman and Barnard, 1979: 138 (Gmelina pusilla Sars, 1896,  
 original designation).

Body smooth, urosomites smooth or spinose. Lateral cephalic lobes  
 protuberant, subacute to rounded, sinus obsolescent.

Antennae of medium size and extending subequally; antenna 1 of  
Dikerogammarus form, no articles humped, but peduncle stout, ratio of  
 peduncular articles = 27:24:15, flagellar formula = 75:5, ventral setae of  
 article 1 weak and terminal, accessory flagellum 1-articulate. Ratio of  
 articles 3,4,5 and flagellum of antenna 2 = 12:21:18:21, no articles

humped. Mouthparts unknown, space below for addition when described. Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative, ratio of palp articles = 00:00:00, article 3 weakly falcate, setae = ABCDE]. Inner lobes of labium [?absent, weakly gaping]. Maxillae [?well setose medially, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7 spines, palps asymmetric]. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae long, setae of medium size, coxa 1 curved forward, coxa 4 poorly (or strongly) lobed, coxa 5 shorter than 4. Gnathopods almost feeble, subchelate, almost of equal width, wrists of medium length, poorly lobed, hands subrectangular, palm oblique on gnathopod 1, transverse on gnathopod 2, short.

Pereopods 3-7 not fossorial. Article 2 of pereopods 5-6 scarcely expanded, tapering, moderately setose posteriorly or not, of pereopod 7 weakly expanded, unlobate or microlobate, moderately or strongly setose posteriorly.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending subequally, peduncular setae absent, basofacial armaments [unknown], outer ramus of uropod 2 [possibly naked marginally]. Uropod 3 scarcely extended, parviramous, outer ramus elongate, weakly setose and spinose, article 2 short. Telson of ordinary length, deeply cleft, lobes tapering, narrowed, weakly setospinose apically and with lateral setae.

Coxal gills [?2-6]. Oostegites [unknown].

Variants.--Inner ramus of uropod 3 slightly elongate (laeviuscula); oostegites narrow (brachyura); coxal gills 2-6 ovate, some pediculate (brachyura); coxa 4 slightly smaller than 3 (in type-species, other species with normal coxa 4); gnathopod 1 distinctly larger than 2 (brachyura); basis of pereopod 7 extremely expanded, almost lobate (brachyura); telson cleft only halfway (brachyura); cephalic sinus stronger (laeviuscula).

Relationship.--Differing from Echinogammarus in the curved coxa 1 and small 1-articulate accessory flagellum. Yogmelina ovata is especially close to Echinogammarus warpachowskyi because of special shape of basis on pereopod 7. But Y. ovata was said by Martynov to have a 1-articulate accessory flagellum (warpachowskyi is said to have a 2-articulate accessory flagellum).

Yogmelina brachyura is close to Baku paradoxus but differs in the 1-articulate accessory flagellum. See that species for further discussion. Differing from Lanceogammarus andrussowi in the 1-articulate accessory flagellum, the more equable gnathopods and the lack of strongly lobate bases on pereopods 5-6. See Gmelina.

Species.--brachyura (Derzhavin and Pjatakova, 1962) [332];

cocolita Karaman and Barnard, 1979 (= pusilla of Carausu, 1943, not Sars) [337];

laeviuscula (Sars, 1896) [332];

limana Karaman and Barnard, 1979 [337];

ovata (Martynov, 1924a) [337];

pusilla (Sars, 1896) [336];

Caspian and Black Seas and their rivers, 5.

Gmelina Sars

Figures 10, 17, 19

Gmelina Sars, 1894: 191 (Gmelina costata Sars, 1894, original designation).--1896: 430.--Stebbing, 1906: 412.--Mordukhai-Boltovskoi, 1969: 459.

Body carinate, pereonal pleurae humped; urosomites with pegs (tubercles), not spinose. Lateral cephalic lobes subquadrate, short.

Antennae elongate, extending subequally; antenna 1 of Dikerogammarus form, no articles humped, peduncle slender, ratio of peduncular articles = 33:18:15, flagellar formula = 81:3, ventral setae of article 1 weak and terminal, accessory flagellum 1-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 12:36:36:48, no articles humped.

Ratio of mandibular palp articles = 5:14:11, article 3 weakly falcate, setae = ACDE. Inner lobes of labium absent, weakly gaping. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae medium to long, long setae absent, coxa 1 curved forward, coxa 4 lobed. Gnathopods 1-2 of male subchelate, moderately enlarged, of equal width, alike, wrists short, moderately lobed, hands elongate, palmar slopes identical, palms excavate, oblique, long; female gnathopods much smaller than in male, gnathopod 1 like male but small and hand shorter, palm less oblique and straight, gnathopod 2 with elongate wrist, hand slightly narrower than on gnathopod 1.

Pereopods 3-7 not fossorial, though short and strong. Article 2 of pereopods 5-6 weakly expanded basally but tapering distally, unlobate or scarcely produced distally, of pereopod 7 moderately expanded but not ventrally lobate, all poorly to moderately setose.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending subequally, peduncular setae absent, basofacial armaments [unknown], [spine present on aestuarica], one or more rami naked marginally. Uropod 3 extended, parviramous, outer ramus elongate, foliaceous, setose and weakly spinose, article 2 vestigial or moderate. Telson of ordinary length, deeply cleft, lobes tapering, narrowed, weakly spinosetose apically.

Coxal gills [?2-6]. Oostegites [unknown].

Relationship.--Differing from Dikerogammarus and Amathillina in the unlobate article 2 of pereopod 7 and poorly articulate accessory flagellum. Differing from Echinogammarus in the carinate body. Differing from

Yogmelina in the carinate body, more slender antenna 1 and foliaceous uropod 3. See Kuzmelina.

Species.--aestuarica Carausu, 1943 [337];

costata Sars, 1894b [332];

Caspian and Black seas and their rivers, 2.

Kuzmelina Karaman and Barnard

Figure 25

Kuzmelina Karaman and Barnard, 1979: 133 (Gmelina kusnezowi Sowinsky, 1894, original designation).

Body carinate, with bilateral dorsal lines of humps anterior to urosome, best developed on pereonite 6 to pleonite 3; pereonal pleurae humped. Urosomites poorly armed. Lateral cephalic lobes protuberant, mammilliform, sinus obsolescent but rudimentary, lateral wing tooth present (reminiscent of Axelboeckia). Eyes very close to anterior cephalic margin.

Antennae of medium size and extension, almost of equal extent, antenna 1 slender, of Dikerogammarus form, ratio of peduncular articles = 30:24:15, flagellar ratio = 66:4, ventral setae of article 1 weak and mostly terminal, accessory flagellum 1-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 15:33:32:42, no articles humped.

Mouthparts unknown, space below for addition when described. Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar tritritative, ratio of palp articles = 00:00:00, article 3 weakly falcate, setae = ABCDE]. Inner lobes of labium [?absent, weakly gaping]. Maxillae [?well setose medially, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7 spines, palps asymmetric]. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae long, setae short to medium, coxa 1 slightly curved forward, coxa 4 lobed, coxa 5 shorter than 4. Gnathopods medium to small, subchelate, male gnathopods of medium size, alike, wrists short-medium, scarcely lobed, hands elongate, palms oblique, excavate, well defined, of medium length; female gnathopods small, dissimilar, hands similar, rectangular, palms oblique, short, wrists poorly lobed, wrist of gnathopod 1 short, of gnathopod 2 elongate or medium.

Pereopods 3-7 not fossorial. Article 2 of pereopods 5-6 scarcely expanded and tapering, unlobate, of pereopod 7 weakly expanded, unlobate, of 5-7 weakly setose posteriorly.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending equally, lacking marginal spines, peduncles poorly armed. Uropod 3 weakly extended, parviramous, outer ramus elongate, weakly spinose and setose, article 2 short. Telson short, broad, deeply cleft, apices strongly spinose, with lateral spines.

Coxal gills [?2-6]. Oostegites [?].

Relationship.--Differing from Gmelina in the doubled carina, the protruding cephalic lobes, the rudimentary cephalic wing, the marginal eyes and short telson.

See Gmelinopsis, Axelboeckia.

Species.--kusnezowi (Sowinsky, 1894b) (Sars, 1894b) [335];

Caspian, Black and Azov Seas, 1.

#### Amathillina Sars

Figures 7, 25, Map 48c

Amathillina Sars, 1894b: 201, 203 (Amathillina cristata Sars, 1894b, original designation by Sars, 1894b: 203 and not by subsequent designation as stated by Stock, 1974c).--Stebbing, 1906: 499.--Stock, 1974c: 81.

Body strongly carinate dorsomedially, urosomites scarcely humped or rarely with strong tubercle, weakly spinose. Lateral cephalic lobes subquadrate.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 33:24:24, ratio of flagella = 105:39, ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 9:27:27:66, article 3 unhumped.

Ratio of mandibular palp articles = 5:13:13, article 3 falcate, setae = ABDE. Labium without inner lobes. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 7 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl shorter than 3, unguiform, [?with nail].

Coxae elongate, long setae absent, coxa 1 scarcely expanded below, coxa 4 lobed. Gnathopods 1-2 subchelate, large to medium, almost equal in size, wrists short, weakly to poorly lobed, hands rectangular, elongate, palmar slopes almost identical, oblique, of medium length; female gnathopods very small, subequal, wrists short to medium, usually of diverse lengths, shorter on gnathopod 1, poorly lobed to unlobed, hands small, rectangular, palms oblique, short (generally gnathopod 1 microscopically larger than gnathopod 2 in both sexes).

Pereopods 3-7 moderately to poorly fossorial; article 4 of pereopod 4 narrow, with about 4 widely separated groups of posterior setae, article 5 narrow, rectangular, with only 3 posterior setal groups. Article 2 of pereopods 5-7 with short, sparse posterior setae, of pereopod 5 weakly expanded and tapering, unlobate; of pereopod 6 like pereopod 5 or broadly expanded, unlobate, of pereopod 7 broadly expanded, lobate.

Epimeron 3 lacking posteroventral fan of setae. Uropods 1-2 ordinary. Uropod 3 not extended, parviramous, outer ramus short, weakly spinose and setose, article 2 of medium length. Telson short, deeply cleft, apices of lobes of medium width, moderately spinose and setulose.

Coxal gills [?2-6], ovate, stalked. Oostegites of medium expansion.

Variants.--Medium tubercle on urosomite 1 (spinosa); gnathopod 1 significantly larger than gnathopod 2 (female of pusilla).

Relationship.--Like Echinogammarus but article 2 of pereopod 7 lobate. Differing from Dikerogammarus and Akerogammarus in the very short uropod 3 and carinate back. The gnathopods of either sex are almost identical though gnathopod 1 is perceptibly the larger (especially female pusilla); differing from Lanceogammarus and Baku in the carinate bodies.

Species.--affinis Sars, 1894b [332];

crinata Sars, 1894b [335];

maximovitschi Sars, 1896 [332];

spinosa Sars, 1896 [332];

Caspian, Black, and Azov Seas, weakly fossorial, 5.

#### Axelboeckia Stebbing

Figures 5, 8, 9, 10, 18, 20, 25

Boeckia Sars, 1894b: 182 [homonym, 2 orders] (Boeckia spinosa Sars, 1894b, monotypy).

Axelboeckia Stebbing, 1899c: 423; 1906: 391.--Schellenberg, 1940b: 43 (new name, same type-species).

Body carinate dorsomedially and toothed laterally, pereonal pleurae with processes, urosomite 1 with middorsal and dorsolateral teeth. Rostrum elongate, corner of head and lateral cephalic lobe produced into long cusp, sinus absent.

Antennae of medium extension, antenna 1 longer than 2, of mixed form, no articles humped, ratio of peduncular articles = 36:18:16, flagellar formulae = 136:1, accessory flagellum represented by small tubercle, 1-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 14:26:24:52, no articles humped.

Ratio of mandibular palp articles = 5:15:13, article 3 weakly falcate, setae = DE. Inner lobes of labium small, forming tiny buttress and gape between outer lobes. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 9 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl shorter than 3, nail [?weak].

Coxae elongate, coxae 1-2 curved and produced forward, coxa 4 scarcely lobed, mainly formed by fully concave posterior margin, coxae 1-4 strongly to moderately setose respectively. Gnathopods almost feeble, almost alike, of identical size, wrists of medium length, weakly lobate, hands subrectangular, palm of gnathopod 2 slightly more oblique and longer than oblique short palm of gnathopod 2; sexes similar but gnathopod 1 weakly dominant in female.



Pereopods 3-7 scarcely fossorial, pereopods 3-4 ordinary; article 2 of pereopods 5-7 well setose posteriorly, of pereopods 5-6 unexpanded, tapering, unlobate, of pereopod 7 moderately expanded, and scarcely lobate ventrally (considered herein as unlobate but case marginal).

Rami of uropods 1-2 extending equally, poorly spinose, peduncles poorly spinose. Uropod 3 short, parviramous, outer ramus very short, 1-articulate, thin, poorly armed. Telson very short, much broader than long, cleft about halfway, poorly armed.

Coxal gills [2-6] subcircular to ovate, stalked. Oostegites broad.

Relationship.--Like Gmelinopsis but telson very short, outer ramus of uropod 3 lacking article 2. Differing from Echinogammarus in feeble gnathopods, more strongly toothed body, vestigial accessory flagellum. Like Amathillina but head with cusp, coxa 4 poorly lobate, outer ramus of third uropod 1-articulate; like Kuzmelina but body also with median keel, cephalic tooth large.

Species.--spinosa (Sars, 1894b) [332];

Caspian Sea, Volga and Ural Rivers, weakly fossorial, 1.

#### Gmelinopsis Sars

Gmelinopsis Sars, 1896: 434 (Gmelinopsis tuberculata Sars, 1896, original designation).--Stebbing, 1906: 414.

Body dorsomedially carinate, pereonal pleurae weakly humped, urosomites weakly humped or flat, poorly spinose or not. Rostrum short to medium, lateral cephalic lobes low triangular, anteroventral corner of head produced as hump or tooth below sinus.

Antennae short to medium, antenna 1 slightly longer than 2, no articles humped; ratio of peduncular articles = 28:14:8, flagellar ratio = 68:5, ventral setae of article 1 weak and terminal, accessory flagellum 2-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 10:20:14:14, no articles humped.

Ratio of mandibular palp articles = 5:13:8, article 3 falcate, setae = DE. Inner lobes of labium absent, weakly gaping. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 7 spines, palps [?asymmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae elongate, well setose, coxa 1 curved forward, coxa 4 weakly lobed. Gnathopods 1-2 subchelate, of medium size, gnathopod 1 larger than gnathopod 2, wrist short, lobed, hand elongate, palm oblique, long; gnathopod 2 with similar wrist length but lobe weak, hand smaller, subrectangular, palm weakly oblique, short; sexes similar.

Pereopods 3-7 scarcely fossorial. Article 2 of pereopods 5-7 weakly to moderately setose respectively, of pereopods 5-6 unexpanded, tapering, of pereopod 7 expanded, and ventrally lobate.

Rami of uropods 1-2 extending equally, marginal and peduncular spines mostly absent. Uropod 3 short, parviramous, outer ramus short, weakly spinosetose, article 2 short. Telson of ordinary length to elongate, cleft three fourths to halfway, lobes tapering almost acutely, poorly armed.

Coxal gills [2-6], ovate, stalked. Oostegites slightly broadened.

Relationship.--See Axelboeckia. Differing from Gmelina in the enlarged gnathopod 1, lobed pereopod 7, unusual anteroventral corner of head; differing from Dikerogammarus and Amathillina in the enlarged gnathopod 1, unusual head and reduced accessory flagellum. Differing from Baku in the carinate body, unusual head, poorly, and fossorial pereopods 3-4. Differing from Kuzmelina in the large cephalic tooth, lobate basis of pereopod 7 and long telson.

Species.--aurita Sars, 1896 [332];

tuberculata Sars, 1896 [336];

Caspian and Black Seas, weakly fossorial, 2.

Incipient Genus Represented by

Echinogammarus warpachowskyi

Figure 47b

Typical species.--Echinogammarus warpachowskyi (Sars, 1896).

Urosomites weakly spinose. Lateral cephalic lobes acute.

Antennae of medium extent (smaller than ordinary Echinogammarus), subequal in size, ratio of peduncular articles on antenna 1 = 21:13:10, primary flagellum much longer than peduncle, accessory flagellum 2-articulate. Antenna 2 flagellum shorter than articles 4-5 of peduncle, with about 5 long articles.

[Mouthparts unknown but assumed to be like type of Echinogammarus].

Coxae 1-4 elongate, coxa 1 scarcely expanded apically, coxa 4 with posterior lobe, coxae 1-3 moderately setose ventrally, coxa 4 without ventral setae. Male gnathopods 1-2 almost alike, gnathopod 2 scarcely larger than 1, both with short lobate wrists and ovatorectangular hands, with moderately oblique but identical palms lacking midpalmar spines (not like Gammarus); female gnathopods much smaller, wrists poorly lobed, wrist of gnathopod 2 slightly elongate.

Article 2 of pereopods 5-7 diverse, that of pereopod 5 slightly expanded, scarcely lobate, that of pereopod 6 expanded proximally, tapering and excavate distally, unlobate, that of pereopod 7 expanded but beveled and excavate posteroventrally, moderately setose only on pereopod 7.

Rami of uropods 1-2 extended evenly, spinose. Uropod 3 strongly extended, parviramous, article 2 on outer ramus well developed. Telson short, fully cleft, moderately armed apically and laterally.

Coxal gills [2-7], ovate, some weakly pediculate. Oostegites of medium width.

Relationship.--Differing from typical Echinogammarus in the expansion of article 2 on pereopod 7, the poorly developed antennae, shortened telson; differing from typical Gammarus in the similar gnathopods with identical

palms lacking midpalmar spines. Coxae 1-3 poorly setose. Differing from Akerogammarus and Jugogammarus in the absence of a ventral lobe on article 2 of pereopod 7.

Species.--warpachowskyi (Sars, 1896) [335];

Caspian Sea, 1, but listed also at Echinogammarus.

Akerogammarus Derzhavin and Pjatakova

Akerogammarus Derzhavin and Pjatakova, 1967: 81 (Akerogammarus knipowitschi Derzhavin and Pjatakova 1967, here selected, = Gammarus knipowitschi Derzhavin, 1951, nomen nudum).

Body slender, urosomites weakly humped, strongly spinose. Lateral cephalic lobes subquadrate.

Antennae 1-2 elongate, antenna 1 longer than 2; antenna 1 of Gammarus form, ratio of peduncular articles = 28:18:10, flagellar ratio = 100:24, ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 12:24:26:36, unhumped.

Mouthparts [unknown, presumed to be as follows: Labrum broader than long, entire, rounded-truncate. Mandibular incisor toothed, molar triturative, ratio of palp articles = 5:18:16, setae = ABDE. Labium with inner lobes. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose, article 3 of palp unlobed, dactyl shorter than article 3, unguiform, with nail].

Coxae of medium to short extent, lacking long setae, coxa 1 not expanded below, coxa 4 moderately lobed. Gnathopods 1-2 strongly subchelate, strong, gnathopod 2 enlarged but generally like gnathopod 1, wrists short, poorly to moderately lobed respectively, hands elongate to stout respectively, palmar slopes almost identical, oblique, long; [apparently sexes alike].

Pereopods 3-7 poorly fossorial; article 4 of pereopod 4 with only 4-5 posterior setae arranged in groups, article 5 narrow, rectangular. Article 2 of pereopods 5-7 very poorly setose (mostly with setules), of pereopods 5-6 weakly expanded and weakly lobate, of pereopod 7 moderately expanded and strongly lobate.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropod 2 [possibly shortened; possibly outer rami lacking marginal spines], [basofacial setae and dorsal setae unknown]. Uropod 3 strongly extended, parviramous, outer ramus elongate, setose [and possibly spinose], article 2 short. Telson short, cleft about two thirds, apices narrow, setose-spinose (setae long).

Coxal gills [?2-6]. Oostegites [?narrow].

Variants.--Subnudus with unlobate, straight margined article 2 of pereopod 6, shorter uropod 3, shorter main flagellum of antenna 1, obsolescent telsonic spination, much longer coxae; contiguus with much longer article 2 on outer ramus of uropod 3, posteriorly excavate article 2 on pereopod 6.

Relationship.--Differing from Pontogammarus and its relatives in the reduction of setae on article 4 of pereopods 3-4, on coxae 1-4 and on article 2 of pereopods 5-7. Antenna 1 is of the Dikerogammarus form and Akerogammarus differs from that genus in the absence of distinct urosomal tubercles. Like Shablogammarus but lacking posteroventral lobe on article 2 of pereopod 6.

Possibly a polyphyletic assemblage of neotenic members out of Dikerogammarids and Pontogammarids.

Species.--contiguus (Pjatakova, 1962b) [332];

knipowitschi Derzhavin and Pjatkova, 1967 [332];

subnudus (Sars, 1896) [332];

Caspian Sea, weakly fossorial, 3.

#### Jugogammarus S. Karaman

Map 38

(Jugogammarus) S. Karaman, 1953a: 36 (Gammarus kusceri)

S. Karaman, 1931d, monotypy).

Fontogammarus (Jugogammarus) G.S. Karaman, 1965: 88 (but not Fontogammarus)

Urosomites lacking spination. Lateral cephalic lobes rounded.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = [progressively shorter], accessory flagellum 1-articulate.

Labrum [?broader than long, entire, rounded]. Mandibular incisor toothed, molar triturative, ratio of palp articles = 4:11:8, setae = B,D,E. Inner lobes of labium absent, not gaping. Inner plate of maxilla 1 triangular, medially setose, outer plate with 10 spines, lateralmost spines poorly toothed and blade-like, palps symmetrical, short, 2-articulate, inner plate of maxilla 2 with [?oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae of ordinary length, with few long setae, coxa 1 not dilated, coxa 4 lobed. Gnathopods alike, of similar size, wrists short, weakly lobate, hands elongate but somewhat rectangular, palms oblique, short, with mid-spines.

Pereopods 3-4 ordinary. Pereopods 5-7 diverse, weakly fossorial, article 2 poorly setose posteriorly, expanded, of pereopod 7 strongly lobate ventrally.

Pleopods [?ordinary]. Rami of uropods 1-2 extending equally naked marginally on uropod 2, lacking basofacial armaments. Uropod 3 extended, parviramous, outer ramus elongate, weakly setospinose, article 2 moderately developed. Telson of ordinary length or slightly short, fully cleft, each lobe tapering, with one apical spine and several setules apically.

Coxal gills [?2-7, ovate]. Oostegites slender.

Relationship.--Differing from the genera in the Metohia group in the very strong lobation on article 2 of pereopod 5 and the diversity of pereopods 5-7. Like the Caspian genus Akerogammarus but accessory flagellum 1-articulate.

Species.--kusceri S. Karaman, 1931d [087];

Slovenia, spring near Krka River (subtributary of Danube and Black Sea), weakly fossorial, 1.

Shablogammarus Carausu, Dobreanu and Manolache

Figures 35, 36, Map 38

Shablogammarus Carausu, Dobreanu and Manolache, 1955: 124

(Gammarus chablensis Carausu, 1943, monotypy).

Rostrum obsolescent, lateral cephalic lobes subquadrate. Antennae elongate, antenna 1 of Dikerogammarus form, no article humped, ratio of peduncular articles = 34:22:14, flagellar ratio = 175:22, ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 11:28:28:57, article 3 scarcely humped.

Labrum [?wider than long, entire, rounded]. Mandibular molar [?tritulative], ratio of palp articles = 3?:15:12, article 3 falcate, setae = BDE. Inner lobes of labium obsolescent. Inner plates of maxillae [?medially setose], inner plate of maxilla 1 [?triangular, fully setose medially, outer plate with ?9 spines, palps ?asymmetric]. Inner plate of maxilla 2 [?with oblique facial row of setae].

Coxae elongate, long ventral setae absent, coxa 1 scarcely expanded below, coxa 4 lobed. Female gnathopods 1-2 subchelate, small to feeble, diverse, subequal in size, wrists of medium length, scarcely lobed, hand of gnathopod 1 ovate, palm oblique, poorly defined, hand of gnathopod 2 rectangular, palm almost transverse, short; male gnathopods larger, gnathopod 1 similar to female but hand more robust, gnathopod 2 with shorter wrist, larger hand with oblique palm; gnathopod 2 larger than male gnathopod 1.

Pereopods 3-7 poorly fossorial; article 4 of pereopod 4 narrow, with about 7 widely separated setae in 2 groups, article 5 narrow, rectangular, with only 2 posterior setal-spine groups. Article 2 of pereopods 5-7 with short, sparse posterior setae (setules), of pereopods 5-7 all widely expanded and lobate.

Pleopods [?ordinary]. Epimeron 3 lacking posteroventral fan of setae. Outer rami of uropods 1-2 scarcely shortened, of uropod 2 without marginal spines. Uropod 1 with basofacial spine, no peduncular setae. Uropod 3 extended, parviramous, outer ramus elongate, sparsely spinose, article 2 of medium length. Telson short, cleft about three fourths, apices of medium breadth, spinose, lobes with pairs of basolateral spines also.

Coxal gills [?2-6]. Oostegites narrow.

Relationship.--Like Akerogammarus but article 2 of all pereopods 5-7 widely expanded and lobate. Affinity to the Stenogammarus macrurus of

Carausu, 1943, but that species with Pontogammarid antenna 1, long setae on coxae and Stenogammarid uropod 3.

Species.--chablensis (Carausu, 1943) [337];

rivers and lagoons of Black Sea, fossorial, 1.

#### Dikerogammarus Stebbing

Figures 7, 10, 16, 17, 30, Maps 38, 47c

Dikerogammarus Stebbing, 1899c: 428; 1906: 458 (Gammarus haemobaphes Eichwald, 1841, selected by Stock, 1974c).--Stock, 1974c: 82.

Urosomites (at least) 1 and 2 with large elevated process (knob or tubercle), all spinose or not. Lateral cephalic lobes subquadrate.

Antennae elongate, extending subequally; antenna 1 of Dikerogammarus-form, no articles humped, ratio of peduncular articles = 30:21:12, flagellar ratio = 108:21 (thus article 2 of peduncle much longer than half of article 1, main flagellum highly elongate), ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 14:30:33:54, article 3 weakly humped.

Mouthparts [of type-species unknown but, from observations in other species, presumed to be as follows: Labrum wider than long, entire, subrounded. Mandibular incisor toothed, molar triturative, ratio of palp articles = 5:16:14, article 3 weakly falcate, setae = ABCDE. Labium with inner lobes weak. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 serrate spines, palps asymmetric (toothed and spinose alternately). Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae of medium size to long, long setae absent, coxa 1 not expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, large to medium, gnathopod 2 enlarged but like gnathopod 1, wrists short, weakly to poorly lobed respectively, hands elongate, palmar slopes almost identical, oblique, of medium length; female gnathopods much smaller than in male, hands also relatively shorter.

Pereopods 3-7 moderately fossorial; article 4 of pereopod 4 narrow, with 4-6 widely separated groups of posterior setae, article 5 narrow, rectangular, with only 4-5 posterior setal groups. Article 2 of pereopods 5-7 with short, sparse posterior setae, of pereopod 6 weakly expanded, unlobate, of pereopods 5 and 7 expanded and weakly to strongly lobate respectively.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropod 2 slightly shortened, outer rami of both pairs marginally naked, peduncular setae apparently absent, basofacial setae absent. Uropod 3 extended, parviramous, outer ramus elongate, setose, weakly spinose, article 2 short. Telson of ordinary length, deeply cleft, apices tapered, moderately setospinose.

Coxal gills [2-6], subcircular to ovate, some gills strongly stalked. Oostegites very broad, ovate, or narrow.

Variants.--Metasome toothed-carinate (caspius); rami of uropods 1-2 ordinary (caspius); article 2 of pereopod 5 unlobed (oskari); tubercles of urosomites obsolescent (fluviatilis) (hence species transitional to Akerogammarus); lobation of pereopod 7 weak (villosus).

Relationship.--The basic Dikerogammarid typified by lobate article 2 of pereopod 7 and also distinct from Gammarus on the enlarged gnathopod 2 of male with palm identical to that of gnathopod 1, midpalmar spines absent (except in D. aralychensis which has Gammarus-like gnathopod 1, sloping palm and midpalmar spines).

Species.--?aralychensis (Birstein, 1932, as Pontogammarus robustoides a.) (possibly = Turcogammarus) [331];

balatonicus Ponyi, 1955, 1958, 1961 (D.h.b.) [084];

bispinosus Martynov, 1925x [not seen] (Carausu, 1943) (D.v.b.) [337];

caspius (Pallas, 1771) (Sars, 1894b) [332];

fluviatilis Martynov, 1919 [not seen] (D.v.f.) (Carausu, 1943) [337];

haemobaphes (Eichwald, 1841) (Sars, 1894b) (= ?palmatus Martynov, 1925a) (Stock, 1974c) (see Pontogammarus) [336];

oskari Birstein, 1945a (= grimmi Sars, 1896) [332];

villosus (Sowinsky, 1894b, as Gammarus marinus var. v.) (Carausu, 1943) [337];

Black, Azov, Caspian Seas and their rivers, semifossorial, 7 species and 1 dubious species.

#### Cephalogammarus Karaman and Barnard

Cephalogammarus Karaman and Barnard, 1979: 132 (Gammarus macrocephalus Sars, 1896, original designation).

Urosomites 1-2 each with large elevated tubercle, all weakly spinose. Head greatly enlarged, about as long as first 2.5 pereonites, lateral cephalic lobes subquadrate.

Antennae elongate, antenna 1 slightly the longer, of Dikerogammarus form, no articles humped, ratio of peduncular articles = 30:21:12, flagellar ratio = 114:21, ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 12:22:20:34, article 3 unhumped.

Mouthparts unknown, though unexpanded view of mandibular palp showing D and E setae presumed to be as in Dikerogammarus.

Coxae long, long setae absent, coxa 1 not expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, large to medium, gnathopod 2 enlarged but like gnathopod 1, wrists short, weakly to poorly lobed respectively, hands elongate, palmar slopes almost identical, oblique, of medium length; female [unknown].

Pereopods 3-7 moderately fossorial; article 4 of pereopod 4 narrow, with 4-5 widely separated groups of sparse posterior setae, article 5 narrow, rectangular, with only 3-4 posterior setal groups. Article 2 of pereopods 5-7 with short posterior setules, of pereopods 5-6 weakly expanded, unlobate, posterior margins both weakly concave (sinuous), of pereopod 7 expanded, lobate.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropod 2 slightly shortened and lacking marginal spines, peduncles of uropods 1-2 apparently without setae. Uropod 3 extended, parviramous, outer ramus elongate, setose, weakly spinose, article 2 short. Telson of ordinary length (slightly short), almost fully cleft, apices of medium width, moderately setospinose.

Coxal gills [2-6]. Oostegites [?].

Relationship.--Like Dikerogammarus but head immense.

Species.--macrocephalus (Sars, 1896) [332]; Caspian Sea, moderately fossorial, 1.

#### Lanceogammarus Karaman and Barnard

Lanceogammarus Karaman and Barnard, 1979: 134 (Gammarus andrussowi Sars, 1896, original designation).

Urosomites unhumped, spinose. Rostrum obsolescent, lateral cephalic lobes subquadrate.

Antennae elongate, antenna 1 much longer than 2, of Dikerogammarus-form, no articles humped, ratio of peduncular articles = 30:22:10, flagellar ratio = 150:18, ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5, and flagellum of antenna 2 = 15:36:36:57, article 3 weakly humped, accessory flagellum 4-articulate.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative], ratio of palp articles = 4:13:10, article 3 weakly falcate, setae = B,D,E. Inner plate of maxilla 1 triangular, fully setose medially, outer plate with 10 [?11] serrate spines, palps [?asymmetric]. [?Inner plate of maxilla 2 with oblique facial row of setae]. Outer plate of maxilliped medially setose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, [?with nail or not, illustration in Carausu, 1943, not showing nail].

Coxae of medium size, long setae absent, coxa 1 not expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, diverse, medium to small, gnathopod 1 enlarged, with short scarcely lobed wrist, hand elongate, palm oblique, of medium length; gnathopod 2 small, thin, wrist elongate, scarcely lobed, hand almost as long as wrist, rectangular, palm oblique, very short; male gnathopod 1 larger than in female.

Pereopods 3-7 weakly fossorial; article 4 of pereopod 4 narrow, with 2 widely separated groups of setae and spines, article 5 narrow, rectangular,



with only 2 posterior setae-spine groups. Article 2 of pereopods 5-7 moderately expanded and moderately setose posteriorly, pereopods 5-6 scarcely to weakly lobate, pereopod 7 strongly lobate, article 2 of pereopod 6 convex posteriorly.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropod 2 slightly shortened, lacking marginal spines, peduncle of uropod 1 with basofacial spine, no setae. Uropod 3 extended, parviramous, outer ramus elongate, weakly spinose, article 2 of medium length. Telson short, deeply cleft, apices tapering to medium width, spinose. Also with basodorsal spine pairs.

Coxal gills [2-6]. Oostegites slender.

Relationship.--Differing from Akerogammarus, Dikerogammarus, Shablogammarus, "Stenogammarus" macrurus of Carausu (1943) in the enlarged gnathopod 1. See Baku and Iphigenella. Lanceogammarus andrussowi formerly assigned to Iphigenella but differing from that genus in the nonprehensile pereopods.

Differing from Lobogammarus in the enlarged gnathopod 1.

Species.--andrussowi (Sars, 1896) [336]; Caspian and Black Seas, fossorial, 1.

#### Baku Karaman and Barnard

Baku Karaman and Barnard, 1979: 131 (Pontogammarus paradoxus Derzhavin, in Derzhavin and Pyatkova, 1967, original designation).

Body somewhat slender, at least urosomite 3 with 2 dorsal spines, others apparently flat and naked. Rostrum obsolescent, lateral cephalic lobes subquadrate. Eyes very small.

Antennae short, extending subequally; antenna 1 of Pontogammarus form (almost of Niphargoides form), no articles humped, ratio of peduncular articles = 26:10:6, flagellar ratio = 24:10, ventral setae of article 1 weak and terminal, accessory flagellum 3-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 8:11:13:26 (to some extent of Stenogammarus form), article 3 weakly humped.

Mouthparts [unknown].

Coxae of medium size, setose, coxa 1 weakly curved anteriorly. coxa 4 lobed. Gnathopods 1-2 strongly subchelate, of medium size, gnathopod 1 enlarged but otherwise almost like gnathopod 2, wrists short (but shorter on gnathopod 1), scarcely lobed, hands weakly elongate, subrectangular, palmar slopes almost identical, oblique, short.

Pereopods 3-7 moderately fossorial; article 4 of pereopod 4 narrow but with 10+ posterior groups of (very few) setae (each), article 5 weakly expanded, moderately setose posteriorly. Article 2 of pereopods 5-7 densely setose posteriorly, of pereopod 5 weakly expanded and scarcely lobate, of pereopod 6 unexpanded, tapering, unlobate, posteriorly excavate; of pereopod 7 expanded, lobate.

Epimeron 3 lacking posteroventral fan of setae, posteroventral corner with sharp, weakly curved tooth. Rami of uropods 1-2 extending equally, [peduncular and ramal spination or setation unknown]. Uropod 3 not

extended beyond uropods 1-2, parviramous, outer ramus short, weakly spinose and setose, article 2 short. Telson of ordinary length, lobes tapering, moderately setospinose apically.

Coxal gills [2-6], broadly ovate, stalked. Oostegites of medium expansion.

Relationship.--Differing from ordinary Pontogammarid genera in enlarged gnathopod 1; from Iphigenella in lack of prehensility on pereopods 3-7; from Lanceogammarus in the enlarged female gnathopod 2, which, though not as large as gnathopod 1, is significantly enlarged; from Pachyschysis in curved coxa 1, lobed coxa 4, presence of long fully ventral setae on coxae 1-4, the distinctly lobate pereopod 7 and distinctly though weakly enlarged gnathopod 1; from Amathillina in the uncarinate body, and more strongly setose coxae and pereopods. Differing from Yogmelina brachyura by 3-articulate accessory flagellum, by sharp tooth on epimeron 3 and by distinctly lobate basis of pereopod 7. Lobogammarus has gnathopod 1 smaller than gnathopod 2.

Species.--paradoxus Derzhavin (in Derzhavin and Pyatakova, 1967) [332]; Caspian Sea, moderately fossorial, 1.

#### Iphigenella Sars

Figures 10, 26

Iphigenella Sars, 1896: 478 (Iphigenella acanthopoda Sars, 1896, original designation).--Stebbing, 1906: 447.--Carausu, 1943: 55.

Urosomites humped (weak tubercles), weakly spinose. Lateral cephalic lobes strongly protruding, sharp-mammilliform or quadrate.

Antennae weakly elongate, antenna 1 slightly longer than 2, almost of Pontogammarus form, no articles humped, ratio of peduncular articles = 28:14:10, flagellar ratio = 110:18, ventral setae of article 1 weak and almost terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 17:39:39:60, article 3 weakly humped.

Ratio of mandibular palp articles = 4:13:10, article 3 scarcely falciform, setae = A,D,E. Inner lobes of lower lip obsolescent, no gaping. Maxillae moderately setose medially, inner plate of maxilla 1 ovate, most of distal half medially setose [or fully setose fide Carausu, 1943], outer plate narrow, with 8 [?] spines, palps asymmetric. Inner plate of maxilla 2 with row of medial setae slightly submarginal, perhaps not oblique. Maxilliped [see Carausu, 1943 for slightly different details than basic diagnosis].

Coxae long, lacking long setae, coxa 1 scarcely expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, diverse, medium to small, gnathopod 1 enlarged, with short lobed wrist, hand elongate, palm oblique, of medium length; gnathopod 2 small, thin, wrist elongate, unlobed, hand as long as wrist, rectangular, palm oblique, very short; female gnathopods smaller than in male but otherwise similar.

Pereopods 3-7 weakly fossorial; article 4 of pereopod 4 narrow, with about 4-5 widely separated groups of sparse setae, article 5 narrow, rectangular, with only 2-3 posterior setal groups. Article 2 of pereopods 5-7 closely similar, moderately expanded, lacking long setae, ventrally lobate (7 slightly stronger), article 2 of pereopod 6 convex posteriorly. Pereopods 3-7 weakly prehensile.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropods 1-2 shortened, naked marginally, peduncular setae absent. Uropod 3 extended, parviramous, outer ramus elongate, weakly setose and spinose, article 2 of medium size. Telson slightly elongate, deeply cleft, apices of lobes of medium width, setospinose.

Coxal gills [2-6]. Oostegites slightly broadened.

Relationship.--Differing from Lanceogammarus in the prehensile pereopods. Differing from Pachyschysis in the enlarged gnathopod 1 and lobed bases of pereopods 5-7.

Species.--acanthopoda Sars, 1896 [335];

Caspian, Black, Azov Seas and their rivers, commensal on Decapoda, especially Astacus leptodactylus, L. Also see Markowsky, 1953.

#### Pontogammarids

Antenna 1 of Pontogammarus form, with articles 2 and 3 shortened, article 2 less than half as long as article 1, article 3 less than half as long as article 2, article 1 thickened, flagella shorter than or scarcely more elongate than peduncle; antennae 1-2 subequal to each other.

Gnathopods not fully enfeebled

Article 2 of pereopod 7 with posterior expansion.

Telson of ordinary length, deeply cleft.

#### Key to the Subgroups of Pontogammarids

1. Dactyl of maxillipedal palp reduced or vestigial. . . . . Cardiophilids  
Dactyl of maxillipedal palp ordinary . . . . . 2
2. Gnathopods enfeebled . . . . . Pontoporeiids  
Gnathopods not enfeebled . . . . . 3
3. Gnathopod 1 dominant . . . . . Micruropids  
Gnathopod 1 not dominant . . . . . 4
4. Accessory flagellum less than half as long as primary  
flagellum, latter about as long as peduncle. . . . . Pontogammarins  
Accessory flagellum more than half as long as primary  
flagellum, latter much shorter than peduncle . . . . Compactogammarids

#### Pontogammarins

Dactyl of maxilliped ordinary; primary flagellum of antenna 1 shorter than peduncle, accessory flagellum less than half as long as primary flagellum; gnathopod 1 not dominant.

The first two genera, fossils, are unnaturally placed here; they probably fit into a group ancestral to Gmelina but they are at the apomorphic end of their group because of the Pontogammarus-antenna 1.

#### Key to the Genera of Pontogammarins

1. Pereon carinate, accessory flagellum 1-articulate. . . . . 2  
    Pereon not carinate, accessory flagellum 2+ articulate. . . . . 3
2. Pereon lacking pleural humps . . . . . †Andrussovia  
    Pereon with pleural humps . . . . . †Praegmelina
3. Urosome with knobs . . . . . Turcogammarus  
    Urosome without knobs. . . . . 4
4. Inner ramus of uropod 3 half as long as outer ramus . . . . . Euxinia  
    Inner ramus of uropod 3 much less than half as long as outer ramus. . . 5
5. Article 2 on outer ramus of uropod 3 elongate. . . . . 6  
    Article 2 on outer ramus of uropod 3 short . . . . . 7
6. Article 1 on outer ramus of uropod 3 lacking setae, or  
    setae very sparse, wrist of gnathopod 2 (both sexes)  
    triangular, much shorter than hand  
    . . . . . Stenogammarus (Stenogammarus)  
    Article 1 on outer ramus of uropod 3 with lateral  
    plumose setae, wrist of gnathopod 2 (both sexes)  
    trapezoidal, elongate, almost as long as hand  
    . . . . . Stenogammarus (Wolgagammarus)
7. Article 4 of pereopod 4 with convex posterior margin  
    bearing long setae arranged in continuous fan, article 5  
    enlarged, trapezoidal to oval, highly setose, D and  
    E setae on mandibular palp article 3 merging with one  
    another, D setae elongate, uropod 3 variramous . . . . Pontogammarus  
    Article 4 of pereopod 4 with straight posterior margin  
    bearing ordinary setae arranged in tufts, article 5  
    rectangular, D and E setae of mandibular palp article 3  
    discrete, D setae short, uropod 3 parviramous. . . . . 8
8. Posterior margin of article 2 on pereopod 7 unarmed, ventral  
    margins of epimera unarmed, posterior emargination on  
    coxa 4 occupying almost full length. . . . . Pandorites  
    Posterior margin of article 2 on pereopod 7 setose, ventral  
    margins of epimera setose, posterior emargination  
    on coxa 4 occupying about half of length . . . . . Obesogammarus

#### †Andrussovia Derzhavin

Andrussovia Derzhavin, 1927a: 190 (Andrussovia sokolovi Derzhavin, 1927a,  
 selected by Birstein, 1960).--Hessler, 1969: R390.--Hurley 1973: 213.

Fossil. Body with strong middorsal teeth or carina on pleon (metasome only) and posterior pereon. Lateral cephalic lobes weakly protruding, mammilliform.

Antennae very short, extending equally, antenna 1 of Pontogammarus form, ratio of peduncular articles = 27:10:7, primary flagellum length =

24, accessory flagellum 1-articulate [?or absent]. Antenna 2 very short, article 5 of peduncle short but distinct from flagellum.

Mouthparts [unknown, except maxillipedal palp 4-articulate and mandibular palp present].

Coxae long, anterior coxae weakly tapering, lobe of coxa 4 weak; setae [unknown]. Gnathopods small to feeble, alike, wrists of medium length, poorly lobed, hands of medium size, weakly inflated or ovate, palms very oblique, of medium length; gnathopod 2 scarcely larger than 1.

Article 2 of pereopods 5-7 narrow, weakly pyriform, alike, posterior margins sinuous or concave, unlobed, setae [?weak or absent].

Rami of uropods 1-2 extending equally, armaments [unknown]. Uropod 3 extended, magniramous, article 2 of outer ramus "indistinct". Telson short, [?deeply cleft].

Coxal gills [?2-7, ovate]. Oostegites [?slightly broadened].

Relationship.--Presumably in a group ancestral to Gmelina, uropod 3 being magniramous. See Praegmelina. Differing from Amathillina in the magniramous uropod 3 and unexpanded article 2 of pereopod 7. Differing from Homocerisca in the unexpanded article 2 of pereopod 7; from Dorogammarus in thin peduncle of antenna 1; from Carinurus in the short article 2 of antenna 1; from Gammarus-like genera in the short, Pontogammarus-like antennae.

Species.--bogacevi Derzhavin, 1927a;

sokolovi Derzhavin, 1927a;

vassolevitschi Derzhavin, 1941;

fossil imprints, Upper Sarmatian, Grozny and Eldara Caucasus, 3.

#### †Praegmelina Derzhavin

Praegmelina Derzhavin, 1927a: 187 (Praegmelina andrussovi

Derzhavin, 1927a, selected by Birstein, 1960).--Hessler, 1969: R390.

--Hurley, 1973: 215.

Fossil. Body ordinary to slender, with weak to strong middorsal teeth on metasome, lateral humps on pereonal pleurae, occasional dorsolateral humps on pereon. Lateral cephalic lobes weakly protruding, mammilliform.

Antennae very short, extending equally, antenna 1 of Pontogammarus form, ratio of peduncular articles = 22:10:9, primary flagellum length = 25, accessory flagellum 1-articulate. Antenna 2 very short, article 5 of peduncle short but distinct from flagellum.

Mouthparts [unknown, except maxillipedal palp 4-articulate and mandibular palp present].

Coxae long, anterior coxae weakly tapering, lobe of coxa 4 weak; setae [unknown]. Gnathopods small to feeble, alike, wrists short to medium, poorly lobed, hands small, narrow, palms oblique, short.

Article 2 of pereopods 5-7 narrow, weakly pyriform, alike, posterior margins sinuous, or concave, unlobed, setae [?weak or absent].

Rami of uropods 1-2 extending equally, armaments [unknown]. Uropod 3 scarcely extended, magniramous, article 2 of outer ramus "indistinct". Telson short, [?cleft].

Coxal gills [?2-7, ovate]. Oostegites [?slightly broadened].

Relationship.--Presumably in a group ancestral to Gmelina, uropod 3 being magniramous. Differing from Andrussovia in shorter uropod 3, presence of pleural humps on pereon, more feeble gnathopods. Differing from Brandtia in the short, Pontogammarus-like antennae and unexpanded article 2 of pereopods 5-7; from Boeckaxelia in the short antennae and feeble gnathopods. See Andrussovia.

Species.--andrussovi Derzhavin, 1927a;

archangelskii Derzhavin, 1927a;

fossil imprints, Upper Sarmatian, Grozny, Caucasus, 2.

#### Turcogammarus Karaman and Barnard

Map 38

Turcogammarus Karaman and Barnard, 1979: 137 (Obesogammarus turcarum Stock, 1974c, original designation).

Body ordinary or carinate, at least urosomites 1-2 each with large elevated process (knob or tubercle), all spinose. Lateral cephalic lobes subquadrate.

Antennae of medium length, extending subequally, antenna 1 of Pontogammarus form, no articles humped, ratio of peduncular articles = 30:15:7, flagellar ratio = 63:17, ventral setae of article 1 weak and terminal, accessory flagellum 4-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 17:27:21:50, article 3 weakly humped.

Mouthparts of type-species partly known, bracketed remarks need confirmation: Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed, molar triturative], ratio of palp articles = 5:12:9, article 3 weakly falcate, setae = ABCDE! Labium with inner lobes [?weak]. Maxillae [?medially setose, inner plate of maxilla 1 triangular, fully setose medially], outer plate with 9 spines, palps asymmetric. Inner plate of maxilla 2 with [?oblique facial row of setae]. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl as long as 3, unguiform, with nail].

Coxae of ordinary length, strongly setose ventrally, coxa 1 weakly dilated distally, coxa 4 lobed. Gnathopods 1-2 subchelate, almost alike in shape, wrists short, scarcely lobed, hands ovate, palms oblique, of medium length, almost identical in slope, each with midpalmar spine, gnathopod 2 larger than 1. Female gnathopods smaller than in male.

Pereopods 3-7 strongly fossorial; article 4 of pereopod 4 weakly expanded, with about 9 posterior bundles of setae, article 5 scarcely expanded, almost linear, strongly setose. Article 2 of pereopods 5-7 strongly setose posteriorly, moderately setose mediofacially, of pereopods

5 and 7 expanded, weakly and strongly lobed posteroventrally respectively, of pereopod 6 tapering and unlobed.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropod 2 shortened, outer rami of uropods 1-2 without marginal spines. Uropod 3 [?weakly extended], almost parviramous, inner ramus short and scale-like but with several medial setae (by definition thus variramous), outer ramus elongate, weakly spinose and strongly setose, article 2 short. Telson of ordinary length, cleft to base, apices tapering, with several spines and setae.

Coxal gills [?2-6], [?ovoid in type-species, ovoid in spandli]. Oostegites narrow.

Variants.--Metasome with dorsomedial keel (spandli); gnathopodal palm slopes dissimilar (spandli; aralensis); gnathopod 2 palm lacking midspine but gnathopods strongly Gammarus-like (aralensis).

Relationship.--Differing from Dikerogammarus in the strong setosity of coxae, articles 4-5 of pereopods 3-4, and article 2 of pereopods 5-7; differing from Obesogammarus in the presence of urosomal knobs.

Species.--aralensis (Uljanin, 1875) (Sowinsky, 1894a) [331];

spandli (S. Karaman, 1931d) [088-089];

turcarum (Stock, 1974c) [068];

Northern Greece, springs and streams; Turkey, Mt. Ararat region, fountain (we place in Caucasus province), Aral Sea, fossorial but ecology anomalous, 3.

#### Obesogammarus Stock

Figures 16, 18, Map 48a

Obesogammarus Stock, 1974c: 83 (Gammarus obesus Sars, 1894a, original designation).

Urosomites flat, scarcely setose. Lateral cephalic lobes rounded or quadrate.

Antennae 1-2 of medium length, extending subequally; antenna 1 of Pontogammarus form, no articles humped, ratio of peduncular articles = 34:16:8, flagellar ratio = 62:10, ventral setae of article 1 weak and terminal. Ratio of articles 3,4,5 and flagellum of antenna 2 = 16:24:20:40, article 3 weakly humped.

Ratio of mandibular palp articles = 6:15:14, article 3 weakly falcate, setae = ABDE, D setae separable. Labium without inner lobes (type). Maxilla 1 medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 10 (11?) spines, palps [?asymmetric]. [Maxilla 2 unknown].

Coxae long, setose, coxa 1 slightly or not expanded, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, large to medium, gnathopod 2 enlarged

but like gnathopod 1, wrists short, weakly lobate, hands elongate, palmar slopes almost identical, oblique, of medium length; female gnathopods slightly smaller than in male.

Pereopods 3-7 strongly fossorial; article 4 of pereopod 4 with posterior setae arranged in groups (not continuous), article 5 narrow, rectangular. Article 2 of pereopods 5-7 strongly setose, of article 6 poorly expanded, (and not posteriorly concave!), of pereopods 5 and 7 expanded, of pereopod 7 lobate.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending evenly, both rami marginally naked, peduncular setae very sparse, basofacial setae on uropod 1 [unknown]. Uropod 3 not extended, of modified parviramous form, thus inner ramus short and scale-like but outer ramus also very short, setose, weakly spinose, article 2 short. Telson short, deeply cleft, apices broad but poorly spinose.

Coxal gills [?2-6]. Oostegites of medium breadth.

Relationship.--Differing from Pontogammarus in the bundled (not continuous) posterior setae on article 4 of pereopod 4.

Notes.--Obesus a poor type-species, because other species of genus of more ordinary character; for example: crassus with humped urosomites, uropod 3 of normal extended form with elongate outer ramus, telson ordinary, article 2 of pereopod 5 lobate; on the other hand, platycheir with pereopod 7 very poorly lobate, shape of article 2 on pereopod 5 like that of pereopod 6, with excavate posterior margin and tapering distally!, flagellum of antenna 1 short (near Niphargoides kind).

Species.--?boeoticus (Schellenberg, 1944) [142];

crassus (Sars, 1894a) [335];

?mediodanubialis (S. Karaman, 1953a) [084];

obesus (Sars, 1894a) [335];

?olvianus (Sowinsky, 1904) [337];

platycheir (Sars, 1896) [332];

Caspian, Aral, Black and Azov Seas, Greece (Lake Iliki), fossorial, 3 species and 3 doubtful species.

#### Pandorites Sars

Figures 16, 24

Pandora Sars, 1895a: 287 (homonym, Mollusca).

Pandorites Sars, 1895a: 287 (Pandorites podoceroides Sars, 1895a, monotypy).--Stebbing, 1906: 448.--Stock, 1974c: 84.

Urosomites weakly spinosetose. Lateral cephalic lobes strong, rounded. Antennae short, extending subequally; antenna 1 of Pontogammarus form,



no articles humped, ratio of peduncular articles = 30:12:8, flagellar ratio = 22:8, ventral setae of article 1 moderately spread. Ratio of articles 3,4,5, and flagellum of antenna 2 = 14:20:18:32, article 3 weakly humped.

Ratio of mandibular palp articles = 5:13:10, article 3 weakly falcate, setae = ABDE. Labium without inner lobes. Maxillae medially setose, inner plate of maxilla 1 subovate, almost fully setose medially, outer plate with 9 spines, palps [symmetric]. Inner plate of maxilla 2 with oblique row of facial setae.

Coxae of medium size, long setae strong on coxa 1 but diminishing on posterior coxae (few medium to small setae apparent on coxa 4), coxa 1 weakly tapering; coxa 4 with posteroventral lobe obsolescent. Gnathopods 1-2 strongly subchelate, large to medium, gnathopod 2 enlarged but slightly different from gnathopod 1, latter with short wrist and moderate lobe, hand ovatorectangular, palm strongly oblique, long, wrist of gnathopod 2 short, strongly lobed (lobe small but strongly marked), hand enlarged, elongate, ovatotrapezoidal, palm strongly oblique, long; male gnathopods slightly larger than those of female.

Pereopods 3-7 moderately fossorial; article 4 of pereopod 4 weakly expanded, with 6 or more posterior groups of setae, article 5 scarcely expanded, almost rectangular, well setose posteriorly. Article 2 of pereopods 5 and 7 lacking long posterior setae, of pereopod 6 with short, mostly dorsal setae, of pereopod 5 weakly expanded but unlobate, of pereopod 6 unexpanded, posterior edge almost straight, of pereopod 7 broadly expanded, lobate.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending equally, outer ramus of uropod 2 lacking marginal spines, peduncles of uropod 1-2 with sparse dorsal setae, none basofacially. Uropod 3 scarcely extended, actually short (because uropods 1-2 very short), parviramous, outer ramus short, weakly spinose and setose, article 2 vestigial. Telson short, deeply cleft, apices wide, poorly spinosetose.

Relationship.--Like Akerogammarus but lobe of coxa 4 obsolescent; differing from Obesogammarus also by coxa 4 but also by absence of posterior setae on article 2 of pereopod 7.

Species.--podoceroides Sars, 1895a [336];

Caspian and Black Seas, fossorial, 1.

Pontogammarus Sowinsky

Figures 4, 16, Map 47d

(Pontogammarus) Sowinsky, 1904: 394 (Gammarus robustoides Sars, 1894a, selected by Stock, 1974c).--Martynov, 1924a: 33.--Stock, 1974c: 84.

Urosomites weakly humped or not, spinose. Lateral cephalic lobes subquadrate.

Antennae 1-2 of medium length, extending subequally; antenna 1 of Pontogammarus form, no articles humped, ratio of peduncular articles =

30:14:5, flagellar ratio = 55:16 (thus primary flagellum longer than peduncle, accessory flagellum much less than half as long as primary flagellum, differing from Gammarus antenna 1 mainly in shorter article 2 of peduncle), ventral setae of article 1 mostly terminal). Ratio of articles 3,4,5 and flagellum of antenna 2 = 15:20:18:36, article 3 strongly humped.

Mouthparts [of type-species unknown, following description taken from other species: Labrum broader than long, entire. Mandibular incisor toothed, molar triturative, ratio of palp articles = 5:20:16, article 3 ?curved linear falcate, setae = AB(D)E. Labium without inner lobes! Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 11 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose, article 3 of palp unlobed, dactyl scarcely shorter than 3, unguiform, with nail].

Coxae long, setose, coxa 1 slightly expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, strong to medium, gnathopod 2 enlarged but like gnathopod 2, wrists short, weakly lobed, hands elongate or stout, palmar slopes identical, oblique, of medium length; female gnathopods smaller than in male.

Pereopods 3-7 strongly fossorial; article 4 of pereopod 4 with posterior setae in continuous row, article 5 widened, trapezoidal. Article 2 of pereopods 5-7 strongly setose, of article 6 poorly expanded, of pereopods 5 and 7 expanded, of pereopod 7 lobate.

Epimeron 3 lacking posteroventral fan of setae. Outer ramus of uropod 2 shortened, peduncle of uropod 2 with basofacial setal row (weakly shown in Sars, 1894a, plate 12) otherwise peduncles of uropods 1-2 weakly setose dorsally. Uropod 3 extended, variramous (inner ramus short but setose), inner ramus one third as long as outer ramus, outer ramus long, setose and weakly spinose, article 2 short. Telson of ordinary length, deeply cleft, apices of moderate width, spinose.

Coxal gills [2-6]. Oostegites of medium breadth to narrow.

Relationship.--Used as the model Pontogammarid, differing from other Gammaroids in the lobate article 2 of pereopod 7; differing from Dikerogammarus in absence of urosomal tubercles.

Variants.--Outer ramus of uropod 2 marginally naked (borceae); article 2 of pereopod 5 lobate (borceae and aestuarius); again mandibular palp article variable, curved linear to falcate, inner margin setose or not, D setae present or absent (borceae contrasted to aestuarius).

Notes.--We transfer olvianus and setosus to Pontogammarus, whereas Stock (1974c) assigned these to Obesogammarus; we interpret pereopod 4 to be of Pontogammarus form.

Species.--abbreviatus (Sars, 1894a) [332];

aestuarius (Derzhavin, 1924a) (Carasu, 1943) [336];

borceae Carasu, 1943 [337];

palmatum (Martynov, 1925a) (but see Mordukhai-Boltovskoi, 1969, and Stock, 1974c, who state this is Dikerogammarus fluviatilis) [332];

robustoides (Sars, 1894a) [335];

?setosus (Schaferna, 1914) [066];

Caspian, Azov and Black Seas; Caucasus, high spring, fossorial, 6.

Euxinia Tucolesco

Figures 4, 5, 7, 16

Euxinia Tucolesco, 1933: 36 (Euxinia fagei Tucolesco, 1933, monotypy,  
= Gammarus maeoticus Sowinsky, 1894b).--Gurjanova, 1951: 358.

Urosomites flat, naked. Lateral cephalic lobes rounded.

Antennae 1-2 of medium length to short, extending subequally; antenna 1 barely of Pontogammarus form, no articles humped, ratio of peduncular articles = 30:12:6, flagellar ratio = 46:18 (thus primary flagellum scarcely longer than peduncle, almost of Niphargoides type), ventral setae of article 2 all terminal, accessory flagellum multiarticulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 15:16:14:30, article 3 strongly, article 4 moderately humped.

Mouthparts [of type-species partly known (Carasus et alia, 1955, and Tucolesco, 1933) notes in brackets for other species]; [Labrum broader than long, entire, rounded-truncate]. Mandibular incisor toothed, molar triturative, ratio of palp articles = 3:12:14 others = 3:25:13), article 3 claviform, setae = ABDE, DE setae inseparable. Labium with inner lobes. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7 (others = 10) spines, palps [?asymmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae long to medium, setose, coxa 1 not or weakly expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, strong to medium, gnathopod 2 enlarged but like gnathopod 1, wrists short, weakly to moderately lobed, hands elongate and/or stout respectively; palmar slopes identical, oblique, of medium length with mid spine; female gnathopods much smaller than in male. Gnathopod 2 also larger than 1 but wrist poorly lobed.

Pereopods 3-7 strongly fossorial; article 4 of pereopod 4 with posterior setae in continuous row, article 5 widened, trapezoidal. Article 2 of pereopods 5-7 strongly to moderately setose, of article 6 poorly expanded, of pereopods 5 and 7 expanded and lobate.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending equally but outer rami lacking marginal spines, or with spines in weidemanni, peduncle of uropod 1 with weak dorsal setae, basofacial setae [unknown], (present in sarsi). Uropod 3 extended, variramous (inner ramus short but setose), inner ramus half as long as outer ramus, outer ramus long, setose and weakly spinose, article 2 short. Telson of ordinary length, deeply cleft, apices moderate to broad, spinose.

Coxal gills [?2-6], some with stalks (weidemanni). Oostegites of medium breadth to narrow (weidemanni).

Variants.--Antenna 2 of sarsi close to Stenogammarus form. Antenna 2 of weidemanni with unhumped thin articles 4-5. Mandibular palp of weidemanni with all DE setae on short apical margin unlike sarsi (thus like case of Paraniphargoides validity).

Relationship.--Differing from Pontogammarus only in the slightly longer inner ramus of uropod 3 (half as long as outer ramus instead of one third). Probably therefore more primitive than Pontogammarus but latter used as group model for historic and nomenclatural reasons.

Species.--maeoticus (Sowinsky, 1894b) (Sars, 1896)  
(= fagei Tucolesco, 1933) [335];

sarsi (Sowinsky, 1898a) [335];

weidemanni (Sars, 1896) [335];

Caspian, Azov and Black Seas, fossorial, 3.

#### Stenogammarus Martynov

Figures 4, 17, 24

Stenogammarus Martynov, 1924: 41 (Gammarus macrurus Sars, 1894a, selected by Stock, 1974c).--Stock, 1974c: 85.  
(Wolgagammarus) Stock 1974c: 85 (valid subgenus, see below).

Body slender, urosomites unhumped, scarcely setulate or weakly spinose. Rostrum small, lateral cephalic lobe rounded or subquadrate.

Antennae short to medium, extending subequally; antenna 1 of Pontogammarus form, no articles humped, ratio of peduncular articles = 35:13:8, flagellar ratio = 58:15, ventral setae of article 1 weak and terminal, accessory flagellum multiarticulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 18:21:19:50, article 3 weakly humped, [antenna 2 of Stenogammarus form in which first 2 articles of flagellum together almost as long as peduncular article 5, and articles 4-5 of peduncle not humped, slender, article 5 the thinner, hence article 5 forming blend between article 4 and flagellum; this concept so variable and difficult to treat we abandon it as a taxonomic device].

Mouthparts of type-species unknown but probably as follows: Labrum broader than long, entire, rounded truncate. Mandibular incisor toothed, molar triturative, ratio of palp articles = 5:15:12, article 3 curved-linear, setae = AB(D)E, D and E setae terminal. Labium without inner lobes. Maxillae medially setose, inner plate triangular, fully setose medially, outer plate with 11 spines, palps ?asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, ?with nail].

Coxae of medium size to long, setae short and sparse, coxa 1 scarcely to strongly expanded below, coxa 4 lobed. Gnathopods strongly subchelate, medium to small, gnathopod 2 of male slightly larger than but like

gnathopod 1, wrists short, poorly lobate, hands elongate to stout, palmar slopes identical, oblique, of medium length; female gnathopods both much smaller than in male, almost identical in size, wrists much longer but wrist of gnathopod 2 much longer than in gnathopod 1, hands subrectangular, palms short.

Pereopods 3-7 moderately fossorial; article 4 of pereopod 4 with posterior setae arranged in bundles (type) or continuously (similis), article 5 narrow and rectangular (type) or expanded and trapezoidal (similis). Article 2 of pereopods 5-7 weakly (type) to strongly (similis) setose, in type article 2 of pereopod 5 not posteriorly setose, of pereopods 6-7 with short sparse setae, of pereopod 6 weakly expanded, posterior margin convex, of pereopods 5 and 7 strongly expanded, lobate.

Epimeron 3 lacking posteroventral fan of setae. Rami of uropods 1-2 extending evenly, [?apparently outer ramus of uropod 2 lacking marginal spines, basofacial setae of uropod 1 apparently present]. Uropod 3 strongly extended, parviramous, peduncles slightly elongate (or not), outer ramus elongate, (spinose) and setose, article 2 elongate. Telson of ordinary length, apices of medium width, moderately spinose.

Coxal gills [?2-6]. Oostegites of medium breadth.

Relationship.--Differing from Pontogammarus, Euxinia and Obesogammarus in the elongate article 2 on the outer ramus of uropod 3.

Notes.--Antennal measurements taken from carausui (= similis of Carausu, 1943); S. macrurus of Carausu, 1943, removed to incertae sedis below.

Variants.--Species other than the type with concave or sinuous posterior margin on article 2 of pereopod 6.

Species.--carausui Derzhavin and Pjatakova, 1962 (= similis of Carausu, 1943, = olearii Derzhavin, 1951, = compresso-similis Carausu, et alia, 1955 [nomen nudum], = karauschi Dediu, 1967b = kereuschui Mordukhai-Boltovskoi and Ljakhov, 1972) [336];

compressus (Sars, 1894a) [335];

deminutus (Stebbing, 1906) (= minutus Sars, 1894a) [332];

macrurus (Sars, 1894a) [335];

similis (Sars, 1894a) [335];

Caspian, Azov and Black Seas, attendant rivers, fossorial, 5.

#### Stenogammarus sp.

Stenogammarus macrurus.--Carausu, 1943: 59, plates 16, 17 (not Sars, 1894a).

Like Stenogammarus but article 2 of pereopod 6 lobate; like Shablogammarus but article 2 on outer ramus of uropod 3 elongate, coxae 1-4 with long setae, antenna 1 of Pontogammarus form.

Carausu's material needs reexamination to see if it is properly described and, indeed, whether or not Sars's depiction of S. macrurus is correct. If not, all species of Stenogammarus must be realigned to reflect the outcome. We do not know if Stock (1974c) based some of the diagnosis of Stenogammarus on this depiction by Carausu, a potential problem needing clarification.

Species.--sp. (macrurus of Carausu, 1943) [337];

Danube River, fossorial, 1.

Stenogammarus (Wolgagammarus) Stock

(Wolgagammarus) Stock, 1974c: 85 (Stenogammarus dzjubani Mordukhai-Boltovskoi and Ljakhov, 1972, original designation).

Like Stenogammarus but male gnathopod 2 of neotenic form, thus like female; article 5 of pereopods 3-4 especially elongate.

Outer margin of uropod 3 with pinnate setae.

Species.--dzjubani Mordukhai-Boltovskoi and Ljakhov, 1972 [338];  
Volga River, man made lakes, 1.

Compactogammarids

Dactyl of maxilliped ordinary; primary flagellum of antenna 1 about as long as peduncle, accessory flagellum more than half as long as primary flagellum; gnathopod 1 not dominant.

Key to the Genera of Compactogammarids

1. D-setae well developed on mandibular palp article 3. . . . . 2  
D-setae on mandibular palp article 3 absent or vestigial. . . . . 3
2. Epimeron 3 with setal fan, outer ramus of uropod 3 with lateral plumose setae, article 2 of mandibular palp slender, longer than article 3. . . . . Niphargoides  
Epimeron 3 lacking setal fan, outer ramus of uropod 3 with lateral spines, setae when present simple, article 2 of mandibular palp enlarged, swollen, subequal to article 3. . . . . Paraniphargoides
3. Epimeron 3 lacking setal fan, article 2 of peduncle on antenna 1 swollen ventrally, article 2 on outer ramus of uropod 3 elongate. . . . . Niphargogammarus  
Epimeron 3 with setal fan, article 2 of peduncle on antenna 1 linear, article 2 on outer ramus of uropod 3 short. . . . . 4
4. Uropod 3 with lateral plumose setae, inner ramus short, with plumose setae, article 2 of pereopod 7 strongly lobate ventrally. . . . . Compactogammarus  
Uropod 3 with lateral spines only, inner ramus elongate, lacking setae, article 2 of pereopod 7 scarcely lobate ventrally . . . . . Uroniphargoides

Uroniphargoides Stock

Uroniphargoides Stock, 1974c: 87 (Niphargoides spinicaudatus Carausu, 1943, original designation).

Urosomites weakly humped and weakly spinose. Lateral cephalic lobes mammilliform

Antennae 1-2 short, extending subequally, stout; antenna 1 of Niphargoides kind, ratio of peduncular articles = 33:15:6, flagellar ratio = 15:9, ventral setae of article 1 widely spread, no articles humped. Ratio of articles 3,4,5 and flagellum of antenna 2 = 12:18:11:11, articles 3-4 slightly humped.

Ratio of mandibular palp articles = 8:20:18, article 3 sublinear (scarcely falciform), setae = A,B,E, with D setae vestigial. Labium with inner lobes. Maxillae 1-2 medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 spines, palps [?asymmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae long, setose, coxa 1 slightly expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, medium, gnathopod 2 enlarged but gnathopod 1 generally like gnathopod 2, wrists short, weakly and strongly lobate, hands elongate, ovate, palmar slopes identical, oblique, of medium length. Female gnathopod 2 smaller than in male.

Pereopods 3-7 strongly fossorial. Article 2 of pereopods 5-7 strongly setose, of pereopods 5 and 7 moderately to broadly expanded, not truly lobate (even pereopod 7!), of pereopod 6 scarcely expanded.

Pleopods [?ordinary]. Epimeron 3 with posteroventral fan of setae. Rami of uropods 1-2 extending equally, peduncles with sparse dorsal setae, peduncle of uropod 1 with basofacial setal row. Uropod 3 moderately extended, outer ramus of medium length, spinose and weakly setose, article 2 vestigial, inner ramus of variramous kind, with only 2 apical spines (and 2 medial on occasion) but more than half as long as outer ramus. Telson length ordinary, almost fully cleft, apices broad and spinose.

Coxal gills [?2-6], broad, stalked. Oostegites narrow to medium.

Relationship.--Like Niphargoides but inner ramus of uropod 3 elongate.

Species.--spinicaudatus (Carausu, 1943) [337];

delta of Danube, fossorial, 1.

Niphargoides Sars

## Figure 4

Niphargoides Sars, 1894a: 371 (Niphargus caspius Sars, 1894a, monotypy).--Stebbing, 1906: 450.--Stock, 1974c: 86.

Lateral cephalic lobes rounded.

Antennae 1-2 short, extending equally, stout; antenna 1 of Niphargoides kind, ratio of peduncular articles = 31:15:6, flagellar ratio 20:14 (thus primary flagellum shorter than peduncle and usually shorter than peduncular article 1, accessory flagellum more than half as long as primary

flagellum), ventral setae of article 1 mostly terminal, no articles humped. Ratio of articles 3,4,5 and flagellum of antenna 2 = 16:20:16:20 only article 3 slightly humped.

Ratio of mandibular palp articles = 6:19:15, article 3 falcate, setae = ABDE. Labium with inner lobes. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae medium, setose, coxa 1 not expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, medium, gnathopod 2 enlarged but gnathopod 1 generally like gnathopod 2, wrists short, weakly and strongly lobate, hands elongate, ovate, palmar slopes identical, oblique, short.

Pereopods 3-7 strongly fossorial. Article 2 of pereopods 5-6 slightly expanded, unlobate, strongly setose, of pereopod 7 well expanded, scarcely lobate, strongly setose.

Epimeron 3 with posteroventral fan of setae. Rami of uropods 1-2 equally extending, outer ramus of uropod 1 (and 2) lacking marginal spines, peduncle of uropod 1 often dorsally setose and with basofacial setal row. Uropod 3 unextended, short, parviramous, outer ramus short, setose, article 2 very short. Telson length ordinary, almost fully cleft, apices broad and spinose.

Coxal gills [?2-6]. Oostegites [?].

Notes.--Antenna 1 of Niphargoides kind intergraded towards the Pontogammarus kind by Euxinia maeoticus (see description of Euxinia). Uropod 3 slightly extended (boltovskoyi).

Relationship.--The basic Niphargoidid differing from Pontogammarids in antenna 1 as defined in this description.

Species.--boltovskoyi Derzhavin and Pjatakova, 1968 [332];

caspius (Sars, 1894a) [332];

corpulentus Sars, 1895a [335];

Caspian, Azov and Black Seas, fossorial, 3.

#### Compactogammarus Stock

#### Figure 24

Compactogammarus Stock, 1974c: 86 (Niphargoides compactus Sars, 1895a, original designation).

Lateral cephalic lobes rounded. Antennae 1-2 short, extending equally, (but peduncles more slender than Niphargoides); antenna 1 of Niphargoides type, ratio of peduncular articles = 25:17:4, (but see Carausu, 1943) flagellar ratio = 12:7, ventral setae of article 1 mostly terminal, no articles humped. Ratio of articles 3,4,5 and flagellum of antenna 2 = 11:24:15:11, only article 3 scarcely humped.



[Mouthparts as rendered by Carausu, 1943, but antenna 1 not like Sars rendition, though Stock combining knowledge of Sars and Carausu to create this genus: Mandibular palp ratio = 7:27:23, article 3 sublinear, setae = ABE, others vestigial to absent. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7 spines, palps asymmetric (setose and toothed). Inner plate of maxilla 2 with weak oblique facial row of setae. Outer plate of maxilliped with medial spines, palp article 3 unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae medium, setose, coxa 1 expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, large, gnathopod 2 enlarged but gnathopod 1 like gnathopod 2, wrists short, strongly lobate, hands stout, palmar slopes identical, oblique, long.

Pereopods 3-7 strongly fossorial. Article 2 of pereopods 5-6 expanded, unlobate, strongly setose, of pereopod 7 well expanded, weakly lobate, strongly setose.

Epimeron 3 with posteroventral fan of setae. Rami of uropods 1-2 equally extending, outer ramus of uropod 1 [?bearing marginal spines], peduncle and rami of uropod 1 dorsally setose, with basofacial setal row (see Carausu, 1943). Uropod 3 weakly extended, inner ramus short but strongly setose (thus variramous), outer ramus of medium size, broad, setose, article 2 obsolescent. Telson length ordinary, almost fully cleft, apices broad and spinose.

Coxal gills [2-6]. Oostegites [unknown].

Relationship.--Scarcely differing from Niphargoides, only in the longer article 2 of antenna 1 (but negated by Carausu, 1943, rendition), thinner peduncles of antennae and the absence of D-setae on the mandibular palp.

Species.--compactus Sars, 1895a (possibly also Carausu, 1943) [336];

Caspian and Black Seas, fossorial, 1.

#### Paraniphargoides Stock

Figures 4, 13, 19

Paraniphargoides Stock, 1974c: 87 (Niphargoides motasi Carausu, 1943, original designation).

Urosomites 2 scarcely humped and 2-3 weakly spinose. Rostrum medium, lateral cephalic lobes rounded.

Antennae 1-2 short, extending subequally, stout; antenna 1 of Niphargoides kind, ratio of peduncular articles = 28:9:6 flagellar ratio = 20:13, ventral setae of article 1 widely spread, article 2 scarcely humped. Ratio of articles 3,4,5 and flagellum of antenna 2 = 10:17:14:20, articles 3 and 4 poorly humped.

Labrum [?]. Ratio of mandibular palp articles = 4:15:16, article 2 swollen, article 3 subfalciform, setae = ABDE (unlike Niphargogammarus, D and E setae present on inner margin of article 3). Labium with inner lobes. Maxillae medially setose, inner plate of maxilla 1 subtriangular, fully setose medially, outer plate with 10 spines, palps [?asymmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae long, setose, coxa 1 moderately expanded below, coxa 4 lobed. Gnathopods [only female known type-species] strong, subchelate, small, gnathopod 2 enlarged but gnathopod 1 like gnathopod 2, wrists short, scarcely lobed, hands stout, palmar slopes identical, oblique, short.

Pereopods 3-7 strongly fossorial. Article 2 of pereopods 5-7 strongly setose, of pereopod 6 weakly, of pereopods 5 and 7 strongly expanded, of latter pereopods lobate.

Pleopods [?ordinary]. Epimeron 3 without posteroventral fan of setae. Rami of uropods 1-2 equally extending, inner without marginal spines, peduncle of uropod 1 with dorsal setae, [basofacial setae unknown]. Uropod 3 extended, parviramous, outer ramus stout, spinose and/or setose, article 2 short. Telson of ordinary length, deeply cleft, apices broad and spinose.

Coxal gills [?2-6]. Oostegites narrow.

Variants.--Wrists of gnathopods strongly lobate (derzhavini); article 2 on outer ramus of uropod 3 extremely vestigial (derzhavini); apices of telson narrow (derzhavini).

Relationship.--Differing from Niphargogammarus only in the presence of setae on the inner margin of palp article 3 on the mandible (and article 3 in type-species of Niphargogammarus is only presumed by Stock). Species of Niphargogammarus also have article 2 on the outer ramus of uropod 3 elongate.

Niphargoides grimmi departs significantly in poorly setose article 1 of antenna 1, and lack of spines on outer ramus of uropod 3 (setae only).

Species.--derzhavini (Pjatakova, 1962a) [332];

?grimmi (Sars, 1896) [332];

motasi (Carausu, 1943) [337];

Caspian and ?Black Seas, fossorial, 1 species and 2 probable species.

#### Niphargogammarus Birstein

Figures 4, 5, 8, 10, 13

(Niphargogammarus) Birstein, 1945a: 519 (Niphargoides quadrimanus Sars, 1895a, original designation).

Niphargogammarus.--Stock, 1974c: 85.

Lateral cephalic lobes rounded. Antennae 1-2 short, extending equally, stout; antenna 1 of Niphargoides type, ratio of peduncular articles = 36:12:6, flagellar ratio = 35:17; ventral setae of article 1 moderately spread, article 2 weakly humped. Ratio of articles 3,4,5 and flagellum of antenna 2 = 11:11:11:24, articles 3-4 strongly humped.

Mouthparts [undescribed for type-species, following description taken from Niphargoides intermedius Carausu, 1943, and apparently used by Stock for generic diagnosis]: [Labrum broader than long, entire, rounded.

Mandibular palp ratio = 4:15:18, article 3 linear, setae = AE (unlike Paraniphargoides, all E setae apical). Labium with inner lobes. Maxillae poorly setose medially, inner plate of maxilla 1 ovate-circular, with only 4 setae mostly terminal, outer plate with 9 spines, palps asymmetric. Plates of maxilla 2 very short, inner with only 1-2 setae in oblique facial row, one of these very large, other medial setae thin, weak, possibly "hairs". Outer plate of maxilliped medially spinose, palp article 3 unlobed, dactyl shorter than 3, unguiform, nail indistinct (perhaps overlooked)].

Coxae medium, setose, coxa 1 slightly expanded below, coxa 4 lobed. Gnathopods 1-2 strongly subchelate, medium, gnathopod 2 enlarged but gnathopod 1 generally like gnathopod 2, wrists short, strongly lobed, hands elongate but almost stout, palmar slopes identical, oblique, short.

Pereopods 3-7 strongly fossorial. Article 2 of pereopod 5 weakly, of pereopods 6-7 strongly setose, of pereopod 6 weakly, of pereopods 5 and 7 strongly expanded, of latter pereopods lobate.

Pleopods [?ordinary]. Epimeron 3 without posteroventral fan of setae. Rami of uropods 1-2 equally extending, peduncle on uropod 1 not dorsally setose, [probably with basofacial setal row]. Uropod 3 extended, long, parviramous, outer ramus elongate, spinose and/or setose, article 2 elongate. Telson of ordinary length, almost fully cleft, apices rounded, tapering, poorly spinose.

Coxal gills [?2-6]. Oostegites [?narrow].

Variations.--Rami of uropods 1-2 marginally naked (aequimanus); inner rami of uropods 1-2 shortened, uropod 3 shortened, telsonic apices broad and spinose (intermedius); articles 4-5 of antenna 2 slightly longer than in type (borodini, intermedius).

Relationship.--Differing from Niphargoides in the absence of a setal fan on epimeron 3, in the humped and shortened article 4 of antenna 2.

Species.--aequimanus (Sars, 1895a) [332];

borodini (Sars, 1897) [332];

intermedius (Carausu, 1943) [337];

quadrimanus (Sars, 1895a) [332].

Caspian Sea and rivers of Black Sea, fossorial, 4.

#### Cardiophilids (polyphyletic)

Maxillipedal dactyl reduced in size or pereopods 3-7 weakly prehensile (dactyl of Pachyschysis unknown).

Either gnathopod 1 or 2 dominant.

See Pachyschysis in Baikal group, III L.

## Key to the Genera of Cardiophilids

1. Articles 2 and 4 of pereopods 5-7 widely expanded. . . . . 2  
Articles 2 and 4 of pereopods 5-7 not widely expanded. . . . . Cardiophilus
2. Gnathopod 1 dominant . . . . . Pachyschysis (part)  
Gnathopod 1 not dominant . . . . . 3
3. Article 2 of pereopods 5-7 hatchet shaped, coxa 1 not  
expanded apically . . . . . Behningiella  
Article 2 of pereopods 5-7 ovate, coxa 1 expanded  
apically. . . . . Zernovia

Cardiophilus Sars

Figures 4, 26

Cardiophilus Sars, 1896: 474 (Cardiophilus baeri Sars, 1896, monotypy).--Stebbing, 1906: 395.

Body slender, urosomites naked. Lateral cephalic lobes strongly protruding, mammilliform.

Antenna 1 scarcely elongate, antenna 2 very short, no articles humped, antenna 1 almost of Pontogammarus form, ratio of peduncular articles = 28:14:8, flagellar ratio = 64:8, ventral setae of article 1 vestigial, accessory flagellum 2-articulate. Ratio of articles 3,4,5 and flagellum of antenna 2 = 18:38:30:40.

Labrum entire, subrounded [fide Sars, but slightly excavate fide Carausu, 1943]. Ratio of mandibular palp articles = 4:13:11, article 3 falcate, setae = (C)DE. Inner lobes of lower lip absent, weakly gaping. Maxillae weakly setose medially, inner plate of maxilla 1 ovatotriangular, with 3 medial setae near apex, outer plate with 7 spines, palp small, slender, slightly exceeding outer plate, 2-articulate, each article of equal length, apex with 2 small setae. Inner plate of maxilla 2 with weakly oblique facial row of 3-4 setae. Maxilliped palp article 3 weakly lobate apically, dactyl vestigial, with 2 weak apical setae.

Coxae of medium size, long setae absent, coxa 1 unexpanded below, coxa 4 scarcely lobate. Gnathopods feeble, subchelate, gnathopod 1 short, wrist of medium length, weakly lobate, hand rectangular, palm slightly oblique, short; gnathopod 2 elongate but slightly thinner than gnathopod 1, wrist elongate, scarcely lobate, hand about as long as wrist, rectangular, palm transverse, short.

Pereopods 3-4 ordinary, though dactyls slightly elongate. Article 2 of pereopods 5-7 generally similar, scarcely expanded, posterior margin weakly convex, of pereopod 7 scarcely lobate.

Rami of uropods 1-2 extending subequally, outer rami not marginally spinose. Uropod 3 short, parviramous, peduncle slightly elongate, outer ramus very short, weakly setose, article 2 vestigial or absent (specific character). Telson very short, much broader than long, deeply cleft, apices broadly tapered, each with setule, main lateral setule pairs thus highly apicad.

Coxal gills [2-6], ovate. Oostegites of medium breadth.

Relationship.--Like Pandorites in coxa 4 but gnathopods feeble and basis of pereopod 7 unexpanded and poorly lobate.

Differing from Pachyschysis in the dissimilar gnathopods with the wrist of gnathopod 2 being elongate; the parviramous uropod 3 (contrast is variramous), short telson, and slightly lobed coxa 4 (contrast is unlobed).

Species.--baeri Sars, 1896 [332];

marisnigrae Miloslawskaya, 1931 (= miloslavskajae Carausu et alia, 1955) [334];

Caspian and Black Seas, commensal in Corophium and mollusks (Cardium spp.), 2.

### Behningiella Derzhavin

Figures 26, 34

Behningiella Derzhavin, 1948: 281 (Behningiella brachypus Derzhavin, 1948, original designation).--Birstein and Romanova, 1968: 277.

Urosomites dorsally naked. Rostrum absent, lateral cephalic lobes rounded, weak sinus present.

Antennae poorly extended, short, antenna 1 longer than 2, ratio of peduncular articles and primary flagellum = 22:10:8:64, accessory flagellum 1-articulate. Antenna 2 somewhat Stenogammarid in form, article 1 of flagellum slightly elongate.

Ratio of mandibular palp articles = 7:16:13, article 3 weakly falcate, setae = [? E only]. Inner lobes of labium weakly developed, small gape present. Maxillae moderately setose medially, inner plate of maxilla 1 broadly ovate, partially setose medially, outer plate with about 8-9 spines, palp 2-articulate but very short, articles subequally long. Inner plate of maxilla 2 weakly setose apicomediaally, facial setae absent. Both plates of maxilliped enlarged, outer apparently grossly striate on medial face, palp slender and weak, article 3 thin, unlobate, dactyl vestigial.

Coxae elongate, poorly setose, coxa 1 unexpanded, apically rounded, coxa 4 lobate. Gnathopods [only of female known] feeble, of same size, wrist of gnathopod 1 of ordinary length, of 2 slightly elongate, neither lobate, hands rectangular, palms subtransverse, short.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 broadly expanded, hatchet-shaped, broadly lobate and truncate below posteroventrally, serratosetulate posteriorly, pereopods 5-7 very short and stout, article 4 slightly dilated.

Outer rami of uropods 1-2 slightly shortened, all rami apparently naked dorsally, peduncle of uropod 1 apparently unarmed basofacially. Uropod 3 unextended, short, parviramous, outer ramus short, 2-articulate, article 2 very short. Telson short, deeply cleft, lobes tapering, poorly armed.

Coxal gills [?2-6]. Oostegites moderately narrow.

Relationship.--Like Zernovia but article 2 of pereopods 5-7 hatchet-shaped, female gnathopods feeble, and palp of maxilla 1 and dactyl of

maxilliped more strongly reduced; differing from Cardiophilus in the broadly expanded bases of pereopods 5-7.

Species.--brachypus Derzhavin, 1948 [332];

Caspian Sea, 16-30 m, 1.

Zernovia Derzhavin

Figures 2, 13, 26

Zernovia Derzhavin, 1948: 280 (Zernovia volgensis Derzhavin, 1948, original designation).-- Birstein and Romanova, 1968: 278.

Urosomites naked. Lateral cephalic lobes submammilliform, sinus [?weak].

Antennae of medium extension, antenna 1 longer than 2, ratio of peduncular articles and primary flagellum = 20:11:8:55, accessory flagellum 1-2 articulate. Antenna 2 somewhat Stenogammarid, first article of flagellum scarcely shorter than last article of peduncle.

Mandibular molar small [but apparently triturative]; ratio of palp articles = 6:16:10, article 3 falcate, setae = DE. Inner lobes of labium weak, gape present. Maxillae medially setose, inner plate of maxilla 1 broadly triangular, fully setose medially, outer plate with [at least 7 spines, illustration very small], palps 2-articulate, [?symmetric]. Inner plate of maxilla 2 with apicomedial setae [facial setae not apparent in small figure]. Maxilliped dactyl shorter than 3, stubby, with long nail.

Coxae very elongate, poorly setose, coxa 1 expanded apically, coxa 4 lobate. Gnathopod 2 large, gnathopod 1 much smaller, with medium wrist poorly lobate, hand rectotrapezoidal, palm oblique, female gnathopod 2 like 1 but enlarged, male gnathopod 2 even larger, structure of 1 and 2 alike.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-7 expanded, broadly lobate posteroventrally, posterior margins minutely serrate, setulose only; article 4 broadened.

Rami of uropods 1-2 extending equally, [apparently unarmed], peduncle of uropod 1 [apparently unarmed basofacially]. Uropod 3 not extended, small, parviramous, outer ramus short, 2-articulate, article 2 short. Telson short, fully cleft, apices tapering, poorly armed.

Coxal gills [?2-7], ovate, anterior members pediculate. Oostegites narrow.

Relationship.--Somewhat similar to Shablogammarus and Cardiophilus but article 4 of pereopods 5-7 dilated.

Species.--volgensis Derzhavin, 1948 [338];

delta of Volga River, Caspian Sea, 2-30 m.

## Pontoporeiids

Antenna 2 of Pontogammarus form, with articles 2 and 3 shortened, articles 2 and 3 less than half as long as article 1, flagella shorter than or scarcely more elongate than peduncle; antenna 2 variable.

Gnathopods enfeebled.

Article 2 of pereopod 7 expanded or not.

Telson variable, cleft more or less.

Differing from Pontogammarids in enfeebled gnathopods.

## Key A to Pontoporeiids

1. Accessory flagellum absent . . . . . Zaramilla  
Accessory flagellum present . . . . . 2
2. Antenna 1 geniculate . . . . . 3  
Antenna 1 not geniculate . . . . . 4
3. Gnathopods diverse, gnathopod 1 weakly subchelate,  
gnathopod 2 cryptochelate (dactyl vestigial, hand  
with oblique "palm") . . . . . Bathyporeia  
Gnathopods alike, weakly subchelate . . . . . Amphiporeia
4. Wrist of gnathopod 1 not lobate, coxae 1-4  
pointed . . . . . Priscillina  
Wrist of gnathopod 1 lobate, coxae 1-4 truncate . . . . . Pontoporeia

Key B to Pontoporeiids (less Zaramilla)

1. Gnathopods more or less alike. . . . . 2  
Gnathopods strongly diverse. . . . . 3
2. Antenna 1 not geniculate, coxae 1-4 pointed, article 2  
of pereopods 5-6 slender. . . . . Priscillina  
Antenna 1 geniculate, coxae 1-4 truncate, article 2 of  
pereopods 5-6 expanded. . . . . Amphiporeia
3. Antenna 1 not geniculate, gnathopod 2 parachelate,  
pereopod 7 of Phoxocephalid form (article 2 expanded  
but apical arm = articles 3-7, short) . . . . . Pontoporeia  
Antenna 1 geniculate between articles 1-2, gnathopod 2  
cryptochelate (dactyl vestigial and "palm" oblique),  
pereopod 7 ordinary. . . . . Bathyporeia

Key C to Pontoporeiids (less Zaramilla)

1. Article 2 of pereopod 7 broadly expanded . . . . . 2  
Article 2 of pereopod 7 not broadly expanded . . . . . 3
2. Anterior coxae pointed below, accessory flagellum more  
than half as long as primary flagellum . . . . . Priscillina  
Anterior coxae rounded or quadrate below, accessory  
flagellum much less than half as long as primary  
flagellum . . . . . Pontoporeia
3. Gnathopod 2 subchelate, inner ramus of uropod 3 half as  
long as article 1 of outer ramus, maxillipedal palp  
ordinary. . . . . Amphiporeia

Gnathopod 2 simple, inner ramus of uropod 3 very short, scale-like, maxillipedal palp article 2 apicomediaally produced. . . . . Bathyporeia

Zaramilla Stebbing

Zaramilla Stebbing, 1888: 866 (Zaramilla kergueleni Stebbing, 1888, monotypy).

Urosomites simple. Rostrum obsolescent, lateral cephalic lobes scarcely protuberant, rounded. Antennae well extended, antenna 2 scarcely longer than 1, antenna 1 of short Gammarus form, ratio of peduncular articles = 20:14:11, primary flagellum slightly longer than peduncle, accessory flagellum absent. Flagella of both antennae with calceoli as in other Pontoporeiids.

Ratio of mandibular palp articles = 8:20:20, article 3 scarcely expanded, setae = ADE. Inner lobes of labium ephemeral. Maxillae strongly setose medially, inner plate of maxilla 1 leaf shaped, outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 medially setose, with full facial row of setae. Maxilliped dactyl of medium length, with nail.

Coxae of ordinary length, strongly setose, coxa 1 not expanded below, coxa 4 strongly lobate. Gnathopods feeble, sexes alike, wrists slightly longer than hands, not lobate, hands weakly expanded, palms oblique.

Pereopods 3-7 fossorial, 3-4 moderately. Pereopods 5-7 alike, article 2 expanded, strongly setose posteriorly, article 4 strongly, article 5 weakly expanded, dactyls elongate and pectinate on inferior margins; pereopods 5-7 heavily setose, lacking facial spines.

Rami of uropods 1-2 marginally spinose, strongly so apically only outer ramus of uropod 2 shortened, no basofacial armaments. Uropod 3 weakly extended, ordinary, magniramous, aequiramous, rami 1-articulate, weakly armed. Telson weakly elongate, deeply cleft, lobes tapering, weakly armed.

Coxal gills 2-7, ovate and trapezoidal. Oostegites short, oval, asetose.

Relationship.--Differing from other Pontoporeiids in the absence of accessory flagellum; otherwise very primitive, with no modifications on antennae, gnathopods or coxae.

Species.--kergueleni Stebbing, 1888 [851];

Kerguelen Island, surface, 1.

Pontoporeia Kroyer

Figures 27, 28

Pontoporeia Kroyer, 1842: 152 (Pontoporeia femorata Kroyer, 1842, monotypy).--Stebbing, 1906: 127.



Urosomites with or without large dorsal spikes. Rostrum obsolescent, lateral cephalic lobes strongly protuberant, often sharp. Antennae of medium extension, about equally long, antenna 1 of Pontogammarus form, ratio of peduncular articles = 20:10:6, primary flagellum about as long as peduncle, accessory flagellum very short, 2-3 articulate. Antenna 2 of short form, peduncular articles very distinct, flagellum about as long as articles 4-5 combined, article 1 large.

Ratio of mandibular palp articles = 2:14:11, article 3 scarcely falcate, setae = ADE. Inner lobes of labium fleshy. Maxillae weakly setose medially, inner plate of maxilla 1 ovatotriangular, medial margin partly setose, outer plate with 7 spines, palps symmetric. Inner plate of maxilla 2 medially setose, no strongly facial setae present. Maxilliped dactyl short, stubby, with nail.

Coxae of ordinary length, strongly setose, coxa 1 expanded below, coxa 4 scarcely lobate. Gnathopods feeble, sexes alike, wrists moderately elongate, wrist of gnathopod 1 strongly to moderately lobate very broadly, hand inflated, palm oblique; wrist of gnathopod 2 more elongate, unlobed, hand elongate, thin, rectangular, palm parachelate, short.

Pereopods 3-7 fossorial, 3-4 moderately. Pereopods 5-7 diverse, article 2 of pereopods 5-6 scarcely expanded, unlobate, strongly setose posteriorly, of pereopod 7 strongly expanded, strongly lobate, strongly setose; pereopods 5 and 7 of similar length, pereopod 6 greatly elongate.

Rami of uropods 1-2 marginally spinose, but poorly so apically, equally extending, uropod 1 with multiple basofacial armaments. Uropod 3 scarcely extended, small, magniramous, almost aequiramous in male, less strongly so in female, rami 1-articulate, weakly armed. Telson short to ordinary cleft halfway or slightly more, lobes weakly tapering, poorly armed.

Coxal gills 2-7, ovate. Oostegites slender or broad.

Variants.--Urosomite 1 with large bifid spike (femorata); urosomite 1 lacking tooth (femorata); some anterior brood plates broad (affinis, here examined).

Relationship.--Differing from ordinary Gammaroids in the parachelate gnathopod 2, but resembling members of Pontogammarus and Dikerogammarus groups in the diverse pereopods 5-7, the Pontogammarus group in antenna 1 but otherwise uropod 3 magniramous. Unlike Phoxocephalidae in the lack of a visor-rostrum.

Species.--See Sars (1895), Gurjanova (1951, 1962), Bousfield (1973); [setosa Stuxberg, 1880, nomen nudum];

affinis Lindstrom, 1855 (= brevistilus Hay, 1872, nomen nudum)  
(= microphthalma Sars, 1896) (= weltneri Ekman, 1913) (= gurjanovae Birula, 1937) (= brevicornis Segerstrale, 1937) [149 and 332];

femorata Kroyer, 1842 (= furcigera Bruzelius, 1859) (= sinuata Ekman, 1913) (= ekmani Bulycheva, 1936) [210];

hoyi S.I. Smith, 1874 (= filicornis S.I. Smith, 1874) (= kendalli Norton, 1909) (Weckel, 1907) (Segerstrale, 1977) [151];

circumboreal, mostly glacial lakes, brackish ocean, 3.

Priscillina Stebbing

Figures 27, 28

Priscilla Boeck, 1871: 124 (homonym, Coleoptera) (Pontoporeia armata Boeck, 1861, monotypy).

Priscillina Stebbing, 1888: 1680 (new name, assumed same type-species).

Pleonites weakly carinate. Rostrum obsolescent, lateral cephalic lobes mammilliform. Eyes absent.

Antennae of medium extension, antenna 1 slightly the shorter, of Pontogammarus form, ratio of peduncular articles = 20:10:5, primary flagellum about as long as article 1 of peduncle, accessory flagellum elongate, 5-articulate. Antenna 2 stout, article 4 large, with facial spines, article 5 short, flagellum scarcely longer than article 4 of peduncle.

Labrum rounded but minutely notched. Mandibular incisor almost untoothed, ratio of palp articles = 3:14:16, article 3 scarcely falcate, setae = AB(D)E. Inner lobes of labium fleshy. Maxillae fully setose medially, inner plate of maxilla 1 triangular, medial margin fully setose, outer plate with 11 spines, palps symmetric. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl short but unguiform, with nail.

Coxae weakly elongate, first 4 tapering to point, strongly setose, coxa 4 with posterior lobe, coxae 5-7 short. Gnathopods feeble, almost alike, sexes alike, wrists moderately elongate, unlobate, hands of trichophoxin shape, strongly setose anteriorly, palms short, transverse or almost so.

Pereopods 3-7 fossorial, 3-4 moderately, dactyls vestigial. Pereopods 5-7 diverse but lengths similar, article 2 of pereopods 5-7 strongly setose, of pereopods 5-6 scarcely expanded or very thin, with strong posterodorsal tooth, of pereopod 7 strongly expanded, scarcely lobate, apical articles of pereopods 5-7 stenopodous.

Rami of uropods 1-2 extending equally, almost naked on uropod 1, spinose almost to apices on uropod 2, peduncle without basofacial armament. Uropod 3 short but exceeding uropods 1-2, parviramous, article 2 on outer ramus absent or represented by stiff apical spine. Telson of ordinary length, weakly notched, apices moderately armed.

Coxal gills 2-6, ovate. Anterior oostegites broad, posterior narrow.

Species.--armata (Boeck, 1861) (Sars, 1895b) (Gurjanova, 1951, 1962) [200];

circumarctic, sublittoral, 1.

Amphiporeia Shoemaker

## Figure 28

Amphiporeia Shoemaker, 1929: 167 (Amphiporeia lawrenciana Shoemaker, 1929, original designation).

Rostrum obsolescent, lateral cephalic lobes mamilliform.

Antennae of medium extension, male antenna 2 not elongate, antenna 1 slightly shorter than 2, of Pontogammarus form, ratio of peduncular articles = 25:6:6, article 2 attached geniculately to article 1, primary flagellum about as long as article 1 of peduncle, its articles indistinguishable from articles 2-3 of peduncle, with calceoli in male, accessory flagellum less than half as long as primary flagellum, generally of 2 long articles. Antenna 2 flagellum about as long as articles 4-5 of peduncle combined.

Labrum with weak apical incision. Mandibular incisor scarcely toothed, ratio of palp articles = 3:12:12, article 3 weakly falcate or clavate, setae = ADE. Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 11 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae 1-4 elongate, truncate, well setose, coxa 1 unexpanded, coxa 4 with posterior lobe. Gnathopods feeble to medium, somewhat similar though gnathopod 2 more elongate, wrists long, unlobed or lobed, hands weakly ovate to narrow, or pyriform, palms oblique, long on gnathopod 1, short on gnathopod 2, female of lawrenciana with especially elongate wrist on gnathopod 2.

Pereopods 3-7 fossorial; article 4 of pereopods 5-6 expanded, strongly setose on pereopod 5; article 2 of pereopods 5-7 widely expanded, lobate, but sparsely to moderately setose; pereopods 5-7 thus only weakly diverse, pereopod 5 generally like Phoxocephalids but distal arm (articles 3-6) elongate; dactyls of pereopods 5-7 vestigial, of 3-4 weak.

Rami of uropods 1-2 extending equally, inner ramus of uropod 2 marginally naked but other rami with marginal spines and all rami with apical nails and accessory nails, uropod 2 with 2+ basofacial armaments. Uropod 3 of medium extent, variramous, inner ramus about half as long as article 1 of outer ramus, weakly spinose, article 2 of outer ramus of medium size to large. Telson of ordinary length, deeply cleft, lobes tapering, weakly spinose apically and dorsolaterally.

Coxal gills 2-6 (occasionally with weak 7), ovate to sausage shaped. Oostegites slender.

Species.--gigantea Bousfield, 1973 [254];

lawrenciana Shoemaker, 1929, 1930 (Bousfield, 1973) [255-257];

virginiana Shoemaker, 1933b (Bousfield, 1973) [361];

Northwestern Atlantic, sublittoral, 3.

Bathyporeia Lindstrom

Figures 27, 28

Bathyporeia Lindstrom, 1855: 59 (Bathyporeia pilosa Lindstrom, 1855, monotypy).--Stebbing, 1906: 119.--Watkin, 1938: 211 (key: 234).  
--Schellenberg, 1942: 164 (key).  
Thersites Bate, 1857b: 146 (homonym, Mollusca).

Urosomite 1 humped and poorly setose or spinose. Rostrum obsolescent, lateral cephalic lobes mammilliform, broad, shallow. Eyes enlarged in male.

Antennae of medium extension except male antenna 2 immensely elongate, antenna 1 scarcely shorter than 2 in female, of Pontogammarus form, ratio of peduncular articles = 20:4:4, article 2 attached geniculately to article 1, primary flagellum about as long as peduncle, its articles indistinguishable from articles 2-3 of peduncle, with calceoli in male, accessory flagellum less than half as long as primary flagellum, generally of 1-2 very elongate articles. Antenna 2 of female ordinary though generally well developed, peduncle especially large, flagellum in female about as long as article 4 of peduncle, in male greatly elongate as in Phoxocephalidae.

Labrum with weak apical incision. Mandibular incisor simple or scarcely toothed, raker spines very sparse, ratio of palp articles = 2:12:10, article 3 curved, setae = AE! Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 softly triangular, fully setose medially, outer plate with 7-9 spines, palps symmetric. Inner plate of maxilla 2 with oblique facial row of setae (weakly submarginal). Maxilliped palp article 2 very long and apicomediaally produced, article 3 thin and unlobed, often bent, dactyl short, stubby, minute, often hidden among spines, with thin nail.

Coxae 1-4 of ordinary length, truncate, strongly setose, coxa 1 apically expanded or turned forward, coxa 4 weakly lobate. Gnathopods feeble, sexes alike, wrists elongate, indistinctly lobate, hand of gnathopod 1 ovate, with weak oblique palm, hand of gnathopod 2 elongate, triangular, simple, lacking dactyl, palmar region oblique and bearing long setal brush.

Pereopods 3-7 fossorial; pereopod 7 not significantly shorter than 6; articles 4-5 of pereopods 3-4 inflated, strongly setose, article 6 linear, strongly spinose; article 2 of pereopods 5-6 strongly expanded, weakly lobate, of pereopod 7 poorly expanded, unlobate, all strongly setose posteriorly, article 4 of pereopods 5-7 expanded and elongate, of pereopod 7 smaller, thus pereopods 5-7 diverse; dactyls of pereopods 5-6 absent or vestigial.

Pleopods ordinary. Rami of uropods 1-2 marginally spinose fully to apex, outer rami occasionally shortened, uropod 1 with basofacial setae. Uropod 3 extended, parviramous, article 2 of outer ramus well developed. Telson slightly elongate, cleft almost to base, lobes not tapering, truncate, strongly setose or spinose apically and midlaterally.

Coxal gills 2-6 sausage-shaped. Oostegites slender.

Variants.--Eyes absent (gracilis); article 4 of pereopod 5 especially setose anteriorly, these setae projecting downwards as broad ventral brush when animal in habitus position (all species).

Species.--See Sars (1895b); Gurjanova (1951); Chevreux and Fage (1925); Watkin (1938);

elegans Watkin, 1938 (= pelagica of Sars, 1895b, not Bate) [240];

gracilis Sars, 1895b (Vader, 1970) [238];

guilliamsoniana (Bate, 1857b) (= norvegica Sars, 1895b) [240];

lindstromi Stebbing, 1906 [348];

megalops Chevreux, 1911 [344];

nana Toulmond, 1966 (Fincham, 1967, 1969) [242];

parkeri Bousfield, 1973 [361];

pelagica (Bate, 1857a) [355];

pilosa Lindstrom 1855 (= robertsoni Bate, 1862) [240];

pontica Marcusen, 1867 [334];

quoddyensis Shoemaker, 1949b (Bousfield, 1973) [260];

sarsi Watkin, 1938 (= robertsoni of Sars, 1895b, and Chevreux and Fage, 1925, not Bate) [240];

tenuipes Meinert, 1877 (Schellenberg, 1942) [240];

circumboreal, mostly littoral, to brackish, to Black Sea, 13.

#### Micruropids

Baikal. Antenna 1 of Micruropus form, with articles 2 and 3 shortened, article 2 half as long as article 1 or shorter, article 3 as long as article 2 or much shorter, primary flagellum of antenna 1 usually greatly longer than peduncle, occasionally subequal, accessory flagellum reduced, usually 1-articulate.

Anterior coxae setose.

Gnathopod 2 in male not larger than gnathopod 1, latter often enlarged.

Telson generally poorly spinose apically, often shortened.

Body lacking dorsal teeth.

Differing from the Macropereiopids in the stronger reduction of the accessory flagellum. Differing from the Pontogammarids and allies in the dominance of gnathopod 1.

Macropereiopids include Macropereiopus, Ommatogammarus and Pachyschysis.

Key to the Genera of Macropereiopids and Micruropids

1. Accessory flagellum 2+ articulate. . . . . 2  
    Accessory flagellum 1-articulate . . . . . 5
2. Article 2 of pereopods 5-7 alike, evenly expanded. . . . . Pachyschysis  
    Article 2 of pereopods 5-6 not like pereopod 7 . . . . . 3
3. Peduncle of antenna 1 very short, eyes irregular,  
    article 2 of pereopods 5-7 poorly setose  
    posteriorly. . . . . Ommatogammarus  
    Peduncle of antenna 1 of ordinary form for  
    Pontogammarids, eyes ordinary, article 2 of  
    pereopods 5-7 strongly setose posteriorly. . . . . 4
4. Wrist of gnathopod 2 elongate, coxae 1-4 glabrous,  
    article 2 of pereopod 7 not lobate ventrally. . . . . Macropereiopus  
    Wrists of both gnathopods very short, coxae 1-4 setose,  
    article 2 of pereopod 7 lobate  
    ventrally . . . . . (see Caspian groups, IIIH2) Baku
5. Article 1 of antenna 1 greatly thickened . . . . . 6  
    Article 1 of antenna 1 not thickened . . . . . 7
6. Eyes absent, antenna 2 of Stenogammarid form, article 3  
    of antenna 1 not thickened . . . . . Homocerisca  
    Eyes present, antenna 2 of Pontogammarid form, article 3  
    of antenna 1 thickened . . . . . Crypturopus
7. Setae of uropod 3 not plumose. . . . . Echiuropus  
    Setae of uropod 3 plumose. . . . . 8
8. Mandibular palp article 3 with D and E setae . . . . . Micruropus  
    Mandibular palp article 3 with only E setae. . . . . Pseudomicruropus

Macropereiopus Sowinsky

Macropereiopus Sowinsky, 1915: 125 (Gammarus flori Dybowski,  
 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 285.

Baikal. Article 2 of antenna 1 half or less as long as article 1,  
 article 3 shorter than article 2, accessory flagellum 3+ articulate,  
 primary flagellum much longer than peduncle. Antenna 2 short.

Coxae 1-4 glabrous. Gnathopod 1 dominant. Gnathopod 2 with elongate  
 wrist and hand, palms of both gnathopods transverse or almost transverse.

Pereopods 3-4 moderately fossorial. Article 2 of pereopods 5-6  
 unexpanded, slender, weakly pyriform. Article 2 of pereopod 5 broadly  
 expanded, ventrally lobate, article 2 of pereopods 5-7 densely setose  
 posteriorly.

Uropods 1-2 spinose. Uropod 3 magniramous to variramous, article 2 on  
 outer ramus ordinary, setae on outer ramus simple. Telson ordinary, fully  
 cleft, poorly spinose.

Body untoothed, urosome spinose, occasionally pleonites weakly setose  
 dorsally.

Variant.--Article 2 of pereopod 7 not ventrally lobate (wagneri).

Relationship.--Differing from Baikalogammarus in the fossorial pereopods 3-4, shortened articles 2-3 of peduncle on antenna 1, dense posterior setation of article 2 on pereopods 5-7.

Species.--albulus (Dybowsky, 1874);

flori (Dybowsky, 1874);

grandimanus Bazikalova, 1975b;

leucophthalmus (Sowinsky, 1915);

mirus Bazikalova, 1975b;

parvus Bazikalova, 1945;

?wagneri Sowinsky, 1915; w. dagarskii Sowinsky, 1915;

Baikal, 6 species and 1 probable species and 1 probable subspecies.

#### Ommatogammarus Stebbing

Ommatogammarus Stebbing, 1899c: 427; 1906: 454 (Gammarus albinus Dybowsky, 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 281.

Baikal. Eyes of irregular shape. Peduncle of antenna 1 very short, articles 2 and 3 each half as long as article 1, accessory flagellum 4+ articulate, primary flagellum much longer than peduncle. Antenna 2 short.

Coxae 1-4 glabrous. Gnathopod 1 dominant, of Gammarus form. Gnathopod 2 with rectangular hand, palm weakly oblique.

Pereopod 3 moderately fossorial but unexpanded, pereopod 4 not fossorial. Article 2 of pereopods 5-7 partially expanded, posteroventral corner slightly acute or right angular, posterior margin of pereopod 6 weakly sinuous, of pereopods 5 and 7 evenly convex. Article 2 of pereopods 5-7 weakly setose posteriorly.

Uropods 1-2 [?spinose]. Uropod 3 variramous, article 2 on outer ramus ordinary. Telson ordinary, almost fully cleft, poorly to moderately spinose.

Body untoothed, urosome spinose.

Relationship.--Differing from Macropereiopus in the much shorter peduncle of antenna 1 and the weakness of posterior setation on article 2 of pereopods 5-7. Differing from Leptostenus in the short antenna 1 (relatively) and expanded article 2 of pereopod 7.

Species.--albinus (Dybowsky, 1874);

carneolus (Dybowsky, 1874), c. amethystinus (Dybowsky, 1874),  
c. melanophthalmus Bazikalova, 1945<sup>1</sup>;

<sup>1</sup>Wrongly attributed to Dorogostaisky, = new species by Bazikalova.

flavus (Dybowsky, 1874);

Baikal, 3 species and 2 additional subspecies.

### Pachyschesis Bazikalova

#### Figure 19

Pachyschesis Bazikalova, 1945: 272 (Gammarus branchialis Dybowsky, 1874 original designation).

Baikal. Antennae short. Article 2 of antenna 1 half or less as long and much narrower than article 1, article 3 slightly smaller than article 2. Accessory flagellum 2+ articulate. Primary flagellum slightly longer than peduncle.

Maxillae almost to fully naked medially. [Maxilliped dactyl unknown].

Coxae 1-4 either setose or glabrous. Gnathopod 1 dominant. Wrist of gnathopod 2 not elongate, hand rectangular or weakly tumid, palm short, slightly oblique.

Pereopods 3-4 weakly to moderately fossorial, pereopods 3-7 weakly prehensile. Article 2 of pereopods 5-7 expanded, not ventrally lobate, poorly setose posteriorly.

Uropods 1-2 spinose. Uropod 3 variramous, article 2 on outer ramus ordinary. Telson ordinary, deeply to fully cleft, weakly spinose or moderately setose.

Body untoothed, urosome spinose, pleosome with dorsal setae.

Relationship.--Differing from Macropereiopus in the similarity among pereopods 5-7 of article 2, in the shorter wrist of gnathopod 2 and the weakly prehensile pereopods 3-7.

Species.--bazikalovae G.S. Karaman, 1967f;

bergi Bazikalova, 1945;

branchialis (Dybowsky, 1874);

crassus (Sowinsky, 1915);

Baikal, 4, inquiline, in brood pouches of other Gammaridans.



Micruropus Stebbing

Figures 17, 35, 37

- Micruropus Stebbing, 1899c: 424; Stebbing, 1906: 398 (Gammarus wahl  
Dybowsky, 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 23.  
Microgammarus Sowinsky, 1915: 47 (Gammarus glaber Dybowsky, 1874,  
here selected) (considered valid subgenus by Bazikalova, 1945).  
M. (Setogammarus) Bazikalova, 1945: 36 (Micruropus ciliodorsalis  
Sowinsky, 1915, here selected) (considered valid subgenus by  
Bazikalova, 1945).  
M. (Gammarisca) Bazikalova, 1945: 41 (Microgammarus laeviusculus  
Sowinsky, 1915, here selected) (considered valid subgenus by  
Bazikalova, 1945).

Baikal. Articles 1 and 3 and peduncle and accessory flagellum on  
antenna 1 thin. Antenna 2 not of Stenogammarid form.

Mandibular palp article 3 with A,B,D,E setae.

Article 2 of pereopod 7 either not ventrally lobate or ventral lobe  
very weak.

Uropod 3 parviramous or weakly variramous, article 2 on outer ramus  
present or absent, setae plumose. Eyes present.

Key to Subgenera of Micruropus

1. Epimera densely setose . . . . . (Micruropus)  
Epimera weakly setose . . . . . 2
2. Some pereopods 5-7 weakly prehensile . . . . . (Microgammarus)  
Pereopods not prehensile . . . . . 3
3. Though weakly setose, epimera with sparse setae in rows,  
uropods 1-2 with plumose setae. . . . . (Setogammarus)  
Though weakly setose, epimera with setae set singly,  
uropods 1-2 only spinose . . . . . (Gammarisca)

Species.--Subgenera, G, Gammarisca; M, Micruropus; R, Microgammarus;  
S, Setogammarus;

M. asper Bazikalova, 1962;

G. bogucani Bazikalova, 1945;

R. brevicauda Bazikalova, 1945;

S. ciliodorsalis Sowinsky, 1915, c. rostratus Bazikalova, 1945;

S. cristatus Dorogostaisky, 1936

G. dybowski Bazikalova, 1945;

N. eugeneii Bazikalova, 1959;

M. fixseni (Dybowsky, 1874);

- M. galasii Bazikalova, 1962;  
R. glaber (Dybowsky, 1874), g. murini Bazikalova, 1945;  
G. ivanowi Bazikalova, 1945, m. garjajewi Bazikalova, 1945;  
M. klukii<sup>1</sup> (Dybowsky, 1874);

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<sup>1</sup>kluckii lacks pinnate setae on uropod 3 and looks like  
an Echiruopus  
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- R. koshowi Bazikalova, 1945, k. setosus Bazikalova, 1945,  
k. crassicauda Bazikalova, 1962;  
G. laeviusculus (Sowinsky, 1915), l. dubius Bazikalova, 1962;  
M. littoralis (Dybowsky, 1874), l. crassipes Sowinsky, 1915;  
M. macrochirus Bazikalova, 1945;  
G. macroconus Bazikalova, 1945, m. gurjanowae Bazikalova, 1945,  
m. calceolaris Bazikalova, 1945, m. tenuis Bazikalova, 1962;  
R. minutus (Sowinsky, 1915);  
S. mozi Bazikalova, 1945;  
S. parvulus Bazikalova, 1945;  
M. platycercus (Dybowsky, 1874);  
M. possolskii Sowinsky, 1915;  
G. puella (Dybowsky, 1874);  
M. pupilla Bazikalova, 1962;  
M. pusillus Bazikalova, 1962;  
S. semenowi Bazikalova, 1945;  
R. simplex (Sowinsky, 1915);  
M. talitroides (Dybowsky, 1874), t. angarensis Dorogostaisky, 1917,  
t. eurypus Bazikalova, 1945, t. latus Bazikalova, 1962;  
M. ushkani Bazikalova, 1945;  
R. vortex (Dybowsky, 1874), v. vorticellus Bazikalova, 1945,  
v. angarensis Bazikalova, 1962;

M. wahli (Dybowsky, 1874), w. platycerus (Dybowsky, 1874);

Baikal, 30 species and 17 subspecies.

### Crypturopus Sowinsky

Figures 18, 34

Crypturopus Sowinsky, 1915: 34 (Gammarus pachytus Dybowsky, 1874, selected by Bazikalova, 1945).--Bazikalova, 1945: 14.

Baikal. Articles 1 and 3 of peduncle and accessory flagellum on peduncle thick. Antenna 2 not of Stenogammarid form.

Mandibular palp article 3 with (A)DE setae.

Article 2 of pereopod 7 not ventrally lobate.

Uropod 3 parviramous, lacking plumose setae, article 2 on outer ramus absent.

Eyes present.

Relationship.--Differing from Micruropus only in the thick antenna 1; probably not generically significant.

Species.--inflatus (Dybowsky, 1874) (= borealis Sowinsky, 1915);

pachytus (Dybowsky, 1874) (= dilatatus Dybowsky, 1874);

rugosus (Dybowsky, 1874);

tenuipes Bazikalova, 1945;

tuberculatus (Dybowsky, 1874);

Baikal, 5.

### Echiuropus Sowinsky

Figure 34

Echiuropus Sowinsky, 1915: 55 (Echiuropus macronychus Sowinsky, 1915, monotypy).--Bazikalova, 1945: 62.

Asprogammarus Bazikalova, 1975: 35 (unavailable, no type-species, can be treated as subgenus for evolutionary purposes).

Smaragdogammarus Bazikalova, 1975: 65 (unavailable, no type-species, can be treated as subgenus for evolutionary purposes).

Baikal. Articles 1 and 3 of peduncle and accessory flagellum on antenna 1 thin, antenna 2 not of Stenogammarid form.

Mandibular palp article 3 with ABDE, setae, D and E setae merging with each other.

Article 2 of pereopod 7 not lobate ventrally.

Uropod 3 magniramous, weakly variramous, article 2 on outer ramus absent, setae not plumose.

Eyes present.

Remarks.--If the so-called species of Asprogammarus are added the accessory flagellum of the genus becomes more than 1-articulate and article 2 on uropod 3 becomes present. The situation needs clarification.

Relationship.--Like Micruropus but setae of uropod 3 not plumose.

Species.--bathyphilus (Bazikalova, 1975);

gulekani (Bazikalova, 1975b);

levis (Bazikalova, 1975b);

macronychus Sowinsky, 1915, m. brevicudatus Sowinsky, 1915,  
m. sempercarinatus Bazikalova, 1975b;

macropsis (Bazikalova, 1975b);

morawitzi (Dybowsky, 1874);

perplexus Bazikalova, 1975b;

puer (Bazikalova, 1975b);

pulchelliformis (Bazikalova, 1975b);

pulchellus (Dybowsky, 1874);

rhodophthalmus (Dybowsky, 1874), r. brachyurus (Bazikalova, 1975b),  
r. microphthalmus (Dybowsky, 1874), (= zablotskii Sowinsky, 1915),  
r. strenuus Bazikalova, 1975b);

seidlitzii (Dybowsky, 1874);

smaragdinus (Dybowsky, 1874) (= intermedius Dybowsky, 1874).

Baikal, 13 species and 5 subspecies.

#### Pseudomicruropus Bazikalova

Pseudomicruropus Bazikalova, 1961: 63 (Micruropus [Gammarisca]  
rotundulatus Bazikalova, 1945, here selected).

Baikal.--Like Micruropus but mandibular palp article 3 with only E setae.

Species.--chargoensis (Sowinsky, 1914);

lepidiformis Bazikalova, 1962;

lepidus (Bazikalova, 1945);

rotundulatus Bazikalova, 1945, r. magnus Bazikalova, 1962;

Baikal, 4 species and 1 subspecies.

#### Homocerisca Bazikalova

Homocerisca Bazikalova, 1945: 20 (Gammarus perla Dybowski, 1874, original designation).

Baikal. Article 1 of peduncle on antenna 1 very thick. Antenna 2 of Stenogammarid form.

Mandibular palp article 3 with ADE setae.

Article 2 of pereopod 7 weakly lobate ventrally or not.

Uropod 3 parviramous, outer ramus with or without article 2.

Eyes absent.

Relationship.--Like Micruropus but antenna 1 thick, antenna 2 of Stenogammarid form.

Species.--caudata Bazikalova, 1945;

perla (Dybowski, 1874);

perlodes Bazikalova, 1945;

Baikal, 3.

#### Hyaellopsids

Uropod 3 severely reduced; body and posterior appendages discoid. Otherwise derived from Baikalian Micrurapid facies.

#### Hyaelloopsis Stebbing

Figures 18, 20, 24, 33, 36, 41

Hyaelloopsis Stebbing, 1899c: 422; 1906: 374 (Gammarus czyrnianskii Dybowski, 1874, original designation).--Bazikalova, 1945: 72.

Baikal. Anteroventral corner of head usually protuberant. Antennae short. Article 2 of antenna 1 about half as long as article 1, article 3 as long as or shorter than article 2, accessory flagellum 1-articulate, primary flagellum slightly longer than peduncle.

Coxae 1-4 glabrous. Gnathopods of weak Gammarus form.

Pereopods 3-4 not fossorial. Article 2 of pereopods 5-6 weakly to strongly expanded, moderately setose posteriorly, of pereopod 7 expanded and weakly to strongly lobate ventrally, moderately setose posteriorly.

Uropod 3 vestigial, formed of spinose peduncle lacking rami.

Telson short, broad, entire, poorly armed.

Body scarcely (type) to strongly toothed or humped dorsally, pereonites with or without (type) lateral humps just above coxae, urosomites not spinose.

Relationship.--Together with Gammarosphaera, characterized in Baikal by the vestigial uropod 3. See Gammarosphaera.

Species.--bicolorata Bazikalova, 1948;

carinata Sowinsky, 1915;

costata Sowinsky, 1915;

czyrnianskii (Dybowski, 1874);

depressirostris Sowinsky, 1915;

eugeniae Sowinsky, 1915;

grisea Dorogostaisky, 1930;

hamata Sowinsky, 1915;

irinae Bazikalova, 1959;

latipes Bazikalova, 1945, l. selengensis Bazikalova, 1945;

macrocephala Bazikalova, 1945;

nana Bazikalova, 1945;

setosa Sowinsky, 1915;

stebbingi Sowinsky, 1915 (= clavata Dorogostaisky, 1930);

taczanowskii (Dybowski, 1874) (= paradoxa Sowinsky, 1915);

tixtonae Sowinsky, 1915, t. glabra Bazikalova, 1945;

variabilis Dorogostaisky, 1930;

Baikal, 17 species and 2 subspecies.

Gammarosphaera Bazikalova

## Figure 36

Gammarosphaera Bazikalova, 1936: 36; 1945: 86 (Gammarosphaera insularis Bazikalova, 1936, monotypy).

Baikal. Oculocephalic lobe strongly protuberant. Antennae short. Article 2 of antenna 1 less than half as long as article 1, article 3 slightly shorter than article 2, article 1 with dorsal crest, accessory flagellum 1-articulate, primary flagellum much longer than peduncle.

Coxae 1-4 glabrous.

Gnathopods poorly described, possibly like those of Hyalelloopsis.

Pereopods 3-4 fossorial. Article 2 of pereopod 5 unexpanded, of pereopod 6 broadly expanded, not lobate ventrally. of pereopod 7 hugely expanded and lobate ventrally, of pereopods 5-7 not setose posteriorly.

Inner rami of uropods 1-2 vestigial.

Uropod 3 vestigial, formed of spinose peduncle with vestigial rami. Telson short, broad, uncleft, poorly armed.

Body with weak dorsal humps becoming more pronounced on pleosome and urosomite 1, urosomites 1-2 said to be fused (doubtful).

Relationship.--Differing from Hyalelloopsis in the immense pereopod 5 and the retention of both rami, though vestigial, on uropod 3; Hyalelloopsis has only one ramus or none.

Species.--insularis Bazikalova, 1936, 1945; Baikal, 1.

## IV. Mesogammarids

Coxal gill 7 absent, accessory coxal gills absent; urosome dorsally spinose; female gnathopods of Eulimnogammarid form, male gnathopods of Anisogammarus form but palmar spines of gnathopod 1 not peg-shaped; uropod 3 magniramous, almost aequiramous but outer ramus bearing well developed article 2, peduncle slightly elongate; telson short, well spinose, weakly cleft, lobes gaping; maxillae only moderately setose medially.

## Key to the Genera of Mesogammarids

Pleonites 1-3 strongly toothed posterodorsally,  
gnathopod 2 dominant. . . . . Mesogammarus  
Pleonites 1-3 untoothed dorsally,  
gnathopod 1 dominant. . . . . Paramesogammarus

Mesogammarus Tzvetkova

Figures 12, 18, 41

Mesogammarus Tzvetkova, 1965b: 1631 (Mesogammarus melitoides Tzvetkova, 1965b, original designation); 1975c: 170.

Pleonites coarsely toothed transversely, urosomites dorsally spinose. Lateral cephalic lobes weakly mammilliform.

Antennae well extended, antenna 1 longer than 2, ratio of peduncular articles = 28:24:9, primary flagellum longer than peduncle, accessory flagellum 4-articulate.

Labrum truncate. Antenna 2 not calceolate. Ratio of mandibular palp articles = 8:19:18, article 3 weakly falcate, setae = DE. Inner lobes of labium obsolescent. Maxillae moderately setose medially, inner plate of maxilla 1 ovatorectangular, weakly setose medially, outer plate with 9 spines, palps asymmetric. Inner plate of maxilla 1 with medial setae, facial setae [unknown].

Coxae of ordinary dimensions, poorly setose, coxa 1 scarcely expanded apically, coxa 4 scarcely lobate, posterior margin weakly concave. Gnathopods medium to small, gnathopod 1 larger than 2, wrists of medium length, not lobate, hand of gnathopod 1 ovate, palm oblique, poorly defined, spinose, hand of gnathopod 2 rectangular, elongate, palm oblique, short, not spinose.

Article 2 of pereopods 5-7 slightly expanded, pyriform, tapering distally, poorly setose, unlobate.

Pleopods [?ordinary]. Rami of uropods 1-2 [?extending equally marginally spinose, peduncles unarmed basofacially]. Uropod 3 extended, magniramous, almost aequiramous but outer ramus with small lanceolate article 2, peduncle slightly elongate. Telson short, broad, cleft halfway, lobes gaping, apically and laterally spinose.

Coxal gills 2-6, ovate. Oostegites [?broad, narrow].

Relationship.--Like Gammarus but coxal gill 7 absent, gnathopod 2 slender, palm poorly spinose, telson poorly cleft; differing from Anisogammarus in the simple gills and lack of peg-shaped spines on the gnathopods.

Species.--melitoides Tzvetkova, 1965b, 1975c [016];

Japan Sea and northward, marine intertidal, 1.

#### Paramesogammarus Bousfield

Paramesogammarus Bousfield, 1979: 304 (Paramesogammarus americanus Bousfield, 1979, original designation).

Pleonites dorsally smooth, urosomites dorsally spinose. Lateral cephalic lobes quadrate.

Antennae well extended, antenna 1 slightly longer than 2, ratio of peduncular articles = 19:16:7, primary flagellum longer than peduncle, accessory flagellum 3-4 articulate. Antenna 2 with acorn calceoli in both sexes.

Ratio of mandibular palp articles = 8:17:18, article 3 weakly falcate, setae = ADE. Inner lobes of labium obsolescent. Maxillae moderately setose medially, inner plate of maxilla 1 ovatotriangular, weakly setose medially, outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 with medial setae and apparently with short row of facial setae.



Coxae of ordinary dimensions, almost glabrous, rounded below, coxa 1 weakly expanded but as large as coxa 4, latter not excavate posteriorly. Gnathopods of medium size, alike in sexes, gnathopod 1 dominant, wrist short, weakly lobate, hand large, ovate, palm very oblique, spinose, spines sharp; gnathopod 2 with slightly elongate wrist, weakly lobate, hand slightly narrowed, palm oblique, poorly spinose (mostly spines in defining group).

Article 2 of pereopods 5-7 slightly expanded, weakly pyriform, tapering distally, weakly excavate behind on pereopods 6-7, all poorly setose.

Rami of uropods 1-2 extending equally, margins spinose, outer ramus of uropod 1 in male with midmarginal U-shaped spine. Uropod 3 extended, magniramous, almost aequiramous but outer ramus with lanceolate article 2, peduncle slightly elongate. Telson short, broad, cleft or emarginate one third, lobes gaping, apically and laterally spinose.

Coxal gills 2-6, ovate. Oostegites slender.

Relationship.--See key to family.

Species.--americanus Bousfield, 1979 [272];

southeastern Alaska, near Sitka, intertidal, 1.

#### V. Gammaroporeiids

Coxal gill 7 absent, accessory coxal gills absent; urosome sparsely setose dorsally; gnathopod 1 slightly dominant, wrists on both pairs short, palmar spines of male gnathopod 1 and partially of male gnathopod 2 peg-shaped; pleosomites untoothed and naked; uropod 3 greatly reduced, parviramous, altogether shorter than rami of uropod 2, outer ramus very short, shorter than peduncle, 1-articulate, inner ramus very small; telson short, poorly armed, deeply cleft; maxillae fully setose; article 2 of pereopod 7 broadly expanded but scarcely lobate ventrally.

Differing from Mesogammarids in peg-shaped palmar spines of male, reduced uropod 3, fully setose maxillae.

#### Gammaroporeia Bousfield

Figures 18, 20, 23, 28

Gammaroporeia Bousfield, 1979: 345 (Micruropus alaskensis Bousfield and Hubbard, 1968, original designation).

Urosomites weakly humped and weakly setose dorsally. Lateral cephalic lobes quadrate.

Antennae of medium extent, antenna 1 longer than 2, ratio of peduncular articles = 21:13:10, primary flagellum = 72, accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 4:11:9, article 3 = weakly falcate, setae = ADE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 pyriform, fully setose medially, outer plate with 9 spines, palps asymmetrical. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of medium extension, moderately to weakly setose, coxa 1 not expanded below, coxa 4 scarcely concave posteriorly. Gnathopods small to medium, gnathopod 1 slightly larger than 2, wrists short to medium, weakly lobate, hands slightly longer than wrists, subrectangular, palms weakly to moderately oblique, short, gnathopods of male larger than female, palms, especially of gnathopod 2, with peg-shaped spines.

Article 2 of pereopods 5-6 weakly expanded, unlobate, weakly setose posteriorly, posterior margins convex, of pereopod 7 broadly expanded, lobate, poorly setose.

Rami of uropods 1-2 extending evenly, only inner ramus of uropod 1 marginally spinose, peduncles without basofacial armaments. Uropod 3 not extended, very small, parviramous, rami shorter than weakly flabellate peduncle, 1-articulate, outer ramus weakly setose apically. Telson short, broad, deeply cleft, lobes tapering but appressed, poorly armed.

Coxal gills 2-6, ovate, anterior members weakly pediculate. Oostegites of medium width.

Species.--alaskensis (Bousfield and Hubbard, 1968) [272];

Alaska, littoral, 1.

#### VI. Eoniphargids

Sternal gills absent; coxal gill 7 absent; some coxal gills strongly pediculate; male antenna 2 with tympanic calceoli; lower lip lacking inner lobes; gnathopods feeble, Eulimnogammarid, lacking peg spines; uropod 3 parviramous; telson cleft more than halfway; maxillae fully setose; lower lip lacking inner lobes.

This enigmatic monotypic group is probably an offshoot of a Gammarid owing to the tympanic calceoli, which differ so strikingly from the paddle-shaped calceoli of Crangonyctoids. Otherwise, the general morphology relegates it to the primitive side of Crangonyctoids but the loss of sternal gills is critical.

Differing from Metaceradocoides in the absence of inner lobes on lower lip and the parviramous uropod 3.

#### Eoniphargus Ueno

Figure 33, Map 22

Neoniphargus (Eoniphargus) Ueno, 1955: 148 (Neoniphargus [Eoniphargus] kojimai Ueno, 1955, original designation).

Body [?somewhat slender], urosomites sparsely setose. Rostrum [?absent], lateral cephalic lobes rounded, sinus [?present]. Eyes absent.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles = 23:17:10, primary flagellum much longer than peduncle, with

aesthetascs, accessory flagellum 4-articulate. Antenna 2 male flagellum with tympanic calceoli.

Ratio of mandibular palp articles = 7:14:11, article 3 weakly falcate, setae = ADE. Inner lobes of labium absent, no gape. Maxillae medially setose, inner plate of maxilla 1 ovate, fully setose medially, outer plate with 10 spines, palps 2-articulate, asymmetric. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of medium size, poorly setose ventrally, coxa 1 rectangular (parallelogram), coxa 4 lobate. Gnathopods weak, almost alike in sexes, wrists not lobate, gnathopod 1 slightly stouter than 2, wrist of medium length, hand rectangular, palm oblique, short, wrist of gnathopod 2 elongate, Eulimnogammarid, hand also elongate but scarcely shorter than wrist, palm weakly oblique or transverse (male).

Pereopods 5-7 of medium size, progressively longer, article 2 weakly expanded, lobate posteroventrally, posterior margins weakly convex, minutely serratosetulate; dactyls short.

Outer rami of uropods 1-2 slightly shortened, rami with marginal spines, uropod 1 with 3 ventral facial spines. Uropod 3 extended, parviramous, outer ramus elongate, 1-articulate (but notches marking article 2 apparent), setospinose. Telson of ordinary length, cleft about two thirds, lobes tapering, apically and laterally spinose.

Coxal gills [?2-6], some ovate and pediculate. Oostegites narrow.

Relationship.--Superficially like Indoniphargus but gnathopods without full neotenic facies (not mittenform), maxillae strongly setose medially; without sternal gills as far as known and therefore distinct from Pseudocrangonyx but clearly distinct from various Crangonyctids because the calceoli of Eoniphargus are tympanic and those of Crangonyctids are paddle-shaped.

Differing from Sternomoera in the parviramous uropod 3 and large accessory flagellum.

Differing from Hadziids in the presence of tympanic calceoli.

See Metaceradocoides.

Species.--39 kojimai Ueno, 1955 [027];

Japan, Tokyo, water works near Tama River, in sand filter bed, 1.

## VII. Anisogammarids

Coxal gill 7 present, accessory coxal gills present; urosome dorsally spinose; gnathopod 1 weakly dominant, wrists of both pairs short, palmar spines peg-shaped; pleosomites untoothed, occasionally medially carinate, occasionally urosomites 1-2 with dorsal tooth; uropod 3 almost magniramous to parviramous, outer ramus bearing well developed article 2; telson ordinary, moderately to strongly spinose, deeply cleft; maxillae fully setose medially.

Because of the accessory coxal gills this is one of the most distinctive of the groups in Gammaridans and fully qualifies for family status.

The ensuing key to Anisogammarids starts to follow that of Bousfield (1979) but then is recomposed beginning at couplet 3 to eliminate the dependence on trying to decide whether or not pleonites have dorsal armaments and what kind; Karaman and Barnard (1979) already went through that exercise and found it too unproductive for evolutionary importance. The new composition also then brings together genera into what seems to be more natural pairings and shows then how little difference there is between the pairs of (1) Eogammarus and Spinulogammarus and (2) Jesogammarus and Spasskogammarus; also disregarded is the overlapping of 1-4 and 4-7 groups of setae on peduncular articles of antenna 1 and 1-3 or 3-7 spines on urosomites for Spassko-Jesogammarus and the overlapping setosity condition of article 2 on pereopod 7 for Eo-Spinulogammarus reflected in Eogammarus confervicolus and various other characters which we found inexact.

#### Key to the Genera of Anisogammarids

1. No coxal gill with more than one accessory lobe, (all pleonites strongly carinate middorsally; article 2 on outer ramus of uropod 3 absent). . . . . Carineogammarus  
Some coxal gills with 2 or more accessory lobes,  
(middorsal carination of pleonites weak or absent;  
article 2 on outer ramus of uropod 3 vestigial or strong). . . . . 2
2. Urosomite 2 with tall median tooth and pair of small dorsolateral cusps, rami of uropod 3 extending subequally, antenna 1 shorter than 2, cephalic sinus with narrow posterior notch. . . . . Anisogammarus  
Urosomite 2 never with more than one tooth or cusp, tall tooth if present bearing only one apical spine, inner ramus of uropod 3 less than half as long as outer, antenna 1 as long as or longer than 2, cephalic sinus lacking notch. . . . . 3
3. Uropods 1-2 short, rami of uropod 2 (excluding spines) not exceeding apex of peduncle on uropod 3, article 2 on outer ramus of uropod 2 vestigial. . . . . Locustogammarus  
Uropods 1-2 of ordinary length, well exceeding apex of peduncle on uropod 3, article 2 on outer ramus of uropod 3 distinct. . . . . 4
4. Urosomites 1-2 both with elevated tooth bearing 0-1 apical spine, rami of uropods 1-2 lacking spines. . . Barrowgammarus  
Urosomites 1-2 slightly elevated but multispinose, rami of uropods 1-2 with marginal and apical spines . . . . . 5
5. Gill of coxa 6 with 3 accessory lobes. . . . . 6  
Gill of coxa 6 with one accessory lobe . . . . . 7
6. Telsonic lobes fused basally 20 percent of their length, male antenna 2 calceolate, pleonites dorsally naked . . . . . Eogammarus  
Basal fusion of telsonic lobes insignificant, male antenna 2 not calceolate, pleonites dorsally setospinose. . . . . Spinulogammarus

7. Urosomites with spine groups each reduced to one single spine, each segment with total of 4 spines, posterior accessory lobe on coxal gills 2-5 much smaller than anterior accessory lobe . . . . . Annanogammarus  
 Urosomites with some spine groups multispinose, accessory lobes on coxal gills 2-5 of equal size (or only anterior one reduced) . . . . . 8
8. Urosomites 2-3 with only 2 groups of dorsal spines each, articles 1-2 of antenna 1 subequally long . . . Ramellogammarus  
 Urosomites 2-3 each with 4 groups of dorsal spines each, article 2 of antenna 1 shorter than article 1. . . . . 9
9. Antenna 2 calceolate, pleonites with both slender setae and spines dorsally. . . . . Jesogammarus  
 Antenna 2 not calceolate, pleonites only with stout spines dorsally. . . . . Spasskogammarus

Anisogammarus Derzhavin

Figure 38, Map 50

Anisogammarus Derzhavin, 1927c: 8 (Anisogammarus dybowskyi Derzhavin 1927c, monotypy, = Gammarus pugettensis Dana, 1853).  
 --Bousfield, 1979: 310.

Pleosomites without prominent middorsal carina, dorsally bare; urosomite 2 with prominent median tooth and smaller pair of dorsolateral teeth; urosomites 1-3 with 2-0-2 spine groups on poorly elevated prominences; urosomite 2 with large dorsal tooth.

Cephalic sinus with posterior notch.

Antenna 1 shorter than 2, peduncular article 2 shorter than 1.

Palp of maxilla 1 with 4-5 lateral setae.

Female gnathopods dissimilar.

Uropods 1-2 [?long, rami of 2 exceeding peduncle of uropod 3], rami [?linear or lanceolate], apically and marginally spinose. Rami of uropod 3 extending subequally, outer ramus 2 articulate, article 2 prominent, ramus elongate. Telsonic lobes fused basally for only one sixth their length.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 3 accessory lobes.

Relationship.--Character of urosomite 2 definitive.

Species.--?pribilofenis (Pearse, 1913) [?277-279];

"pu" pugettensis (Dana, 1853) (J.L. Barnard, 1954) [230];

sp. (as pugettensis of Tzvetkova, 1975a) [394];

Bering Sea to N. California, littoral, 2.

Eogammarus Birstein

Figure 38, Maps 50-52

Eogammarus Birstein, 1933: 149 (Gammarus kygi Derzhavin, 1923a, selected by Tzvetkova, 1975a).--Bousfield, 1979: 312.

Pleosomites without prominent middorsal carina, not dorsally spinose; urosomites 1-3 with 4-2-4 unelevated spine groups.

Cephalic sinus without posterior notch.

Antenna 1 longer or subequal to antenna 2, peduncular article 2 shorter than 1.

Palp of maxilla 1 with 3-6 lateral setae.

Female gnathopods weakly dissimilar.

Uropods 1-2 long, rami of 2 exceeding peduncle of uropod 3, rami linear, apically and marginally spinose. Uropod 3 parviramous, outer ramus 2-articulate, article 2 prominent, ramus short elongate. Telsonic lobes fused basally for only one fifth their length.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 3 accessory lobes.

Relationship.--The basic Anisogammarid.

Species.--"ba" barbatus Tzvetkova, 1965b [389];

"co" confervicolus (Stimpson, 1856c) (J.L. Barnard, 1954) [270];

"ky" kygi (Derzhavin, 1923a) [389];

"ol" oclairi Bousfield, 1979 [268-271];

"po" possjeticus Tzvetkova, 1968 [280];

"ps" psammophilus Bousfield, 1979 [273];

"ry" ryotoensis Ueno, 1940b [031F];

"sc" schmidti (Derzhavin, 1927c) [389];

"ti" tiuschovi (Derzhavin, 1927c) [389];

"tu" turgimanus Shen, 1955 [397];

margins of N. Pacific Basin from California counterclockwise to S. China, intertidal, brackish and riparian, 10.

Barrowgammarus Bousfield

Figure 38, Map 50

Barrowgammarus Bousfield, 1979: 321 (Anisogammarus macginitiei Shoemaker, 1955, original designation).

Pleosomes without middorsal carina, not spinose; urosomites 1-2 with prominent median tooth bearing 0-1 apical spines; urosomite 3 with no dorsal groups of spines.

Cephalic sinus without posterior notch.

Antenna 1 as long as antenna 2, peduncular article 2 shorter than 1.

Palp of maxilla 1 with [?lateral setae].

Female gnathopods [unknown].

Uropods 1-2 intermediate, rami of 2 scarcely exceeding peduncle of uropod 3, rami lanceolate, not apically and marginally spinose. Inner ramus of uropod 3 almost half as long as outer, outer ramus 2-articulate, article 2 prominent, ramus elongate. Telsonic lobes fused basally.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 3 accessory lobes.

Relationship.--Characterized by gross dorsal toothing of urosomites 1-2, each tooth with 0-1 spine, plus the absence of marginal spination on the rami of uropods 1-2.

Species.--"ma" macginitiei (Shoemaker, 1955) [267];

Beaufort Sea, sublittoral, 1.

Spinulogammarus Tzvetkova

Map 51

A. (Spinulogammarus) Tzvetkova, 1972b: 954 (Gammarus ochotensis Brandt, 1851).-- Bousfield, 1979: 328.

A. (Spinulogammarus) Tzvetkova, in Golikov and Tzvetkova, 1972: 954.-- Tzvetkova, 1972a: 310; 1972b: 221; 1975a: 152 (Gammarus ochotensis Brandt, 1851, original designation).

Pleosomes without prominent middorsal carina, dorsally spinose; urosomites 1-3 with 4-2-4 spine groups on elevated prominences.

Cephalic sinus without posterior notch.

Antenna 1 as long as 2, peduncular article 2 as long as 1, articles 1-2 with 4-7 posterior groups of long to medium to short setae. Peduncular articles 4-5 of antenna 2 with 4-7 posterior groups of setae.

Palp of maxilla 1 with 5-6 lateral setae.

Female gnathopods dissimilar.

Uropods 1-2 long, rami of 2 exceeding peduncle of uropod 3, rami lanceolate, apically and marginally spinose. Uropod 3 parviramous, outer ramus 2-articulate, article 2 prominent, ramus elongate. Telsonic lobes scarcely fused basally.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 3 accessory lobes.

Relationship.--Scarcely differing from Eogammarus except for the presence of dorsal pleonal spines, lack of calceoli and poor basal fusion of telsonic lobes.

Species.--"at" atchensis (Brandt, 1851) (Bousfield, 1979) [273];

"oc" ochotensis (Brandt, 1851) [283];

"su" subcarinatus (Bate, 1862) (Bousfield, 1979) [271-279];

Kamchatka to British Columbia, littoral, 3.

Ramellogammarus Bousfield

Figure 41, Maps 50, 51

Ramellogammarus Bousfield, 1979: 377 (Gammarus ramellus Weckel, 1907, original designation).

Pleosomites without middorsal carina, dorsally with weak armaments; urosomites 1-3 with 4-2-2 or 2-2-2 spine groups on poorly elevated prominences.

Cephalic sinus without posterior notch.

Antenna 1 longer than 2, peduncular article 2 as long as 1.

Palp of maxilla 1 with 0-3 lateral setae.

Female gnathopods dissimilar.

Uropods 1-2 long, rami of 2 exceeding peduncle of uropod 3, rami lanceolate, apically and marginally spinose or not. Uropod 3 parviramous, outer ramus 2-articulate, article 2 prominent, ramus elongate. Telsonic lobes fused basally for only one fifth their length.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 1 accessory lobe.

Relationship.--Differing from Eogammarus in the reduction of accessory lobes on coxal gill 6 and from Spasskogammarus-Jesogammarus in the presence of only 2 spine groups each on urosomites 2-3 and from most Anisogammarids in the equal length of articles 1-2 on antenna 1.

Species.--"or" oregonensis (Shoemaker, 1944) (Bousfield, 1979) [268F];

"ra" ramellus (Weckel, 1907) (Bousfield, 1979) [270F];

"si" similimanus (Bousfield, 1961) [268];

"va" vancouverensis Bousfield, 1979 [271F];

sp. Bousfield, 1979 [271F];

British Columbia to Oregon, riparian, 4.



Jesogammarus Bousfield

## Map 51

Jesogammarus Bousfield, 1979: 335 (Anisogammarus jesoensis Schellenberg, 1937g, original designation).

Pleosomes without prominent middorsal carina, dorsally with weak armaments; urosomes 1-3 with 4-4-4 spine groups on poorly elevated prominences.

Cephalic sinus without posterior notch.

Antenna 1 longer than 2, peduncular article 2 shorter than 1.

Palp of maxilla 1 with 4-5 lateral setae.

Female gnathopods dissimilar.

Uropods 1-2 [?short, rami of 2 exceeding peduncle of uropod 3], rami linear, apically and marginally spinose. Uropod 3 parviramous, outer ramus 2-articulate, article 2 prominent, ramus "short". Telsonic lobes fused basally for one fifth their length.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 1 accessory lobe.

Relationship.--Close to Spasskogammarus, see key and text for latter, differing from Eogammarus in same fashion.

Species.--"je" jesoensis (Schellenberg, 1937g) [026];

sp. Bousfield, 1979 [027];

Japan, freshwater, 1.

Spasskogammarus Bousfield

## Map 51

Spasskogammarus Bousfield, 1979: 332 (Echinogammarus spasskii Bulycheva, 1952, original designation).

Pleosomes without prominent middorsal carina, dorsally spinose; urosomes 1-3 with 4-4-4 spine groups on poorly elevated prominences.

Cephalic sinus without posterior notch.

Antenna 1 as long as antenna 2, peduncular article 1 shorter than 1.

Palp of maxilla 1 with 3-5 lateral setae.

Female gnathopods dissimilar.

Uropods 1-2 long, rami of 2 exceeding peduncle of uropod 3, rami lanceolate, apically and marginally spinose. Uropod 3 parviramous, outer ramus 2-articulate, article 2 prominent, ramus elongate. Telsonic lobes fused basally for one fourth their length.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 1 accessory lobe.

Relationship.--Close to Jesogammarus (see key), differing from Eogammarus in reduced accessory lobes on coxal gill 6.

Species.--"sp" spasskii (Bulycheva, 1952) (Tzvetkova, 1975a) [389];

"tz" tzvetkoveae Bousfield, 1979 [273];

Japan Sea to Aleutians, littoral, 2.

#### Annanogammarus Bousfield

Map 51

Annanogammarus Bousfield, 1979: 336 (Gammarus annandalei Tattersall, 1922a, original designation).

Pleosomes without prominent middorsal carina, not dorsally spinose; urosomites 1-2 with 4-4-4 spine groups on poorly elevated prominences, each group with only one spine!

Cephalic sinus without posterior notch.

Antenna 1 longer than 2, peduncular article 2 almost as long as 1.

Palp of maxilla 1 with 1 lateral seta.

Female gnathopods dissimilar.

Uropods 1-2 long, rami of 2 exceeding peduncle of uropod 3, rami linear, apically and marginally spinose. Uropod 3 parviramous, outer ramus 2-articulate, article 2 prominent, ramus elongate. Telsonic lobes fused only basally.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 strongly unequal, gill of pereopod 6 with 1 accessory lobe.

Relationship.--Differing from Eogammarus in the reduction of accessory lobes on coxal gill 6 but from all other Anisogammarids in the reduction of urosomal spines to one spine per group, 4 spines per segment.

Species.--"an" annandalei (Tattersall, 1922a) (Tzvetkova, 1975a) [390F].

#### Locustogammarus Bousfield

Figure 41, Map 51

Locustogammarus Bousfield, 1979: 322 (Gammarus locustoides Brandt, 1851).

Pleosomes without middorsal carina, not dorsally spinose; urosomites 1-3 with 4-4-4 spine groups on poorly elevated prominences.

Cephalic sinus without posterior notch.

Antenna 1 slightly longer than 2, peduncular article 2 shorter than 1.

Palp of maxilla 1 with variable lateral setae.

Female gnathopods weakly dissimilar.

Uropods 1-2 short, rami of 2 not exceeding peduncle of uropod 3, rami linear, usually not apically and marginally spinose. Uropod 3 parviramous, outer ramus 2-articulate, article 2 vestigial. Telsonic lobes fused basally for one third their length.

Some coxal gills with 2 accessory lobes, pairs of lobes on gills of pereopods 2-4 subequal, gill of pereopod 6 with 1 accessory lobe.

Relationship.--With more accessory lobes on coxal gills than Carineogammarus but otherwise differing from other Anisogammarids, like Carineogammarus, in the shortened uropods 1-2.

Species.--"ae" aestuariorum (Tzvetkova 1972b) [283];

"hi" hirsutimanus (Kurenkov and Mednikov, 1959) [283];

"le" levingsi Bousfield, 1979 [272];

"lo" locustoides (Brandt, 1851) (Bousfield, 1979) [230];

boreal Pacific, littoral, 4.

#### Carineogammarus Bousfield

Map 51

Carineogammarus Bousfield, 1979: 343 (Eogammarus makarovi Bulycheva, 1952, original designation, = Anisogammarus schmitti Shoemaker, 1964).

Pleosomites with prominent middorsal carina, not dorsally spinose; urosomites 1-3 with 2-2-2 spine groups on elevated prominences.

Cephalic sinus without posterior notch.

Antenna 1 as long as 2, peduncular article 2 shorter than 1.

Palp of maxilla 1 without lateral setae.

Female gnathopods dissimilar.

Uropods 1-2 short, rami of 2 not exceeding peduncle of uropod 3, rami linear, apically and marginally spinose. Uropod 3 parviramous, outer ramus 1-articulate, ramus elongate. Telsonic lobes fused basally for one third their length.

Coxal gills with 1 accessory lobe.

Relationship.--The only Anisogammarid with only one accessory lobe on any of the coxal gills; also like Locustogammarus in the shortened uropods 1-2.

Species.--"mk" makarovi (Bulycheva, 1952) (= schmitti Shoemaker, 1964) (Bousfield, 1979) [389];

Sea of Japan to southern Alaska, littoral, 1.

## Bathyceradocids

Coxal gill 7 present, accessory gills unknown; urosome dorsally spinose, pleosome and urosomites with dorsal teeth; gnathopod 2 dominant in male, gnathopod 1 small and Melitid, gnathopod 2 of male with peg spines on palm; uropod 3 magniramous, article 2 on outer ramus vestigial; telson ordinary; maxillae fully setose medially; article 1 on primary flagellum of antenna 1 elongate and richly furnished with aesthetascs.

Similar to Mesogammarids but coxal gill 7 present. Differing from Anisogammarids in strong sexual dimorphism of gnathopods.

Bathyceradocus Pirlot

## Figure 12

Bathyceradocus Pirlot, 1934: 224 (Bathyceradocus stephensi Pirlot, 1934).

Body slender, pleon and urosomites 1-2 with middorsal tooth and other transverse serrations, urosomites 1-3 also with articulate dorsal spines. Rostrum obsolescent, lateral cephalic lobes weak, mammilliform, sinus weak. Eyes absent.

Antennae elongate, antenna 1 as long as 2, ratio of peduncular articles = 32:12:5, ratio of flagella = 120:42, accessory flagellum with 10+ articles, article 1 of primary flagellum usually elongate and brushy in male (articles proliferate but fused together). Antenna 2 long and slender.

Ratio of mandibular palp articles = 8:22:15, article 3 weakly falcate, setae = ABDE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 ovatopyriform, fully setose medially, outer plate with 11 spines, palps asymmetrical, one palp with ordinary length article 1 and stout apical spines on article 2, other palp with elongate article 1 and only apical setae on article 2. Inner plate of maxilla 2 with long facial row of setae, plate scarcely wider than outer. Outer plate of maxilliped medially setose, dactyl variable, unguiform to stubby, with nail or with several thick setal nails.

Coxae of medium (ordinary) extension, poorly setose, coxa 1 nearly rectangular, scarcely expanded apically, coxa 2 tapering, coxa 4 lobate posteriorly, coxa 5 much shorter than 4. Gnathopods of Melitid form, gnathopod 1 small, wrist very elongate, unlobate, hand shorter, or scarcely so, rectangular, palm transverse, short; female gnathopod 2 also feeble but larger than 1, wrist elongate, hand longer, narrow, rectangular, palm oblique, short; male gnathopod 2 enlarged, wrist weakly elongate, scarcely lobate, hand narrowly ovate, palm oblique, often excavate, setose and armed with many short spines.

Article 2 of pereopods 5-7 weakly expanded, alike, scarcely lobate, posteroventral corners weakly produced somewhat sharply, posterior margins of articles serrate, poorly setose, weakly convex, or scarcely sinuous, pereopods otherwise slender, slightly longer progressively.

Rami of uropods 1-2 marginally spinose, outer rami more or less shortened, peduncle of uropod 1 with basofacial or facial spines, each apex with constricted hook-like spine. Uropod 3 slightly extended, magniramous, aequiramous, peduncle scarcely elongate, rami large, weakly flabellate. Telson slightly elongate, cleft two thirds or more, lobes tapering, weakly armed.

Coxal gills 2-7, ovate to sausage shaped, some anterior members weakly pediculate. Oostegites slender.

Variants.--Anteroventral corner of head weakly to strongly produced; outer plate of maxilliped with apical point (iberiensis); coxa 4 not excavate posteriorly (iberiensis).

Relationship.--Coxal gill 7 being present suggests affinity with freshwater Gammaroids but the genus may be a relict from a Paleozoic ancestor of Crangonyctoid-Gammaroid taxa that preceded the Pangaenic cosmopolitan distribution of Gammaridans.

Species.--iberiensis Andres, 1977 [303A];

stephenseni Pirlot, 1934 (J.L. Barnard, 1961) [600AB];

world bathyal and abyss, 7250-11,654 m, 2.

#### Metaceradocoides Birstein and Vinogradova

Metaceradocoides Birstein and Vinogradova, 1960: 160 (Metaceradocoides vitjazi Birstein and Vinogradova, 1960, original designation).

Rostrum absent, lateral cephalic lobes [?protruding, sinus present]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 22:17:6, flagellum much longer than peduncle, accessory flagellum 11-articulate. Antenna 2 flagellum longer than peduncle.

Ratio of mandibular palp articles = 7:15:11, article 3 weakly falciform, setae = DE. Inner lobes of labium small. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 spines, palps [?symmetrical]. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially striate, dactylar nail [apparently absent].

Coxae of ordinary length, poorly setose, coxa 1 not expanded, coxa 4 weakly lobate. Gnathopods small, almost feeble (only female known), wrist of gnathopod 1 of medium length, hand subrectangular, palm oblique, short, dactyl strongly overlapping palm; gnathopod 2 elongate, Eulimnogammarid, not wider than 1, wrist elongate, hand elongate, palm almost transverse, short.

Article 2 of pereopods 5-7 slightly expanded, scarcely lobate, minutely serratosetulate posteriorly.

Pleopods [?ordinary]. Inner rami of uropods 1-2 marginally spinose, outer rami naked, outer of uropod 1 strongly shortened, peduncles of each with apicolateral scale, peduncle of uropod 1 [apparently without

basofacial spine]. Uropod 3 [?extended], magniramous, almost aequiramous, outer ramus with small article 2. Telson elongate, deeply cleft, lobes tapering, poorly armed apically.

Coxal gills [?2-7], ovate. Oostegites narrow.

Relationship.--Differing from Bathyceradocus in absence of dorsal ornamentation, lack in female of aesthetascs on article 1 of primary flagellum on antenna 1, better development of article 2 on outer ramus of uropod 3 and the form of uropods 1-2.

Differing from Eoniphargus in the presence of inner lobes on the lower lip and the magniramous uropod 3.

Differing from Weckeliids in the presence of both article 2 on the outer ramus of uropod 3 and the inner lobes on the lower lip.

Species.--vitjazi Birstein and Vinogradova, 1960 [231];

North Pacific, hadal, 1.

#### VIII. Cheirocratids

Gnathopods more or less feeble and becoming simple, or telson entire.

A polyphyletic group with Gammarellus in the fore with its well developed gnathopods but uncleft telson signalling its plesiomorphic position to Weyprechtia.

The subgroups of Cheirocratus, Hornellia and Megaluropus are especially similar to each other.

#### Key to the Genera of Cheirocratids

1. Telson elongate and entire. . . . . 2  
Telson elongate and cleft or short and entire . . . . . 4
2. Accessory flagellum absent. . . . . Calliopius  
Accessory flagellum present . . . . . 3
3. Gnathopods subchelate, wrists short . . . . . Gammarellus  
Gnathopods simple, wrists elongate. . . . . Weyprechtia
4. Article 3 of antenna 1 longer than articles 1 or 2,  
coxae vestigial, body mysidiform. . . . . Macrohectopus  
Article 3 of antenna 1 shorter than articles  
1 or 2, coxae well developed, body not mysidiform. . . . . 5
5. Coxa 3 significantly shortened. . . . . 6  
Coxa 3 ordinary . . . . . 8
6. Rami of uropod 3 flabellate . . . . . Megaluropus  
Rami of uropod 3 lanceolate . . . . . 7
7. Article 5 of antenna 2 ordinary, pleonites 1-3  
transversely serrate. . . . . Aurohornellia  
Article 5 of antenna 2 short, pleonites 1-3  
transversely smooth . . . . . Argissa
8. Maxillipedal dactyl absent, anterior coxae of male diverse . . . . . 9  
Maxillipedal dactyl present, anterior coxae of male congruent. . . . . 10
9. Male coxa 2 ordinary, pleopodal rami multiarticulate . . . . . Maerella  
Male coxa 2 gigantic, pleopodal rami 1-articulate . . . . . Jerbarnia

10. Pleonites 1-3 transversely smooth . . . . .11  
 Pleonites 1-3 transversely serrate. . . . .14
11. Female gnathopod 2 subchelate . . . . .Cheirocratella  
 Female gnathopod 2 simple . . . . .12
12. Urosomite 2 toothed . . . . .Cheirocratus  
 Urosomite 2 untoothed . . . . .13
13. Urosomites without teeth. . . . .Incratella  
 Urosomite 1 with tooth. . . . .Casco
14. Peduncle of uropod 3 shorter than peduncle of uropod 1 . . . . .15  
 Peduncle of uropod 3 longer than peduncle of uropod 1. . . . .16
15. Outer ramus of uropod 3 2-articulate. . . . .Hornellia  
 Outer ramus of uropod 3 1-articulate. . . . .Metaceradocus
16. Accessory flagellum long, 2+ articulate . . . . .Melphidippa  
 Accessory flagellum very short, 1-articulate . . . . .17
17. Telson cleft. . . . .Melphidippella  
 Telson entire, emarginate . . . . .Melphisana

#### Gammarellids

Peduncle of uropod 3 not elongate; pleonites lacking transverse dorsal serrations; anterior coxae ordinary; hands of gnathopods variable, simple or subchelate; article 2 of pereopods 5-7 lacking posteroventral lobes; plates of maxilla 2 slender; telson entire or poorly cleft but elongate; outer ramus of uropod 2 as long as inner ramus.

#### Gammarellus Herbst

Figures 5, 20, 39, 41

- Gammarellus Herbst, 1793: 106 (Astacus homari J.C. Fabricius, 1779, selected by Chevreux and Fage, 1925).--Stebbing, 1906: 386.
- Amathia Rathke, 1837: 375 (homonym, Hydrozoa) (Amathia carinata Rathke, 1837, monotypy).
- Grayia Bate, 1862: 101 (homonym, Reptilia) (Grayia imbricata Bate, 1862, here selected, = Astacus homari).--Bate and Westwood, 1863: 151.
- Amathilla Bate and Westwood, 1863: 359 (new name for Amathia).
- Pseudogammarellus Lagardere, 1968: 176 (Pseudogammarellus ledoyeri Lagardere, 1968, original designation, = Astacus homari).

Body with dorsal median carina (often very weak), urosomites with or without carina, spineless. Rostrum small to medium, lateral cephalic lobes quadrate.

Antennae elongate, subequally extended, ratio of peduncular articles on antenna 1 = 18:12:10, primary flagellum slightly longer than peduncle, accessory flagellum 3+ articulate; articles of primary flagella on each antenna very short (proliferate). Antenna 2 ordinary. One or both antennae with calceoli in male.

Labrum truncate or rounded. Ratio of mandibular palp articles = 8:16:15, article 3 falcate (actually scythe-shaped by bending and not by asymmetrical opposite side margins), setae = ABDE. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 triangular,

fully setose medially, outer plate with 9 spines, palps [?symmetrical]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae slightly shortened, poorly setose, coxa 1 unexpanded, much smaller than coxa 2, coxa 4 lobate. Gnathopods medium, alike, wrists short to medium, weakly lobate, hands rectangular to ovate, palms oblique, armaments slender or feeble, sexes alike.

Article 2 of pereopods 5-7 moderately to weakly expanded, slightly lobate, shape of pereopod 5 ovate, of 7 pyriform.

Rami of uropods 1-2 extending subequally, marginally spinose, [?without basofacial armaments]. Uropod 3 not extended, magniramous, almost aequiramous, outer ramus 1-articulate, rami long and lanceolate. Telson of ordinary length to elongate, entire or minutely excavate, poorly armed.

Coxal gills 2-7, ovate, often plaited. Oostegites broad.

Variants.--Articles of antennae often with numerous short setae on apical circumferences, forming whorls.

Relationship.--Like Gammarus but telson entire, coxa 1 reduced, gnathopods enfeebled and palms identical to each other.

Species.--See Gurjanova, 1951;

angulosus (Rathke, 1843) (Sars, 1895) (Bousfield, 1973) [250];

carinatus (Rathke, 1837) (Miloslavskaja, 1930, 1931, 1939b) [334];

homari (J.C. Fabricius, 1779) (= ledoyeri Lagardere, 1968) (Sars, 1895) [200];

circumarctic and high boreal, littoral and estuarine, 3.

#### Weyprechtia Stuxberg

Figures 39, 40

Weyprechtia Stuxberg, 1880: 27 (Weyprechtia mirabilis Stuxberg, 1880, monotypy, = Amathilla heuglini Buchholz, 1874).--Stebbing, 1906: 380.

Lateral cephalic lobes protruding.

Antennae elongate, antenna 1 shorter than 2, ratio of peduncular articles = 20:16:12, primary flagellum longer than peduncle, accessory flagellum 5+ articulate. Antenna 2 very elongate, flagellum much longer than peduncle.

Mandibular incisor simple, ratio of palp articles = 5:12:18, article 3 weakly falcate, setae = A(B)CDE. Inner lobes of labium [?distinct]. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 11 spines, palps [?symmetrical]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of ordinary extension, poorly setose, coxa 1 not expanded, (falsely appearing tapered in one view of Stebbing, 1894), coxa 4 strongly lobate. Gnathopods alike, feeble, slender wrists elongate, unlobed, hands thin, palms obsolescent, dactyls short.



Article 2 of pereopods 5-7 expanded, lobate, not setose posteriorly.

Rami of uropods 1-2 marginally spinose, extended evenly uropod 1 [?without basofacial spine]. Uropod 3 not extended (but long because uropods 1-2 long), magniramous, aequiramous, rami almost flabellate, 1-articulate. Telson slightly elongate, tapering, entire, truncate or weakly concave apically.

Coxal gills [?2-7], widely expanded, some pediculate. Oostegites [?broad].

Variants.--Rami of uropod 3 more strongly lanceolate (pinguis).

Relationship.--Like Gammarellus but body uncarinate, wrists of gnathopods elongate, gnathopods more strongly simple, article 3 of mandibular palp elongate.

Species.--See Gurjanova (1951);

heuglini (Buchholz, 1874) (Stephensen, 1940a) [220];

pinguis (Kroyer, 1838) (Stephensen, 1944a) [220];

arctic, littoral, 2.

#### Calliopius Liljeborg

Calliope Bate, 1857b: 142 [homonym, Aves] (Calliope Leachii Bate, 1857b, = Amphithoe laeviuscula Kroyer, 1838, monotypy).

Calliopius Liljeborg, 1865: 11 (new name for Calliope).--Stebbing, 1906: 295.

Body weakly carinate posterodorsally, urosomites scarcely humped, naked. Lateral cephalic lobes subquadrate.

Antennae of medium extension, subequal, ratio of peduncular articles on antenna 1 = 18:12:5 but article 3 with tooth making total length 10, accessory flagellum absent, primary flagellum longer than peduncle, in male with swollen articles and tympanic calceoli, weakly so in female.

Ratio of mandibular palp articles = 5:18:18, article 3 weakly falcate, setae = ACDE. Inner lobes of labium small. Maxillae variously setose, inner plate of maxilla 1 ovate, with about 4 apical-subapical setae, outer plate with 9 spines, palps symmetric. Inner plate of maxilla 2 with inner marginal setae and one seta in oblique facial row.

Coxae of ordinary length, coxa 1 scarcely expanded apically, coxa 4 lobate posteriorly. Gnathopods similar to each other, neither dominant, wrists short, strongly lobate, hands ovate, palms oblique, long.

Article 2 of pereopods 5-7 expanded and weakly lobate, alike.

Outer rami of uropods 1-2 shortened, rami spinose, basofacial armaments [?absent.] Uropod 3 scarcely exceeding uropod 1, magniramous, almost aequiramous, peduncle scarcely elongate, rami broadly lanceolate. Telson elongate, entire, poorly armed.

Coxal gills 2-6, narrow. Oostegites [?broad].

Relationship.--Like Gammarellus but accessory flagellum absent, medial setae on maxillae sparser, inner lobes of lower lip present. Differing from other Calliopioid-Eusirid taxa such as: (1) Accedomoera in the uncleft telson and stronger lobes on the wrists of the gnathopods; (2) Halirages in the short lobed wrists of the gnathopods, slight inner lobes on lower lip, short peduncle of uropod 3 and presence of only one facial seta on maxilla 2; (3) Pontogeneia in the uncleft telson, lobed wrists of the gnathopods and the presence of only one facial seta on maxilla 2.

Allocation.--Calliope didactyla Thomson (1879b) transferred to Allorchestes novizealandiae Dana in Hyalidae (not Gammaridan).

Species.--behringi Gurjanova, 1951 [281];

laeviusculus (Kroyer, 1838) (= rathkii Zaddach, 1844) (Sars, 1895b)  
(= crenulatus Chevreux and Fage, 1925) [210];

?pictus (Giles, 1890) [662];

boreal sublittoral, 2 species and 1 doubtful tropical species.

#### Cheirocratids

Peduncle of uropod 3 elongate; urosomites with transverse dorsal serrations; anterior coxae ordinary; hands of gnathopods variable; article 2 of pereopods 5-7 lacking posteroventral lobes; plates of maxilla 2 slender; telson cleft more than halfway; outer ramus of uropod 2 slightly shortened.

#### Cheirocratella Stephensen

##### Figure 15

Cheirocratella Stephensen, 1940c: 50 (Cheirocratella thori Stephensen, 1940c, original designation).

Metasomites and urosomites with dorsal teeth, urosomites also with sparse dorsal spines. Rostrum obsolescent, lateral cephalic lobes mammilliform, sinus often forming deep notch, lower corner protuberant. Eyes present. Antennae elongate, extending about equally, ratio of peduncular articles on antenna 1 = 16:15:4, primary flagellum about as long as peduncle, accessory flagellum 2-articulate. Antenna 2 large and elongate, flagellum scarcely longer than article 5 of peduncle; gland cone large.

Labrum [?as broad as long, weakly notched apically]. Mandibular incisor [?toothed, molar triturative, ratio of palp articles = ?10:18:10, article 3 weakly falcate, setae = ?ADE]. Inner lobes of labium [?well developed]. Maxillae medially setose, inner plate of maxilla 1 [?ovatotriangular, fully setose medially, outer plate with 9 spines, palps ?asymmetric]. Inner plate of maxilla 2 with oblique facial row of setae and also fully setose on medial margin. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, without nail].

Coxae of ordinary length, poorly setose, coxa 1 apically expanded, coxa 4 scarcely lobate. Gnathopods diverse, female gnathopod 1 simple, feeble, wrist elongate, hand thin, lacking palm; female gnathopod 2 with medium short wrist, weakly ovate, hand subrectangular, strongly subchelate, palm oblique, short; [male gnathopods unknown].

Article 2 of pereopods 5-7 scarcely expanded, scarcely lobate, posterior margins sparsely serrate; legs not elongate.

Pleopods [?ordinary]. Rami of uropods 1-2 marginally spinose, outer ramus of uropod 2 slightly shortened, uropod 1 [?with basofacial spine]. Uropod 3 [?extended, magniramous, almost aequiramous, peduncle elongate, rami 1-articulate, lanceolate]. Telson of ordinary length, deeply cleft, gaping, lobes tapering, well spinose apically.

Coxal gills [?2-6], ovate. Oostegites slender.

Relationship.--Like Cheirocratus but female gnathopod 2 subchelate; therefore, probably the plesiomorphic member of the Cheirocratus group.

Species.--thori Stephensen, 1940c [246];

Iceland, 216-326 m, 1.

#### Cheirocratus Norman

##### Figure 40

Cheirocratus Norman, 1867: 12 (Cheirocratus mantis Norman, 1867, monotypy, = Gammarus assimilis Liljeborg, 1852).--Stebbing, 1906: 417.

Urosomites dorsally denticulate and spinosetose transversely. Rostrum obsolescent, lateral cephalic lobes mammilliform, sinus often forming deep notch, lower corner protuberant.

Antennae elongate, antenna 1 much shorter than antenna 2, ratio of peduncular articles = 16:16:5, primary flagellum as long as peduncle, accessory flagellum 2+ articulate. Antenna 2 large and elongate, flagellum scarcely shorter than peduncle; gland cone large.

Labrum weakly notched apically. Ratio of mandibular palp articles = 10:18:11, article 3 weakly falcate or strongly sickle-shaped, setae = (A)DE. Inner lobes of labium well developed. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 9 spines, palps symmetric. Inner plate of maxilla 2 with oblique facial row of setae or strongly setose medially.

Coxae of ordinary length, poorly setose, coxa 1 slightly to strongly expanded apically, coxa 4 scarcely lobate or not. Gnathopods diverse; female gnathopods simple, feeble, wrists elongate, unlobate, hands thin, lacking palms; male gnathopod 1 like female, gnathopod 2 greatly enlarged, wrist short, not lobate, hand large, elongate, ovate, rectangular or trapezoidal, palm oblique, elongate, smooth or sculptured.

Article 2 of pereopods 5-7 scarcely expanded or not, almost linear, scarcely lobate or not, posterior margins weakly serratosetulate; legs not elongate.

Rami of uropods 1-2 marginally spinose, evenly extended, peduncle of uropod 1 without basofacial armaments. Uropod 3 extended, magniramous, almost aequiramous, peduncle elongate, rami 1-articulate, lanceolate. Telson short, deeply cleft, gaping, lobes tapering, well spinose apically.

Coxal gills 2-6 ovate, occasionally pediculate. Oostegites narrow.

Variants.--Rami of uropods 1-2 poorly or not spinose (inermis); telson poorly armed (inermis); article 2 of pereopods 5-7 better expanded and lobed (inermis); male gnathopod 2 like zeylanica Melitas, hand ovate, palm undefined and heavily setose, dactyl riding onto medial face of hand (sundevalli); mouthparts in diagnosis based on C. sundevalli of Sars (1895).

Relationship.--Like Cheirocratella but female gnathopod 2 simple.

Species.--See Chevreux and Fage, 1925;

armatus G.S. Karaman, 1977e [343S];

assimilis (Liljeborg, 1852) (Sars, 1895b) (Chevreux and Fage, 1925) [355];

intermedius Sars, 1895b [355];

monodonatus G.S. Karaman, 1977h [340];

robustus Sars, 1895b (Stephensen, 1928, 1929, 1940a) [238];

sundevalli (Rathke, 1843) (Sars, 1895b) [355];

pan-Boreal and antiboreal Australian (in press), sublittoral, 6.

#### Casco Shoemaker

#### Figure 40

Casco Shoemaker, 1930: 136 (Cheirocratus bigelowi Blake, 1929, original designation).

Body ordinary to slender, urosomite 1 with dorsal tooth, all urosomites with sparse thin spine-setae. Rostrum weak, lateral cephalic lobes mammilliform, lower corner especially protruding.

Antennae elongate, antenna 1 much shorter than 2, ratio of peduncular articles = 20:28:10, flagellum scarcely longer than peduncle, accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 5:15:7, article 3 weakly falcate, setae = ADE. Inner lobes of labium fleshy. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 11 spines, palps [?symmetric]. Inner plate of maxilla 2 with weakly oblique facial row of setae and other medial setae.

Coxae short, moderately setose, coxa 1 strongly expanded (with sharp anteroventral corner), coxa 4 unlobate, coxae becoming shorter from 1 to 7. Gnathopods diverse; female gnathopods simple, feeble, wrists elongate,

unlobate, hands thin, lacking palms or gnathopod 2 with scarce palm; male gnathopod 1 like female, gnathopod 2 enlarged, wrist short, unlobate, hand large, ovate, palm oblique, weakly defined but sculptured, dactyl short, curved.

Article 2 of pereopods 5-7 unexpanded, unlobate, weakly serrate posteriorly; legs not elongate.

Rami of uropods 1-2 spinose marginally, extending evenly, uropod 1 [?with basofacial spine]. Uropod 3 extended, magniramous, almost aequiramous, peduncle elongate, rami 1-articulate, lanceolate. Telson of ordinary length, fully cleft, lobes tapering, each with one apical spine in notch.

Coxal gills [?2-6, ovate]. Oostegites [?slender].

Relationship.--Like Cheirocratus but female gnathopod 2 weakly subchelate and urosomite 2 untoothed.

Species.--bigelowi (Blake, 1929) (Bousfield, 1973) [260];

western Atlantic, Gulf of St. Lawrence to New Jersey, sublittoral, often neritic, l.

#### Incratella Barnard and Drummond

Incratella Barnard and Drummond, 1981x:xx (Cheirocratus inermis Ledoyer, 1967b, original designation).

Like Cheirocratus but urosomites without teeth.

Species.--inermis (Ledoyer, 1967b) (Griffiths, 1975) [698];

Madagascar and South Africa, sublittoral, l.

#### Hornelliids

Peduncle of uropod 3 only weakly elongate; pleonites with transverse serrations dorsally or dorsolaterally; anterior coxae ordinary; hands of one or more gnathopods with weak palm or palms bulging; article 2 of pereopods 5-7 lacking postroventral lobes; plates of maxilla 2 broadened, inner plate of maxilla 2 medially setose; telson cleft more than halfway; outer ramus of uropod 2 shortened.

#### Hornellia Walker

Figures 15, 40

Hornellia Walker, 1904: 268 (Hornellia incerta Walker, 1904, monotypy).--Ledoyer, 1973b: 29.

Tulearogammarus Ledoyer, 1967a: 129 (Tulearogammarus peresi Ledoyer, 1967a, original designation, = Hornellia incerta Walker).

Pleon and urosome dorsally crenulate transversely on posterior segmental margins, urosomites often with dorsal articulate spines. Lateral cephalic lobes rounded-quadrate.

Antennae elongate, extending subequally or antenna 2 longer, ratio of peduncular articles on antenna 1 = 20:13:7, primary flagellum longer than peduncle, accessory flagellum 2-5 articulate.

Labrum notched (type) or entire. Ratio of mandibular palp articles = 4:11:10 or 4:18:15, article 3 linear (type) or falcate, setae = (AB)DE. Inner lobes of labium present. Inner plate of maxilla 1 ovate, apically and part to all medially setose, outer plate with 11 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl [?shorter than 3, with nail].

Coxae ordinary, poorly setose, coxa 1 apically expanded, coxa 4 lobate. Gnathopods feeble, slender, scarcely subchelate, wrists elongate, lobed (type) or unlobed, hands ovate to rectangular, hand of gnathopod 2 elongate, palms oblique, weak, poorly defined.

Article 2 of pereopods 5-7 slightly expanded, poorly setose, scarcely lobate.

Rami of uropods 1-2 marginally spinose, only outer of uropod 2 shortened, uropod 1 with basofacial spine [in several species, type unknown]. Uropod 3 extended, magniramous, almost aequiramous, peduncle slightly elongate, rami elongate, lanceolate, setose, outer 2-articulate. Telson elongate, not fully cleft, lobes tapering, notched (type), weakly spinose apically and medially and dorsally (type) and laterally.

Coxal gills 2-7, ovate. Oostegites slightly broadened to slender.

Relationship.--Differing from Elasmopoides, Maeropsis and Ceradocus in the feeble gnathopod 2 of both sexes; somewhat ancestral to Maerella and Jerbarnia but anterior coxae normal, not reduced or diversified and maxillipedal dactyl well developed; differing from the Eriopisella group in the magniramous uropod 3 and well setose maxillae.

Species.--incerta Walker, 1904 (= peresi Ledoyer, 1967a) (Ruffo, 1969) [690];

whakatane (J.L. Barnard, 1972b) [775];

New Zealand to Madagascar, sublittoral, 2.

#### Metaceradocus Chevreux

Figure 15

Metaceradocus Chevreux, 1925: 304 (Metaceradocus perdentatus Chevreux, 1925, monotypy).

Like Hornellia but telson fully cleft and article 2 on outer ramus of uropod 3 absent.

Species.--micramphopus (Stebbing, 1910) [781];

occidentalis J.L. Barnard, 1959e [373];

perdentatus Chevreux, 1925 [441];

vesentiniae Ruffo, 1969 [677];

weakly circumtropical and warm-temperate, sublittoral, 4.

#### Maerellids

Peduncle of uropod 3 elongate; pleonites with transverse serrations dorsally or dorsolaterally; anterior coxae of male diverse; male gnathopod 2 large and subchelate, other gnathopods feeble and nearly simple; maxillae not medially setose; dactyl of maxillipeds absent; telson short, cleft halfway.

#### Maerella Chevreux

Maerella Chevreux, 1911: 218 (Gammarus tenuimanus Bate, 1862, monotypy).

Body slender, pleon and urosome transversely dentate or urosome with large teeth, urosomites also with scattered dorsal spines. Rostrum obsolescent, lateral cephalic lobes mammilliform.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 28:36:6, primary flagellum as long as peduncle, accessory flagellum 5-articulate. Antenna 2 flagellum not longer than article 5 of peduncle.

Ratio of mandibular palp articles = 17:13:12, article 3 sickle-shaped, setae = DE. Inner lobes of labium large and fleshy, no gape. Maxillae not medially setose, inner plate of maxilla 1 thinly rectangular, with 2 apical setae, outer plate with 7 spines, palps [?symmetrical]. Inner plate of maxilla 2 lacking medial and facial setae, very thin. Outer plate of maxilliped medially setose, dactyl absent.

Coxae 1-4 of medium length to short, of diverse sizes and shapes, setae sparse, coxa 1 strongly tapered, coxa 2 slightly tapered, coxae 3-4 very broad, coxa 4 scarcely lobate, posterior margin convex and forming lobe but without normal lobe-forming concavity. Female gnathopods thin, elongate, feeble, wrists elongate, not lobed, hands thin, rectangular, palms oblique, poorly defined, short, wrist of gnathopod 2 much longer than 1; male gnathopod 1 like female but wrist intermediate between her gnathopods 1-2, gnathopod 2 enlarged, wrist short, slightly lobed, hand large, rectangular, palm slightly oblique, sculptured, well defined.

Article 2 of pereopods 5-7 unexpanded, unlobate, rectilinear or weakly ovate.

Rami of uropods 1-2 extending evenly, marginally spinose, uropod 1 [?with basofacial spine], uropod 2 much shorter than 1. Uropod 3 greatly extended, magniramous, almost aequiramous, rami ovatolanceolate, peduncle elongate, outer ramus 1-articulate. Telson very short, cleft halfway, lobes appressed, scarcely tapering, with weak apical and larger dorsal spines.

Coxal gills [?2-6], ovate. Oostegites slender.

Variants.--Species poorly known (westwoodi).

Relationship.--Like Hornellia but medial maxillary setae absent, anterior coxae reduced and diversified, maxillipedal dactyls absent.

See Jerbarnia.

Species.--tenuimana (Bate, 1862) (Chevreux and Fage, 1925) [352];

westwoodi (Stebbing, 1899c) (Gurjanova, 1951) [220];

arctic to Mediterranean, sublittoral, 2.

#### Jerbarnia Croker

Figures 20, 41

Jerbarnia Croker, 1971b: 382 (Jerbarnia mecochira Croker, 1971b, original designation).

Body slender, pleon and urosome transversely dentate or toothed, urosomites with scattered dorsal setae. Rostrum obsolescent, lateral cephalic lobes mammilliform.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 24:31:7, primary flagellum as long as peduncle, accessory flagellum 3-articulate. Antenna 2 flagellum not longer than article 5 of peduncle.

Labrum minutely truncate. Ratio of mandibular palp articles = 14:10:10, article 3 scarcely sickle shaped, setae = DE. Inner lobes of labium large, fleshy, no gape. Maxillae not medially setose, inner plate of maxilla 1 thin, with 2 apical setae, outer plate with 7 spines, palps [?symmetric]. Inner plate of maxilla 2 thin, without facial and medial setae. Maxilliped dactyl absent.

Coxae 1-4 short in female, diverse, coxae 1,3,4 in male short, coxa 2 greatly elongate, coxae sparsely spinose, coxa 4 without normal lobe-forming concavity, though with posteroventral lobe. Female gnathopods thin, elongate, feeble, wrists, elongate, not lobed, hands thin, rectangular, palms oblique, poorly defined, short, wrist of gnathopod 2 longer than 1; male gnathopod 1 like female but wrist intermediate between her gnathopods 1-2; gnathopod 2 greatly enlarged, coxa elongate, articles 2-3 elongate, wrist of medium length but unlobate, hand elongate, subrectangular, narrow, palm oblique, short, sculptured, well defined, gnathopod 2 folded to form sled-runner.

Article 2 of pereopods 5-7 scarcely expanded, unlobate.

Pleopods of ordinary size but rami 1-articulate (though elongate). Rami of uropods 1-2 extending equally, marginally spinose; uropod 1 with basofacial spines on peduncle. Uropod 3 greatly extended, magniramous, almost aequiramous, rami ovato lanceolate, peduncle elongate, outer ramus with tiny article 2. Telson very short, cleft halfway, lobes appressed, scarcely tapering, almost truncate, with weak apical spination.

Coxal gills [2-6 ovate]. Oostegites slender.



Relationship.--Like Maerella but male coxa 2 gigantic; rami of pleopods not divided into articles.

Species.--mecochira Croker, 1971b [582];

Eniwetok Atoll, sublittoral, 1.

#### Megaluropids

Peduncle of uropod 3 elongate or not; pleonites with transverse dorsal serrations; anterior coxae diverse, coxa 3 small; gnathopods simple; article 2 of pereopods 5-7 with posteroventral lobes; plates of maxilla 2 broadened; telson cleft more than halfway; outer ramus of uropod 2 slightly shortened.

#### Aurohornellia Barnard and Karaman

Aurohornellia Barnard and Karaman, 1982: 171 (Tulearogammarus sinuatus Ledoyer, 1967b, original designation).

Body [?ordinary], pleon [?and urosome] dorsally crenulate transversely on posterior segmental margins, each of pleosomite 2 to urosomite 2 with 2 dorsal spines, [?urosomites free]. Rostrum medium, lateral cephalic lobes sharply conical.

Antennae elongate, antenna 1 shorter than 2, ratio of peduncular articles = 23:25:10, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 slender.

Ratio of mandibular palp articles = 4:17:15, article 3 linear, stubby, setae = ADE. Inner lobes of labium present. Maxillae moderately setose medially, inner plate of maxilla 1 ovate, very short, moderately setose apicomediaally, outer plate with [?] spines, palps 2-articulate, [?symmetrical]. Inner plate of maxilla 2 [?with oblique facial row of setae]. Outer plate of maxilliped [?spinose medially, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae long, with long setae, coxa 1 slightly expanded apically, coxa 3 much smaller than 1 or 2, coxa 4 long but unlobed. Gnathopods feeble, slender, almost simple, wrists elongate, hands elongate, thin, palms scarcely evident, gnathopod 2 thinner than gnathopod 1 (male not clarified).

Article 2 of pereopods 5-7 expanded, moderately to strongly lobate, serratosetulose posteriorly; pereopod 7 elongate, dactyl [?elongate and setose].

Pleopods [?ordinary]. Rami of uropods 1-2 marginally spinose, outer rami slightly shortened, peduncle of uropod 1 [?with basofacial spine]. Uropod 3 slightly extended, magni or variramous, rami thin, outer ramus with long article 2, inner ramus reaching apex of article 1 on outer ramus. Telson of ordinary length, fully cleft, lobes tapering, poorly armed but with weak dorsal spinules.

Coxal gills [?2-7, ovate]. Oostegites [?narrow].

Relationship.--Standing between Hornellia and Megaluropus; like Hornellia but coxa 3 reduced and like Megaluropus but rami of uropod 3 thin. See Argissa.

Species.--sinuatus (Ledoyer, 1967b) [698];

Madagascar, shallow water, 1.

Megaluropus Hoek

Figures 15, 40

Megalonoura Herdman, 1889: 39 (nomen nudum).

Megaluropus Hoek, 1889: 197 (Megaluropus agilis Hoek, 1889, monotypy).--Stebbing, 1906: 420.--Ledoyer, 1975: 1314 (key).

Phylluropus K.H. Barnard, 1932: 145 (Phylluropus capensis K.H. Barnard, monotypy, = Megaluropus agilis Hoek).

Occasionally pleonites and urosomites dorsally denticulate and spinose transversely.

Rostrum medium to large, lateral cephalic lobes protruding, rounded or pointed, sinus present or weak. Eyes often proliferate.

Antennae medium to elongate, antenna 1 shorter than 2, ratio of peduncular articles = 18:15:5, primary flagellum scarcely longer than peduncle, accessory flagellum 2+ articulate.

Labrum grossly rounded but minutely notched apically. Ratio of mandibular palp articles = 7:18:15, article 3 scarcely subfalcate or linear, setae = ADE. Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 short, ovate, mostly setose medially, outer plate with 9 spines, palps 2-articulate, [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl almost as long as 3.

Coxae of medium length to long but anterior members diverse, strongly setose, coxa 1 expanded apically, coxa 3 smaller than 2, coxa 4 large, elongate, very broadly lobed but lobe shallow, coxae 3-4 often tapering. Gnathopods diverse, of female feeble, scarcely subchelate, wrists elongate, unlobed (type) or lobed, hands slender, palms obsolescent; male gnathopod 1 stronger but mainly thicker than female, gnathopod 2 much stouter and slightly larger than 1, palm slightly better developed, wrist slightly shorter than in female.

Article 2 of pereopods 5-7 expanded, lobate, weakly to moderately setose or serrulose posteriorly; pereopod 7 elongate, dactyl elongate and setose.

Rami of uropods 1-2 marginally spinose, outer ramus of uropod 2 shortened, uropod 1 [?without basofacial spine]. Uropod 3 not extended but generally large, magniramous, aequiramous, rami large, flabellate, uniarticulate. Telson of ordinary length, fully cleft, lobes tapering, poorly armed.

Coxal gills [?2-7], ovate. Oostegites narrow.

Variants.--Article 4 of male and female gnathopod 2 extended along lobed article 5 (longimerus).

Relationship.--Like Hornellia but rami of uropod 3 flabellate, urosomites not crenulate nor spinose, coxa 3 reduced.

Species.--agilis Hoek (Chevreux and Fage, 1925)  
[355 (?740, ?660, ?390)];

falciformis J.L. Barnard, 1969b [377];

longimerus Schellenberg, 1925a (J.L. Barnard, 1962a) [445 (?373)];

massiliensis Ledoyer, 1975 [348];

monasteriensis Ledoyer, 1975 [348];

namaquaensis Schellenberg, 1953 (Griffiths, 1975) [740];

visendus J.L. Barnard, 1969b [377];

circumtropical and warm temperate, littoral to sublittoral and neritic 7.

#### Argissids

Peduncle of uropod 3 not elongate; pleonites smooth dorsally; anterior coxae diverse, coxa 3 small; gnathopods simple, dactyl of gnathopod 1 apically setiferous (Megaluropids); article 2 of pereopods 5-7 with posteroventral lobes; plates of maxilla 2 not greatly broadened; telson cleft more than halfway; outer ramus of uropod 2 scarcely shortened; eyes reduced to wheel of 4 ommatidia or absent (Megaluropids).

#### Argissa Boeck

##### Figure 49

Argissa Boeck, 1871: 125 (Argissa typica Boeck, 1871, monotypy  
= Syrrhoë hamatipes Norman, 1869). -Stebbing, 1906: 276.  
Chimaeropsis Meinert, 1893: 167 (homonym, Pisces).

Urosomites toothed in male. Rostrum obsolescent, lateral cephalic lobes weakly mammilliform. Eyes formed of 4 ommatidia in pinwheel, or eyes absent.

Antennae of medium extension, antenna 1 much shorter than 2, ratio of peduncular articles = 18:10:6, flagellum as long as peduncle, article 1 elongate (indivisibly proliferate) in male accessory flagellum 2 articulate. Antenna 2 ordinary in female but article 4 elongate, flagellum slightly longer than articles 4-5 of peduncle together, in male flagellar articles elongate as in Phoxocephalidae, but flagellum not much longer than in female.

Labrum apex grossly rounded but with small medial notch. Ratio of mandibular palp articles = 3:7:11, palp slight, article 3 linear, setae = DE, sparse. Inner lobes of labium present. Maxillae moderately setose medially; inner plate of maxilla 1 ovate, with 2-3 setae. one of these medial, outer plate with 9 spines. palps [?symmetric]. Inner plate of

maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially striate, dactyl very short, stubby, with long nail.

Coxae elongate, moderately setose, coxa 1 ovately expanded apically, coxa 2 smaller and tapering, coxa 3 smaller than 2 and tapering, coxa 4 very large, lobate. Gnathopods feeble, simple, alike, wrists elongate, unlobed, hands slender, almost styliform, without palms, dactyls of medium length, with long nails.

Article 6 of pereopods 3-4 feeble. Article 2 of pereopods 5-7 expanded, not setose, moderately or scarcely lobate on pereopod 5, scarcely on 6, strongly on 7, these pereopods stubby; dactyls feeble.

Rami of uropods 1-2 extended subequally, marginally spinose sparsely. Uropod 1 without basofacial spine. Uropod 3 slightly extended, almost magniramous, almost aequiramous, rami broadly lanceolate, setose, outer with minute article 2. Telson elongate, deeply cleft, lobes tapering, poorly armed.

Coxal gills [2-7], ovate. Oostegites narrow.

Relationship.--Differing from Megaluropus in the poorly developed eyes (pinwheel or absent), the shortened article 5 of antenna 2, the more feeble mandibular palp, short pereopod 7 with feeble dactyl and unlabellate rami of uropod 3. Differing from Aurohornellia in the same characters except uropod 3, plus the smooth pleonites 1-3. Differing from Salentinella in the much more feeble and simple gnathopods, short article 3 of mandibular palp, presence of facial setae on maxilla 2 and longer antenna 2.

Species.--hamatipes (Norman, 1869) (= stebbingi Bonnier, 1896) (Sars, 1895b) (Bousfield, 1973) [420MB];

cosmopolitan marine sublittoral and bathyal, 1.

#### Melphidippids

Peduncle of uropod 3 highly elongate; pleonites with transverse dorsal serrations; anterior coxae short and ordinary; gnathopods scarcely subchelate; article 2 of pereopods 5-7 not lobate posteroventrally; plates of maxilla 2 slender; telson cleft less than halfway or entire; outer ramus of uropod 2 shortened.

#### Melphidippa Boeck

##### Figure 42

Melphidippa Boeck, 1871: 218 (Gammarus spinosus Goes 1866, homonym, selected by Gurjanova, 1951, = Melphidippa goesi Stebbing, 1899c).  
--Stebbing, 1906: 335.

Body slender, metasome and urosome dorsally toothed. some teeth arranged transversely. Lateral cephalic lobes rounded or quadrate, weak sinus present.

Antennae elongate, antenna 1 scarcely longer than 2, ratio of peduncular articles = 13:18:5, primary flagellum much longer than peduncle, accessory flagellum 2-articulate, elongate. Antenna 2

elongate, peduncle strongly setose, flagellum slightly longer than article 5 of peduncle.

Labrum grossly rounded below but with small apical notch. Ratio of mandibular palp articles = 5:15:11, article 3 scarcely falciform, setae = CDE. Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 pyriform, fully setose medially (medial margin directed apically), outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae short, scarcely contiguous, well setose, coxa 1 expanded below coxa 4 not lobate. Gnathopods feeble, scarcely subchelate, wrists elongate, sexes alike, wrist of gnathopod 1 broadly lobate, hand thin, with oblique weak palm, gnathopod 2 with unlobed wrist, hand thinner and more elongate, palm very short, oblique.

Pereopods 3-4 usually with elongate and setose dactyls. Article 2 of pereopods 5-7 unexpanded, unlobate, weakly setose posteriorly; dactyls often elongate.

Rami of uropods 1-2 marginally spinose, outer rami strongly shortened, uropod 1 [?with basofacial spine]. Uropod 3 greatly extended, magniramous, almost aequiramous, peduncle greatly elongate, rami 1-articulate, lanceolate. Telson of ordinary length, cleft halfway, lobes tapering, notched, poorly armed.

Coxal gills 2-6, ovate. Oostegites narrow.

Variants.--Article 3 of antenna 1 as long as article 1 (macrura); telson elongate (borealis); article 1 of flagellum on male antenna 1 elongate, pubescent and internally proliferate (sinuata); lateral cephalic lobes globose as in Melphidippella (sinuata); see Melphisana for comments on amorita; telson cleft one third (macruroides).

Species.--See Stephensen (1940a), Gurjanova, (1951);

?amorita J.L. Barnard, 1966 [370B];

antarctica Schellenberg, 1926, 1931a (Stephensen, 1947a) [800MB];

borealis Boeck, 1871 (Sars, 1895b) (Nagata, 1965b) [210MB];

globosa Nagata, 1965b [395];

goesi Stebbing, 1899c (= spinosa Boeck in Sars, 1895b) (Stephensen, 1940a) (Gurjanova, 1951) [210];

macrura Sars, 1895b [210];

macruroides Gurjanova, 1946 [220];

serrata (Stebbing, 1888) (as Neohela) [851B];

serrulatus (Kudrjaschov, 1965) (as Syrrhoites) [279];

sinuata (Nagata, 1965b) [395];

sp. Walker, 1901 [348];

bipolar, sublittoral to bathyl, neritic, 10.

Melphidippella Sars

Melphidippella Sars, 1895b: 487 (Atylus macer Norman, 1869, original designation).--Stebbing, 1906: 337.

Body slender, metasome and urosome dorsally toothed, some teeth arranged transversely. Lateral cephalic lobes globose, rounded-acuminate, sinus absent. Eyes fully occupying lateral lobes, bulging laterally.

Antennae elongate, antenna 1 slightly longer than 2, ratio of peduncular articles = 22:18:6, primary flagellum much longer than peduncle, accessory flagellum 1-articulate, vestigial. Antenna 2 elongate, flagellum nearly as long as articles 4-5 of peduncle in female and more elongate in male, article 4 of peduncle in male thickened and with dorsal male pubescence.

Labrum grossly rounded below but with small apical notch. Ratio of mandibular palp articles = 5:15:7, article 3 linear, setae = DE, but mostly of E form. Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 pyriform, fully setose medially (medial margin directed apically), outer plate with 11 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Maxilliped dactyl as long as 3.

Coxae short, scarcely contiguous, poorly setose, coxa 1 weakly expanded below, coxa 4 not lobate. Gnathopods feeble, scarcely subchelate, wrists elongate, sexes alike, wrist of gnathopod 1 broadly lobate, hand thin, with oblique weak palm, gnathopod 2 with unlobed wrist, hand thinner and more elongate, palm very short, oblique.

Pereopods 3-4 with elongate and setose dactyls. Article 2 of pereopods 5-7 unexpanded, unlobate, weakly setose posteriorly.

Rami of uropods 1-2 marginally spinose, outer rami strongly shortened, uropod 1 [?with basofacial spine]. Uropod 3 greatly extended, magniramous, aequiramous, peduncle greatly elongate, rami 1-articulate, lanceolate. Telson of ordinary length, cleft two thirds, lobes tapering, notched, poorly armed.

Coxal gills 2-6, ovate. Oostegites narrow.

Relationship.--Differing from Melphidippa in the vestigial accessory flagellum.

Species.--See Chevreux and Fage (1925);

macra (Norman, 1869) (Sars, 1895b) [240];

NE Atlantic, sublittoral, 1.

Melphisana J.L. Barnard

## Figure 42

Melphisana J.L. Barnard, 1962a: 81 (Melphisana bola J.L. Barnard, 1962, original designation).

Body slender, metasome and urosome dorsally toothed, some teeth arranged transversely. Rostrum of medium size, lateral cephalic lobes subglobose, sinus absent. Eyes present but not filling lobes in female.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 18:22:3 (male), primary flagellum much longer than peduncle, accessory flagellum 1-articulate, vestigial. Antenna 2 elongate, peduncle [?strongly setose, flagellum slightly longer than article 5 of peduncle].

Labrum deeply incised. Ratio of mandibular palp articles = 4:9:3, article 3 linear (actually nodiform), setae = DE. Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 pyriform, fully setose medially (medial margin directed apically), outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped not armed medially, dactyl short and stubby, with nail.

Coxae short, poorly setose, coxa 1 expanded, coxa 4 unlobate. Gnathopods feeble, scarcely subchelate, wrists elongate, sexes alike, wrist of gnathopod 1 broadly but scarcely lobate, hand thin, with oblique, long but weak palm, gnathopod 2 with unlobed wrist, hand similar.

Pereopods 3-4 dactyls short and not setose. Article 2 of pereopods 5 7 unexpanded, unlobate, weakly setose posteriorly; [dactyls unknown].

Rami of uropods 1-2 marginally spinose, outer rami strongly shortened, uropod 1 with basofacial spine. Uropod 3 [?greatly extended, magniramous, aequiramous, peduncle elongate, rami 1-articulate, lanceolate]. Telson of ordinary length, uncleft, apically emarginate, poorly armed.

Coxal gills [?2-6, ovate]. Oostegites [?narrow].

Variants.--Dactyls of pereopods 3-4 vestigial (japonica); ratio of peduncular articles on antenna 1 of female = 18:12:3; hand of gnathopod 2 elongate (japonica).

Relationship.--Differing from Melphidippa and Melphidippella in the uncleft telson, short dactyls of pereopods 3-4, very short mandibular palp article 3. Melphidippa amorita is an intergrade to this genus in its poorly cleft telson and slightly more orthodox mandibular palp.

Species.--bola J.L. Barnard, 1962, 1966 [373];

japonica Nagata, 1965b [395];

California, Japan, sublittoral and neritic, 2.

## Macrohectopids

Peduncle of uropod 3 not elongate. Pleonites with weak to strong dorsal teeth, occasionally urosomites with transverse dorsal serrations. Anterior coxae very short, ordinary. Gnathopods almost simple but hands weakly swollen. Article 2 of pereopods 5-7 unlobate posteroventrally. Plates of maxilla 2 [unknown]. Telson cleft more than halfway. Outer ramus of uropod 2 shortened.

Body mysidiform. Antennae greatly elongate, article 3 of antenna 1 much longer than articles 1 and 2. All coxae very short. Pereopod 6 and often pereopod 7 elongate. Urosome and uropods elongate.

Macrohectopus Stebbing

## Figure 32

Constantia Dybowsky, 1874: 50 (homonym, Mollusca) (Constantia branickii Dybowsky, 1874, monotypy).

Macrohectopus Stebbing, 1906: 394 (new name).--Bazikalova, 1945: 179.

With the familial characters.

†Hellenis Petunnikov

Hellenis Petunnikov, 1914: 153 (Hellenis saltatorius Petunnikov, 1914, original designation).--Hessler, 1969: R390.--Hurley, 1973:214.

Prionochelius Petunnikov, 1914: 149 (Prionochelius mantilloides Petunnikov, 1914, original designation).

Tetrachelius Petunnikov, 1914: 150 (Tetrachelius binagadensis Petunnikov, 1914, original designation).

Body vermiform, dorsally smooth. Lateral cephalic lobes [poorly resolved]. Eyes present.

Antennae of medium extension, antenna 1 longer than 2 [all other information unknown].

Mouthparts [unknown].

Coxae obsolescent. Gnathopods alike, of Acanthogammarid form, wrists very short, weakly lobate, hands large, elongate, ovate, palms very oblique and poorly defined, dactyls very long and almost as long as posterior margins of hands.

Article 2 of pereopods 5-7 linear; these pereopods extremely elongate.

Uropods 1-2 [grossly ordinary, tiny details unknown]. Uropod 3 extended, [other details unknown]. Telson [apparently short].

Coxal gills [unknown]. Oostegites [unknown]. Sternal gills [unknown].

Relationship.--Perhaps a PontoCaspian version of Macrohectopus as indicated by the very slender body, obsolescent coxae and thin elongate pereopods.

Species.--saltatorius Petunnikov, 1914 (= mantilloides and binagadensis Petunnikov, 1914) (Hessler, 1969) [USSR, Caspian, Lower Miocene], 1.



## Hadzioids

Sternal gills absent; coxal gill 7 absent; if gnathopod palms bearing densely packed bifid spines then uropod 3 elongate; most taxa lacking densely packed bifid palmar spines.

Marine or derived from immediate marine ancestors.

## Key to the Groups of Hadzioids

1. Gnathopods alike or mittenform. . . . . 2
- Gnathopods diverse (1 and 2 not alike). . . . . 6
2. Uropod 3 variramous or parviramous. . . . . 3
- Uropod 3 magniramous. . . . . See Meximaera, Mexiweckelia
3. One or more wrists of gnathopods lobate. . . . . 4
- Wrists of gnathopods not lobate . . . . . 5
4. Urosomites coalesced. . . . . Austroniphargids
- Urosomites free . . . . . Eriopisellids
5. Coxa 4 much longer than coxae 1-3 . . . . . Salentinellids
- Coxa 4 not longer than coxae 1-3. . . . . Niphargids
6. Uropod 3 aequiramous. . . . . 7
- Uropod 3 parviramous. . . . . 9
7. Eyes absent . . . . . Weckeliids
- Eyes present. . . . . 8
8. Rami of uropod 3 much longer than peduncle. . . . . Ceradocids
- Rami of uropod 3 much shorter than peduncle . . . . . Parapherusids
9. Uropod 3 miniaturized, outer ramus short, scarcely  
  longer than peduncle or shorter than peduncle. . . . . 10
- Uropod 3 elongate and extended. . . . . 12
10. Telson entire . . . . . Metacrangonyctids
- Telson cleft. . . . . 11
11. Article 2 of pereopod 7 expanded and plate-like. . . . . Gammarella
- Article 2 of pereopod 7 ordinary. . . . . Ceradocopsids
12. Telson almost or fully entire . . . . . Pseudoniphargids
- Telson cleft. . . . . 13
13. Inner lobes of labium large and fleshy. . . . . Melitids
- Inner lobes of labium vestigial or absent . . . . . Hadziids

## Ceradocids

Inner lobes of lower lip various, but usually present. Maxillary setation various. Gnathopod 1 not of Melitid form, of Ceradocid form. Gnathopod 2 of Melitid and Ceradocid form. Article 2 of pereopod 7 not of form in Gammarella. Uropod 3 magniramous, usually aequiramous but inner ramus becoming slightly shortened or rami becoming weakly amphimorphous. Telson cleft except in highly apomorphic descendents. Coxal gills not pediculate, gill 7 absent.

Accessory flagellum 2+ articulate.

The basically aequiramous uropod 3, non-Melitid gnathopod 1, Melitid = Ceradocid gnathopod 2, and lack of pediculation on coxal gills differentiate this family in one or more ways from Melitids and Hadziids.

Article 2 on the outer ramus of uropod 3 is absent or vestigial but the following key includes some alien genera so as to denote other relationships.

See Maerella and Jerbarnia in the Cheirocratids and Gammarella and Ceradocopsis in their following sections; Parapherusa is highly apomorphic and terminal.

Key to Ceradocids (and including Ceradocopsis,

Gammarella, Parapherusa, Paraweckelia,

Metaceradocoides, Maerella and Jerbarnia)

1. Outer ramus of uropod 3 with conspicuous article 2  
[uropod 3 miniaturized]. . . . . 2  
Outer ramus of uropod 3 with article 2 vestigial or absent . . . . . 4
2. Male gnathopod 2 enfeebled, wrist elongate. . . . . 3  
Male gnathopod 2 enlarged, wrist short  
. . . . . Ceradocopsis and Gammarella
3. Palm of male gnathopod 2 oblique, palp article 4 of maxilliped  
short, inner plate of maxilla 1 only terminally setose. . . . . "Meximaera"  
Palm of male gnathopod 2 almost transverse, palp article  
4 of maxilliped unguiform, inner plate of  
maxilla 1 medially setose . . . . . (see VII) Metaceradocoides
4. Peduncle of uropod 3 elongate . . . . . 5  
Peduncle of uropod 3 of ordinary length . . . . . 6
5. Article 3 of male gnathopod 2 elongate, article 3  
of mandibular palp not falcate or weakly so,  
outer ramus of uropod 3 with tiny article 2 . . . (see VIII) Jerbarnia  
Article 3 of male gnathopod 2 not elongate,  
article 3 of mandibular palp falcate,  
outer ramus of uropod 3 lacking article 2 . . . (see VIII) Maerella
6. Article 3 of mandibular palp about one third  
as long as article 2 . . . . . 7  
Article 3 of mandibular palp elongate or absent . . . . . 9
7. Maxillae fully setose medially. . . . . Ceradocus  
Maxillae weakly setose to asetose medially. . . . . 8
8. Epimeron 3, pleonites and urosomites denticulate . . . . . Ceradomaera  
Epimeron 3, pleonites and urosomites not denticulate . . . Paraweckelia
9. Maxilla 2 fully setose medially, with oblique facial row  
of setae on inner plate . . . . . 10  
Maxilla 2 not fully setose medially . . . . . 15
10. Peduncle of antenna 2 elongate and slightly thickened. . . . . 11  
Peduncle of antenna 2 ordinary. . . . . 12
11. Inner plate of maxilla 1 only terminally setose,  
eyes ordinary. . . . . Paraceradocus  
Inner plate of maxilla 1 fully setose, eyes divisory . . . Quadrivisio
12. Telson fully cleft. . . . . 13  
Telson cleft halfway or uncleft . . . . . 14
13. Anterior coxae very large, telson fully cleft. . . . . Elasmopoides  
Anterior coxae short, telson cleft only two thirds . . . . . Maeropsis

14. Telson entire, uropod 1 with interramal tooth on peduncle, uropod 3 very short, rami shorter than peduncle . . . . . Parapherusa  
 Telson cleft halfway, uropod 1 lacking interramal tooth, rami of uropod 3 elongate . . . . . Ceradocoides
15. Inner plate of maxilla 1 fully setose . . . . . Anelasmopus  
 Inner plate of maxilla 1 only terminally setose . . . . . 16
16. Mandibular palp article 3 fully falcate . . . . . Elasmopus  
 Mandibular palp article 3 not falcate . . . . . 17
17. Head lacking cheek notch. . . . . 18  
 Head with cheek notch . . . . . 19
18. Spines on uropods 1-2 small, article 2 of pereopod 5 shorter than coxa 5 . . . . . Lupimaera  
 Spines on uropods 1-2 elongate, article 2 of pereopod 5 longer than coxa 5 . . . . . Maera
19. Body carinate . . . . . 20  
 Body not carinate . . . . . 21
20. Epimeron 3 serrate posteroventrally . . . . . Parelasopus  
 Epimeron 3 not serrate posteroventrally . . . . . Mallacoota
21. Mandibular palp normal, male gnathopod 2 reduced in size . . . . . Linguimaera  
 Mandibular palp abnormal, article 2 reduced or palp absent, male gnathopod 2 enlarged . . . . . 22
22. Mandibular palp absent, telson reduced, entire or emarginate . . . . . Beaudettia  
 Mandibular palp present, 3-articulate, article 2 short, telson normal, cleft . . . . . Ifalukia

Ceradocus Costa

Figures 5, 45

Ceradocus Costa, 1853: 170; 1857: 224 (Ceradocus orchestipes

Costa, 1853, monotypy).--Stebbing, 1906: 430.--Sheard, 1939: 277.

C. (Denticeradocus) Sheard, 1939: 277 (Gammarus rubromaculatus Stimpson, 1856a, here selected). Formerly valid subgenus, now fully synonymized.

Body ordinary to slender, urosomites toothed or denticulate, pleosomites often dorsally denticulate or toothed transversely. Rostrum small to absent, lateral cephalic lobes rounded or extended, sinus often forming notch.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 17:19:3, primary flagellum as long as peduncle, accessory flagellum about 5 articulate. Antenna 2 gland cone very large.

Ratio of mandibular palp articles = 6:12:6, article 1 usually with tooth, article 3 linear, stubby, setae = DE. Inner lobes of labium present. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 7+ spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae.

Coxae of ordinary length to short, poorly setose, coxa 1 anteroventrally produced, coxa 4 scarcely lobate. Gnathopods diverse, gnathopod 1 small, wrist elongate, unlobed, hand ovate to rectangular, palm oblique to transverse, short; male gnathopod 2 enlarged, wrist short, lobate, hand large, ovate to subrectangular or trapezoidal, palm oblique, short to long, smooth or sculptured; female gnathopod 2 generally smaller, wrist slightly elongate, hand very oblique and poorly defined, unsculptured; male gnathopod 2 usually disymmetrical, one side of male form, other of female form.

Article 2 of pereopods 5-7 scarcely expanded, lobate, often sharply.

Rami of uropods 1-2 extending evenly, marginally spinose, uropod 1 with basofacial spine. Uropod 3 extended, peduncle slightly elongate, magniramous, aequiramous, rami elongate, lanceolate to weakly paddle-shaped, 1-articulate or article 2 on outer ramus vestigial. Telson of ordinary length to elongate, deeply to fully cleft, lobes tapering, often sharp, often notched, usually with 1-2 or more long apical or medial spines.

Coxal gills 2-6, ovate, or very broadly expanded. Oostegites narrow.

Variants.--Eyes absent (baffini, torelli); coxae short and discontinuous (torelli); epimeron 3 usually multitoothed.

Relationship.--The basic marine Gammaridan, with aequiramous, magniramous uropod 3.

Species.--baffini Stephensen, 1933b, 1944c (Gurjanova, 1951) [212];

breweri (Kunkel 1910) [367];

capensis Sheard, 1939 (Nagata, 1965c) [743];

chevreuxi Sheard, 1939 [570];

chiltoni Sheard, 1939 [775];

?colei Kunkel, 1910 [367];

diversimanus (Miers, 1884) [691];

dooliba J.L. Barnard, 1972a [780];

hawaiensis J.L. Barnard, 1955, 1970 (?Ledoyer, 1972) [381, ?600];

laevis Olerod, 1970 [641];

natalensis Griffiths, 1974b [743];

orchestipes Costa, 1853, 1857 (Chevreux and Fage, 1925) [250];

?parkeri Kunkel, 1910 [367];

paucidentatus J.L. Barnard, 1952a [376];

ramsayi (Haswell, 1879) (Sheard, 1939) (J.L. Barnard, 1972a) [780];

rubromaculatus (Stimpson, 1856a) (Sheard, 1939) (J.L. Barnard, 1972a) [780], r. haumuri J.L. Barnard, 1972b [774];

sellickensis Sheard, 1939 [785];

semiserratus (Bate and Westwood, 1863) (Chevreux and Fage, 1925) [355];

serratus (Bate, 1862) (J.L. Barnard, 1972a) [781];

sheardi Shoemaker, 1948 (Ortiz, 1974) [460];

shoemakeri Fox, 1973 [481];

spinicauda (Holmes, 1908) (J.L. Barnard, 1962a) [368];

spinifera Ledoyer, 1973a [698];

torelli (Goes, 1866) (Gurjanova, 1951) [200];

spp., = references to rubromaculatus by K.H. Barnard, 1931, 1937, Griffiths, 1974a, 1974b, 1974c, 1975, Ledoyer, 1967b, 1972, Miers, 1884, Nayar, 1967, Pirlot, 1934, 1936, Ruffo, 1954a, 1959a, Tattersall, 1922b, Walker, 1904, 1905, 1909;

circumtropical, rarely colder, littoral and sublittoral, 24.

#### Ceradomoera Ledoyer

Ceradomoera Ledoyer, 1973a: 61 (Ceradomoera plumosa Ledoyer, 1973a, original designation).

Metasomites and urosomites transversely but minutely toothed dorsally, also setose. Lateral cephalic lobes rounded.

Antennae elongate, antenna 1 much longer than 2, ratio of peduncular articles = 24:28:10, primary flagellum [?much longer than peduncle], accessory flagellum 6-articulate. Antenna 2 gland cone large, flagellum only as long as article 5 of peduncle.

Labrum [?broader than long, entire, rounded]. Ratio of mandibular palp articles = 5:15:3, article 1 with tooth, article 3 linear, setae = E. Inner lobes of labium present. Maxillae not medially setose, inner plate of maxilla 1 ovate, with 4 apical setae, outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 without facial setae, medial margin with hairs or weak [?setae].

Coxae short, poorly setose, coxa 1 expanded below, with anteroventral tooth, coxa 4 [?unlobed]. Gnathopods diverse, gnathopod 1 small, wrist elongate, unlobed, hand ovate, palm oblique; either left or right gnathopod 2 enlarged, wrist short, lobate, hand large, ovate, palm very oblique, poorly defined, sculptured in male; opposite gnathopod 2 of male small version, with palm unsculptured; [female not described but gnathopod 2 assumed to be small and unsculptured].

Article 2 of pereopods 5-7 scarcely expanded, weakly lobate (sharp corners), weakly serrate posteriorly.

Pleopods [?ordinary]. Rami of uropods 1-2 extending evenly, marginally spinose, uropod 1 with basofacial spine. Uropod 3 extended, magniramous, aequiramous, rami 1-articulate, peduncle scarcely elongate. Telson of ordinary length, cleft about halfway, gaping, lobes tapering, weakly spinose apically.

Coxal gills [?2-6, ovate]. Oostegites slender.

Relationship.--Differing from Ceradocus in the poorly setose maxillae, from Maera in the short article 3 of the mandibular palp and the disymmetrical gnathopod 2.

Species.--plumosa Ledoyer, 1973a [698];

Madagascar, sublittoral, 1.

#### Ceradocoides Nicholls

Ceradocoides Nicholls, 1938: 123 (Ceradocoides chiltoni Nicholls, 1938, original designation).

Body slender, urosomites 1-2 with sharp pointed triangular carinae. Rostrum absent, lateral cephalic lobes [?protruding, sinus present], anterolateral angle quadrate. Eyes small.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = [?15:18:3], primary flagellum [?longer than peduncle, 60-articulate, accessory flagellum 7-articulate. Antenna 2 more slender than 1, peduncle longer than that of 1, flagellum little longer than article 5 of peduncle, 17-articulate.

Labrum [?broader than long, rounded]. Mandibular incisor [?toothed, molar triturative, ratio of palp articles = ?::?, article 3 ?linear, setae = ?DE]. Inner lobes of labium [?present]. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with 11 spines, palps [symmetric]. Inner plate of maxilla 2 medially setose, facial setae absent. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae becoming progressively more shallow, [?poorly setose], coxa 1 [?unexpanded apically], coxa 4 unlobed. Gnathopods [?diverse, gnathopod 1 small, wrist elongate, unlobed, hand ovato-rectangular, palm weakly oblique, short]; gnathopod 2 enlarged, [?wrist short and lobate], hand enlarged, stout-rectangular, palm transverse, large, dactyl large, overlapping palm.

Pereopods 3-4 [?ordinary]. Article 2 of pereopods 5-7 unexpanded, [?poorly setose].

Pleopods [?ordinary]. Outer ramus of uropod 2 shortened, [?marginally spinose, peduncle of uropod 1 with basofacial spine]. Uropod 3 [?extended], magniramous, rami narrowly lanceolate. Telson of ordinary length, cleft halfway, gaping slightly, lobes strongly tapered, poorly armed.

Coxal gills [?2-6, ovate]. Oostegites [?narrow].

Remarks.--Very poorly described, especially unknown are lower lip, maxillipeds, gnathopods.

Relationship.--Apparently close to Paraceradocus but differing in the linear article 2 of pereopods 5-7 and the lanceolate rami of uropod 3.

Notes.--The identification of C. chiltoni by Sivaprakasam from India should be attributed to a species of Maera although maxilla 2 was not described nor figured (despite text saying it was figured).

Species.--chiltoni Nicholls, 1938 [878];

Antarctica, Commonwealth Bay, bathyal, 1.

#### Paraceradocus Stebbing

Paraceradocus Stebbing, 1899c: 426 (Megamoera miersii Pfeffer, 1888, original designation); 1906: 429.

Urosomites 1-2 each with dorsal tooth. Rostrum minute, lateral cephalic lobes softly pointed, weak sinus present.

Antenna 1 strongly extended, longer than antenna 2, ratio of peduncular articles = 24:20:6, ratio of primary flagellum = 66, accessory flagellum 7-articulate. Antenna 2 stout, flagellum scarcely longer than article 5 of peduncle, proliferate.

Ratio of mandibular palp articles = 3:9:7, article 3 weakly falcate, setae = DE, D-setae = comb. Inner lobes of labium [?apparently absent]. Maxillae [?not medially setose], inner plate of maxilla 1 pyriform, setose (6) apically, outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 [said to be lined medially with hairs, possibly no medial setae and no facial setae]. Maxilliped dactyl about as long as 3, [?nail weak or absent].

Anterior coxae of medium length, weakly decreasing in length by progression, poorly setose, coxa 1 not expanded apically, coxa 4 unlobate posteriorly, coxa 5 not shorter than 4. Gnathopods of Melitid form, gnathopod 1 small, wrist elongate, poorly lobed, hand subrectangular or trapezoidal, palm scarcely oblique, short, gnathopod 2 very large, wrist short, lobate, hand large, short-rectangular, palm almost transverse, weakly sculptured.

Article 2 of pereopods 5-7 weakly expanded, scarcely lobate, poorly setose, pereopods increasingly longer and or stouter.

Outer rami of uropods 1-2 slightly shortened, rami marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 strongly extended, magniramous, peduncle short, rami huge, flabellate, outer 1-articulate. Telson longer than broad, deeply cleft, moderately spinose.

Coxal gills [?2-6]. Oostegites [?narrow].

Variants.--Carination on pleonites variable, present or absent; basal articles of pereopods 5-7 often broadened; descriptions varying on coxae; palm of gnathopod 2 apparently parachelate (unusual for gnathopod 2), with one midhump bearing spine and very large defining spine (see K.H. Barnard, 1932); remains poorly illustrated.

Relationship.--Like Quadrivisio but eyes only 2, inner plate of maxilla 1 with only terminal setae. See Ceradocoides.

Species.--miersi (Pfeffer, 1888) (Schellenberg, 1931) (K.H. Barnard, 1932) (Stephensen, 1947a) (Thurston, 1974a, 1974b) [800];

antarctic, sublittoral, (0-300m<sup>+</sup>), 1.

#### Quadrivisio Stebbing

##### Map 49

Quadrivisio Stebbing, 1907: 159 (Quadrivisio bengalensis Stebbing, 1907, monotypy).

Pseudoceradocus Shoemaker, 1933a: 11 (Pseudoceradocus lutzi Shoemaker, 1933a, monotypy).

Body ordinary to slender. Lateral cephalic lobes broadly rounded, with notch defining lobes below (=sinus). Eyes 4 in number, ommatidial.

Antennae elongate, subequal or antenna 2 slightly the longer, ratio of peduncular articles on antenna 1 = 17:21:4, primary flagellum as long as peduncle, accessory flagellum about 4-12 articulate, almost as long as article 2 of peduncle. Antenna 2 very long.

Ratio of mandibular palp articles = 4:10:12, article 3 linear, setae = E. Inner lobes of labium small. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl with small apical nail.

Coxae of ordinary length, weakly setose, coxa 1 not expanded or tapering apically, coxa 4 lobate. Gnathopods of Melitid form, gnathopod 1 small, wrist elongate, unlobed, hand short, ovate to mittenform, palm short and transverse, female gnathopod 2 slightly enlarged, wrist of medium length, weakly but broadly lobate, hand elongate, ovate, palm oblique, long and poorly defined; male gnathopod 2 greatly enlarged, wrist short, strongly lobate, hand immense, ovate, palm long, oblique, sculptured, poorly defined.

Article 2 of pereopods 5-7 slightly expanded, scarcely lobate, posterior margin densely setuloserrate.

Rami of uropods 1-2 marginally spinose, extending subequally, peduncle of uropod 1 with basofacial spine. Uropod 3 strongly extended, magniramous, almost aequiramous, rami 1-articulate, flabellate. Telson of ordinary length, fully or deeply cleft, strongly spinose on all margins or only apically.

Coxal gills 2-6 ovate. Oostegites narrow.

Variants.--Peduncle of antenna 2 in male very thick (lutzi); urosomites with small dorsal teeth or spines in young male (lutzi).

Species.--1 aviceps (K.H. Barnard) (Griffiths, 1975) [743E];

2 bengalensis Stebbing, 1907 (Chevreux, 1913) (Rabindranath, 1972) [600Q];



- 3 bousfieldi Karaman and Barnard, 1979 (= bengalensis of Bousfield, 1971) [595E];
- 4 chevreuxi Gordon and Monod, 1968 [683];
- 5 lutzi (Shoemaker, 1933a) (= occidentalis Stephensen, 1933c) (Monod, 1951) [400];
- circumtropical and warm-temperate, estuarine, anchialine or inshore, 5.

Anelasmopus Oliveira

Anelasmopus Oliveira, 1953: 322 (Anelasmopus kraui Oliveira, 1953, monotypy).

Apparently like Elasmopus but said to have 11 setae on inner plate of maxilla 1, only 5 spines on outer plate of maxilla 1; shown with 1-articulate palp on maxilla 1. Needs reanalysis.

Species.--kraui Oliveira, 1953 [453];

Brazil, Baia de Guanabara, sublittoral, 1.

Elasmopoides Stebbing

Elasmopoides Stebbing, 1908b: 81 (Elasmopoides chevreuxi Stebbing, 1908b, original designation).

Posterior body segments weakly undulant dorsally, urosomites naked. Lateral cephalic lobes strongly protruding. Eyes covering most of anterior head.

Antennae elongate, antenna 1 as long as 2, ratio of peduncular articles = 14:14:3, of flagella = 60:36, accessory flagellum with 23 articles. Antenna 2 long and slender.

Ratio of mandibular palp articles = 6:25:24, article 3 curved, linear, setae = DE. Inner lobes of labium strong. Maxillae medially setose, inner plate of maxilla 1 pyriform, fully setose medially, outer plate with 11 spines, palps [?symmetrical]. Inner plate of maxilla 2 much broader than outer, with long, oblique, facial row of setae. Palp of maxilliped long, article 3 especially long, dactyl without nail.

Anterior coxae large, poorly setose, slightly decreasing in length progressively, coxa 1 strongly expanded, adz-shaped, coxae 2-3 narrow, coxa 4 larger, with weak posterior concavity, coxa 5 much shorter than 4. Gnathopods of Melitid form, gnathopod 1 small, wrist weakly elongate, weakly lobate, hand ovatorectangular, palm weakly oblique, short; gnathopod 2 of female (and male assumed) very large, wrist very short, lobate, hand immense, ovatotrapezoidal, palm weakly oblique, sculptured.

Article 2 of pereopods 5-7 expanded, lobate, sculptured, poorly setose; these pereopods otherwise short and stout.

Rami of uropods 1-2 extending equally, marginally spinose, uropod 1 [?with basofacial spine]. Uropod 3 not extended, short, magniramous. rami short, ovato-retangular, 1-articulate. Telson elongate, cleft to base, apically armed densely with long setae. Coxal gills [?2-6], ovate. Oostegites slender.

Relationship.--Like Paraceradocus but rami of uropod 3 short, inner plate of maxilla 1 fully setose medially. Differing from Ceradocus in the elongate article 3 of the mandibular palp and the short rami of uropod 3.

Species.--chevreuxi Stebbing, 1908b (Griffiths, 1974c) [743];

off South Africa, sublittoral, 1.

#### Maeropsis Chevreux

Maeropsis Chevreux, 1919: 9 (Maeropsis perrieri Chevreux, 1919, monotypy); 1927: 104.

Body slender. Rostrum obsolescent, lateral cephalic lobes rounded.

Antennae of medium extension, ratio of peduncular articles on antenna 1 = 30:35:7, ratio of flagella = 60:38, accessory flagellum 13-articulate.

Ratio of mandibular palp articles about 6:23:15, article 3 linear, setae = DE. Inner lobes of labium present and fleshy. Inner plate of maxilla 1 bullet-shaped, with 3 apical setae, outer plate with 7 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae. Maxilliped dactyl without nail.

Coxae short, scarcely contiguous, poorly setose, coxa 2 with strong anteroventral point, coxa 4 not lobate. Gnathopods diverse, gnathopod 1 small, of Melitid form, wrist elongate, unlobed, hand ovate, palm oblique, poorly defined, gnathopod 2 very large, wrist short, lobate, hand trapezoidal, expanded apically, palm almost transverse, sculptured in male, smoother in female.

Article 2 of pereopods 5-7 poorly expanded to strongly expanded respectively, poorly to strongly lobate respectively, poorly setose; article 4 of pereopods 6-7 expanded.

Rami of uropods 1-2 subequally extended, [?marginally spinose], peduncle of uropod 1 [?with basofacial spine]. Uropod 3 slightly extended, magniramous and almost aequiramous, but one ramus slightly shortened, both uniarticulate, spinose. Telson of ordinary length, cleft two thirds, weakly gaping, lobes tapering, apically notched, weakly armed.

Coxal gills [?2-6, ovate]. Oostegites [?slender].

Relationship.--Differing from Elasmopoides in the short anterior coxae and less than fully cleft telson; like Maera but maxilla 2 medially setose.

Species.--perrieri Chevreux, 1919, 1927 [401];

off Spanish Sahara, bathyal, 1.

Maera Leach

Figures 41, 43

Maera Leach, 1814a: 403; 1814b: 432 (Cancer grossimanus Montagu, 1808, monotypy).--Stebbing, 1906: 433.--Karaman and Ruffo, 1971: 113.  
Mulleria Leach, 1814a: 436 (nomen nudum).  
Leptochoe Stimpson, 1853: 46 (Leptochoe danae Stimpson, 1853, monotypy).  
 ?Linguimaera Pirlot, 1936: 309 (Maera othonides Walker, 1904, original designation).  
 ?Meximaera J.L. Barnard, 1969b: 209 (Meximaera diffidentia J.L. Barnard, 1969b, original designation).

Body ordinary to slender, urosomites rarely with dorsal tooth or weak armaments. Rostrum small to absent, lateral cephalic lobes rounded, subquadrate, falcate, weak to moderate, sinus or notch strong, large tooth often present. Eyes rarely absent.

Antennae elongate, slender, antenna 1 much longer than 2, ratio of peduncular articles = 15:18:7, ratio of flagella = 24:9, accessory flagellum 2+ articulate (usually multiarticulate). Antenna 2 ordinary to slender, flagellum usually shorter than article 5 of peduncle.

Ratio of mandibular palp articles = 7:13:9, article 1 often with tooth, article 3 linear, setae = (A)DE. Inner lobes of labium well developed. Maxillae poorly setose medially, inner plate of maxilla 1 ovate, with few apical setae, outer plate with 7 spines, palps symmetric. Inner plate of maxilla 2 without facial setae, medial setae absent or sparse and apicad.

Coxae medium to short, poorly setose or setae short, coxa 1 usually expanded apically and with acutely produced anteroventral corner, coxa 4 not lobate (type), or occasionally lobate. Gnathopods diverse and sexually dimorphic, gnathopod 1 small, wrist elongate and poorly lobed, hand ovate or rectangular, small, palm oblique or transverse; gnathopod 2 enlarged, wrist short, weakly to strongly lobed, hand elongate, in female often small, palm oblique or transverse, in female palm weaker than in male (less sculptured or shorter), palm in male usually sculptured. Male gnathopod 2 rarely neotenous, small and like that of female or juvenile.

Article 2 of pereopods 5-7 poorly or weakly expanded, not lobate or strongly lobate; dactyls occasionally with supernumerary inner setules or outer teeth.

Rami of uropods 1-2 extending subequally, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 extended or not, long (type) or short, magniramous, aequiramous, article 2 on outer ramus, if present, vestigial. Telson of ordinary length, deeply cleft, often gaping, lobes tapering, often notched, apically spinose, occasionally also medially, and dorsally or laterally.

Coxal gills 2-6, ovate. Oostegites slender.

Variants.--Palm of male gnathopod 2 occupying full posterior margin of hand, dactyl overreaching palm onto lobe of article 5 (knudseni); article 3 of antenna 1 peduncle usually shorter than in holotype; gnathopods in male reduced, more and more like female (othonis, diffidentia); outer ramus of uropod 3 with visible article 2 (diffidentia).

Relationship.--Like Elasmopus but article 3 of mandibular palp not falciform. Like Ceradocus but inner plate of maxilla 2 lacking facial row of setae; maxillae generally poorly setose medially. Species of Maera probably polyphyletic, sources from Ceradocus, Elasmopus, Mallacoota, etc.

Species.--Chevreux and Fage, 1925; Karaman and Ruffo, 1971; Reid, 1951;

approximans Haswell, 1879a (dubious) [781];

ascensionis K.H. Barnard, 1932 (Reid, 1951) [433 + ?743];

aspera (Dana, 1852) (dubious) [641];

boeckii (Haswell, 1879a) (K.H. Barnard, 1916) [781 + ?743];

bruzelii Stebbing, 1888 (Griffiths, 1975) [743];

carnleyi (Stephensen, 1927) [843];

caroliniana Bynum and Fox, 1977 [365];

chinarra J.L. Barnard, 1979 [540];

danae (Stimpson, 1853) (= fusca Bate, 1864) (= dubia Calman, 1898) (Shoemaker, 1955) [215];

?diffidentia (J.L. Barnard, 1959b) [377];

diversimanus Miers, 1884 [dubious] [693];

emarginata Griffiths, 1975 [743];

eugeniae Schellenberg, 1931a [864];

furcicornis (Dana, 1852, 1853) [641];

grossimana (Montagu, 1808) (Karaman and Ruffo, 1971) [352];

hamigera Haswell, 1879a (K.H. Barnard, 1916) [421];

hirondellei Chevreux, 1900 (= edwardsi Chevreux, 1919-20) [352];

inaequipes (Costa, 1851a) [340];

incerta Chilton, 1883c (J.L. Barnard, 1972b) [775];

indica (Dana, 1853) (Pirlot, 1936) [647];

kaiulani J.L. Barnard, 1970 [381];

komma Griffiths, 1975 [743];

- knudseni Reid, 1951 [352];
- kurgensis (Gerstfeldt, 1858) [dubious] [?298];
- lobata Griffiths, 1976 [743];
- loveni (Bruzelius, 1859) (Sars, 1895b) (Gurjanova, 1951) [200];
- mannarensis Sivaprakasam, 1970b [665];
- massavensis Kossmann, 1880 [dubious] [677];
- mastersi (Haswell, 1879b) (J.L. Barnard, 1972a, 1972b) [600];
- octodens Sivaprakasam, 1970a [665];
- othonides Walker, 1904 (Pirlot, 1936) (Nayar, 1959) [670];
- othonis (Milne Edwards, 1830) (Sars, 1895b) [240];
- othonopsis Schellenberg, 1938a (J.L. Barnard, 1965) [580];
- pachytelson Karaman and Ruffo, 1971 [343];
- pacifica Schellenberg, 1938a (J.L. Barnard, 1970) (Ledoyer, 1972)  
(Griffiths, 1976) (?Ortiz, 1974 = 483) [600];
- pfefferi K.H. Barnard, 1932 [836];
- prionochira Bruggen, 1907 (Gurjanova, 1951) [201];
- pubescens (Dana, 1852) [dubious] [578];
- quadrimana (Dana, 1852) (same references as pacifica) [600];
- rathbunae Pearse, 1908 (Kunkel, 1910) [367 + 478];
- reishi J.L. Barnard, 1979 [369];
- schellenbergi Ruffo, 1938b, 1969 [677];
- schiecke Karaman and Ruffo, 1971 [348];
- schmidti Stephensen, 1915 (Karaman and Ruffo, 1971) [340];
- serrata Schellenberg, 1938a (J.L. Barnard, 1970) (Ledoyer, 1972)  
(?Ortiz, 1974 = 483) [600];
- serratipalma Nagata, 1965c [395];
- simile Stout, 1913 (J.L. Barnard, 1959e, 1969a) [370];

simplex Reid, 1951 [444];

sodalis Karaman and Ruffo, 1971 [345];

tenella (Dana, 1852) (Nayar, 1967) [576];

tenera Sars, 1885 (Gurjanova, 1951) [218];

tepuni J.L. Barnard, 1972b [772];

thrixi Griffiths, 1975 [743];

tinkerensis Kunkel, 1910 [367];

tulearensis Ledoyer, 1972 [698];

vagans K.H. Barnard, 1940 (= levis K.H. Barnard, 1916, homonym)  
(Griffiths, 1975) [743];

vigota J.L. Barnard, 1969a [372];

viridis Haswell, 1879a (J.L. Barnard, 1972a) [780];

williamsi Bynum and Fox, 1977 [365];

cosmopolitan marine, littoral to sublittoral, sparse polewards, 59.

#### Lupimaera Barnard and Karaman

Lupimaera Barnard and Karaman, 1982: 174 (Maera lupana J.L. Barnard, 1969a, original designation).

Body slender, urosomites free, naked. Rostrum obolescent, lateral cephalic lobes mammilliform. Antennae medium to short, antenna 1 scarcely longer than 2, ratio of peduncular articles = 16:8:3, primary flagellum not longer than peduncular article 1, with 5 articles, accessory flagellum 3-articulate, more than half as long as primary flagellum. Antenna 2 also short, flagellum 4-articulate, not longer than article 5 of peduncle.

Ratio of mandibular palp articles = 2:7:5, article 3 linear, setae = DE. Inner lobes of labium present. Maxillae not setose medially, inner plate of maxilla 1 rectilinear, with 3 apical setae, outer plate with 9 spines, palps symmetric. Inner plate of maxilla 2 with 2 medial and one facial setae. Outer plate of maxilliped medially spinose, palp article 3 unlobed, dactyl shorter than 3, very short, unguiform, with nail.

Coxae of ordinary dimensions, poorly setose, coxa 1 weakly expanded and lobed anteroventrally, coxa 4 not lobate, coxa 5 as long as 4. Gnathopods diverse, not sexually dimorphic, gnathopod 1 small, wrist elongate, unlobed, hand subrectangular, palm short, slightly oblique; gnathopod 2 enlarged, wrist short, lobed, hand large, subrectangular, palm oblique, short, sculptured.

Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 weakly expanded, weakly lobate, posterior margins poorly setose, weakly convex; article 2 of pereopod 5 not longer than coxa 5 (distinction from Maera); pereopods short.

Outer rami of uropods 1-2 slightly shortened, all rami marginally spinose densely, spines small, peduncle of uropod 1 with 1-2 basofacial spines. Uropod 3 not extended, very short, magniramous, almost aequiramous, rami short, scarcely longer than peduncle, spinose, spines short (distinction from Maera). Telson short, almost fully cleft, lobes tapering, apices weakly spinose, notched.

Coxal gills [?2-6, ovate]. Oostegites [?narrow].

Relationship.--Differing from Maera, Paraweckelia, and Meximaera in the small article 2 of pereopods 5-7, article 2 of pereopod 5 not being longer than coxa 5; rami of uropods 1-3 with spines all shortened; article 2 of antenna 1 only half as long as article 1. More than 55 species of Maera do not conform to this group of distinguishing characters noted for Lupimaera. Distinguished from Ceradocus, which it closely resembles, in the poorly setose maxillae, short uropod 3 and short article 2 of antenna 1; from Ceradomoera in the the symmetrical gnthopod 2 and smooth pleon; from Maeropsis in the poorly setose maxilla 2; from Ifalukia in the normally long article 2 of mandibular palp; from Paraceradocus in the poorly setose maxilla 2 and linear mandibular palp; from Anelasmopus by the poorly setose maxillae; and from Ceradocoides in the deeply cleft telson and poorly setose maxillae.

Species.--lupana (J.L. Barnard, 1969a) [370];

California, intertidal, 1.

#### Elasmopus Costa

Figures 4-6, 18, 19, 41

Elasmopus Costa, 1853: 170, 175 (Elasmopus rapax Costa, 1853, monotypy).--Stebbing, 1906: 441.

Neogammaropsis Stout, 1913: 645 (Neogammaropsis antennatus Stout, 1913, monotypy).

Urosomites smooth or rarely with dorsal tooth. Lateral cephalic lobes rounded, sinus often as deep notch.

Antennae moderate to elongate, antenna 1 longer than 2, ratio of peduncular articles = 12:11:7, ratio of flagella = 25:5, accessory flagellum 1+ articulate. Antenna 2 small, slender.

Ratio of mandibular palp articles = 6:11:15, article 3 strongly falciform, setae = DE. Inner lobes of labium present. Maxillae not or weakly setose medially, inner plate of maxilla 1 ovate, with few apical setae, outer plate with 7 spines, palps symmetric. Inner plate of maxilla 2 without facial setae, medial margin with few setae apically. Maxilliped palp article 3 usually with distal tubercle or weak process bearing shagreen.

Coxae ordinary, moderately setose, coxa 1 rectangular or weakly expanded, coxa 4 lobate. Gnathopods diverse, gnathopod 1 small, wrist of medium length, weakly lobate, hand slightly longer than wrist, rectangular, palm slightly oblique, gnathopod 2 enlarged in both sexes, wrist in female of medium length, weakly lobate, hand elongate, rectangular, palm oblique, in male wrist short, strongly lobate, hand much enlarged, palm very oblique, often plain but usually sculptured with specific tooth formulas, dactyl elongate or short, gently or deeply curved, occasionally riding onto medial face of hand; other variables present.

Article 2 of pereopods 5-7 weakly expanded, scarcely to slightly lobate posteroventrally, naked, setulate or strongly setose posteriorly; pereopods 5-7 generally short and stout.

Rami of uropods 1-2 extending equally or subequally, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 scarcely extended, magni or variramous, occasionally almost parviramous, rami or at least outer ramus broad and short, outer ramus always strongly spinose, article 2 if present cryptically vestigial. Telson short to ordinary, deeply cleft, apically spinose, each lobe generally with naked apicomedial protrusion.

Gills 2-6, broad. Oostegites slender.

Relationship.--Differing from Maera in the falcate article 3 of the mandibular palp.

Variations.--Urosome with tooth (neglectus, japonicus); basis of pereopods 5-7 unlobed (spinidactylus).

Species.--affinis Della Valle, 1893 (= congoensis Shoemaker, 1920b) (Monod, 1931a) [352];

antennatus (Stout, 1913) (J.L. Barnard, 1962a) [370];

atolgidus J.L. Barnard, 1965 [591];

bampo J.L. Barnard, 1979 [370];

barbatus Schellenberg, 1925a, 1939b [448];

besnardi Oliveira, 1951 (? = brasiliensis) [462];

bollonsi Chilton, 1915 (J.L. Barnard, 1974) [770];

brasiliensis (Dana, 1853) (J.L. Barnard, 1965) [TL=751];

buchneri Spandl, 1924 (Ruffo, 1969) [677];

calliactis Edmondson, 1951 (J.L. Barnard, 1970) [381];

caprai Maccagno, 1936 [677];

chevreuxi Cecchini, 1928a, 1928c [348];



- crassimana (Miers, 1884) [dubious] (Stebbing, 1910) [781];  
delaplata Stebbing, 1888 [751];  
dentiferus Schellenberg, 1938 [576, 578];  
dentipalmus Walker, 1916 [761];  
diplonyx Schellenberg, 1938 (?J.L. Barnard, 1970) [551];  
dubius Walker, 1904 (Nayar, 1967) [665];  
ecuadorensis Schellenberg, 1936b (J.L. Barnard, 1979) [546];  
erythraeus (Kossmann, 1880) (Sivaprakasam, 1970a) [685];  
excavatus Schellenberg, 1938a (J.L. Barnard, 1965) [580];  
fusimanus Oliveira, 1951 [751];  
gracilis Schellenberg, 1938a (Ruffo, 1969) [600];  
hawaiensis Schellenberg, 1938a (J.L. Barnard, 1970) [381];  
holgurus J.L. Barnard, 1962b, 1969a [373];  
hoohero J.L. Barnard, 1970 (Ledoyer, 1972) [381];  
japonicus Stephensen, 1932 (Sivaprakasam, 1970b) [600];  
levis (S.I. Smith, 1873) (Bousfield, 1973) [364];  
magnispinatus Kunkel, 1910 [367];  
mayo J.L. Barnard, 1979 [540];  
menurte J.L. Barnard, 1974 [788];  
miersi (Wrzesniowsky, 1879) [dubious] [548];  
minimus Chevreux, 1908c (Pirlot, 1936) [555];  
molokai J.L. Barnard, 1970 [381];  
mutatus J.L. Barnard, 1962a, 1979 [373];  
neglectus Chilton, 1915 (J.L. Barnard, 1972b) [775];  
ocoroni J.L. Barnard, 1979 [546];  
pectenicrus (Bate, 1862) (= serrula Walker, 1904) (J.L. Barnard, 1970) [421];

- perditus Reid, 1951 (A. Mateus & E. Mateus, 1966) [350];
- peruvianus (Dana, 1852, 1853) [dubious] [548];
- piikoi J.L. Barnard, 1970 [381];
- pocillimanus (Bate, 1862) (= brevicaudata Heller, 1867) (J.L. Barnard, 1970) [421];
- podotrichius Ruffo, 1969 [677];
- pseudaffinis Schellenberg, 1938a (Ledoyer, 1972) [600];
- rapax Costa, 1853 (Chevreux and Fage, 1925, any other possibly erroneous) [TL = 340];
- serricatus J.L. Barnard, 1969b, 1979 [535];
- smirnovi Bulycheva, 1952 (Tzvetkova, 1967) [391];
- spinibasus Sivaprakasam, 1970a [665];
- spinidactylus Chevreux, 1907b, 1908c (J.L. Barnard, 1970) [421];
- spinimanus Walker, 1904 (Nayar, 1967) [600];
- steinitzii Ruffo, 1959a, 1969 [677];
- temori J.L. Barnard, 1979 [546];
- tiburoni J.L. Barnard, 1979 [377];
- tubar J.L. Barnard, 1979 [369];
- vachoni A. Mateus and E. Mateus, 1966 (Afonso, 1976) [446];
- wahine J.L. Barnard, 1972b [775];
- yunde J.L. Barnard, 1974 [792];
- zoanthidea J.L. Barnard, 1979 [546];
- cosmopolitan, marine, littoral to sublittoral, sparse polewards, 58.

Pareiasmopus Stebbing

Figure 10

Pareiasmopus Stebbing, 1888: 1029 (Gammarus suluensis Dana, 1852, monotypy); 1906: 417.--J.L. Barnard, 1972a: 253.

Urosomites lacking spines but urosomite 1 with pair of longitudinal dorsal carinae. Rostrum small or absent, lateral cephalic lobes softly quadrate, sinus often forming notch.

Antennae elongate, antenna 1 much larger than 2, ratio of peduncular articles 27:29:9, primary flagellum as long as peduncle, accessory flagellum 2+ articulate. Antenna 2 slender.

Ratio of mandibular palp articles = 10:8:10 or 9:3:6 or other combinations, with article 2 always shorter than 1, latter often elongate, article 3 linear, setae = E. Inner lobes of labium present. Maxillae poorly setose to naked medially, inner plate of maxilla 1 slender, apically and subapically setose, outer plate with 7-9 spines, palps [?symmetric]. Inner plate of maxilla 2 lacking facial setae. Maxilliped palp article 3 weakly lobate, dactyl shorter than 3, unguiform, with nail.

Coxae medium to long, poorly setose, coxa 1 expanded below, coxa 4 strongly lobate posteroventrally, coxa 5 shorter than 4. Gnathopods diverse, gnathopod 1 small, wrist elongate, weakly lobate, hand about as long as wrist or slightly shorter, palm oblique, short, female gnathopod 2 scarcely enlarged, wrist elongate, not lobate, hand longer than wrist, very thin, rectangular, palm oblique, short, male gnathopod 2 greatly enlarged, wrist short, lobate, hand large, ovate, palm oblique, weakly sculptured.

Article 2 of pereopods 5-7 expanded or weakly so, poorly setose, usually lobate, this posteroventral lobe often sharp, posterior margin serrate or deeply toothed, sinuous or convex.

Epimeron 3 with multiple ventral serrations on teeth near posterior end. Outer rami of uropods 1-2 slightly shortened, all rami marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 not extended, short, magniramous, almost aequiramous, rami longer than peduncle, 1-articulate or outer ramus with tiny article 2. Telson of ordinary length, deeply to fully cleft, lobes weakly tapering, strongly spinose, usually notched apically.

Coxal gills [?2-6]. Oostegites [?slender].

Relationship.--Like Maera but urosomite 1 with pair of dorsal carinae and article 2 of mandibular palp much shorter than article 1. Like Mallacoota but mandibular palp always 3-articulate and article 3 always shorter than 1; and epimeron 3 with posteroventral serrations.

Species.--See J.L. Barnard, 1972a, for allocations;

albidus (Dana, 1852) [550];

echo J.L. Barnard, 1972a [788];

setiger Chevreux, 1901b [600];

suensis (Haswell, 1879a) [635];

suluensis (Dana, 1852) [635];

ya J.L. Barnard, 1972a [788];

tropical IndoPacific, littoral to sublittoral, 6.

Mallacoota J.L. Barnard

## Figure 44

Mallacoota J.L. Barnard, 1972a: 243 (Megamoera diemensis Haswell, 1880a, original designation).

Urosomites lacking spines but urosomite 1 with pair of longitudinal dorsal carinae. Rostrum small or absent, lateral cephalic lobes softly quadrate, sinus forming notch.

Antennae elongate, antenna 1 much larger than 2, ratio of peduncular articles = 24:23:7, primary flagellum longer than peduncle, accessory flagellum 2+ articulate. Antenna 2 slender.

Ratio of mandibular palp articles = 7:8:11, 7:8:8 or 0:0:0, article 3 linear or absent, setae = (D)E, article 2 present or absent. Maxillae not medially setose, inner plate of maxilla 1 ovate, apically setose, outer plate with [?9-11 spines, palps symmetric]. Inner plate of maxilla 2 lacking facial setae. Maxilliped palp article 3 weakly lobate, dactyl shorter than 3, unguiform, with nail.

Coxae medium to long, poorly setose, coxa 1 expanded below, coxa 4 strongly lobate posteroventrally, coxa 5 shorter than 4. Gnathopods diverse, gnathopod 1 small, wrist elongate, weakly lobate, hand about as long as wrist or shorter, palm oblique, short; female gnathopod 2 scarcely enlarged, wrist elongate, not lobate, hand longer than wrist, very thin, rectangular, palm oblique, short; male gnathopod 2 greatly enlarged, wrist short, lobate, hand large, ovate, palm oblique, weakly sculptured, often strongly setose.

Article 2 of pereopods 5-7 expanded or weakly so, poorly setose, lobate, this posteroventral lobe often somewhat attenuate (never sharp), posterior margins serrate, often thickly crenellated, sinuous or convex; remainder of appendage thick.

Epimeron 3 lacking serrations. Outer rami of uropods 1-2 slightly shortened or rami extending equally, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 scarcely extended, magniramous, almost aequiramous, rami longer than peduncle, 1-articulate or article 2 vestigial. Telson of ordinary length, or short, deeply to fully cleft, lobes weakly tapering, strongly spinose.

Coxal gills [?2-6]. Oostegites [?slender].

Variants.--Mandibular palp variable, absent to 3-articulate, but final article always linear and article 1 never longer than 2.

Relationship.--Differing from Maera and Ifalukia in the bicarinate urosomite 1; from Elasmopus in the non-falciform mandibular palp; from Parelasmpus in the long or absent article 2 of the mandibular palp and the absence of multiple posteroventral teeth on epimeron 3.

Species.--carausui Ortiz, 1976a, 1976b [483];

carteta J.L. Barnard, 1972a [780];

diemenensis (Haswell, 1879b) (J.L. Barnard, 1972a) [782];

insignis (Chevreux, 1901b) (Ledoyer, 1972) [600];

latibrachium (Walker, 1905) (Ledoyer, 1967a, 1967b)  
(Sivaprakasam, 1970) [690];

latibrachioides (Sivaprakasam, 1970a) [665];

marilla J.L. Barnard, 1972a [780];

odontoplax (Pirlot, 1936) [646];

?petriei (Thomson, 1882) (Chilton, 1883) [775];

sokotrae (Walker and Scott, 1903) (Sivaprakasam, 1968) [690];

subcarinata (Haswell, 1879a) (Stebbing, 1888) (J.L. Barnard, 1972a, 1972b)  
[780];

circumtropical, littoral to sublittoral (but not yet western Africa or east Pacific), ll.

Ifalukia J.L. Barnard

Ifalukia J.L. Barnard, 1972a: 243 (Parelasomopus resacus  
J.L. Barnard, 1965, original designation).

Urosomites naked. Rostrum absent, lateral cephalic lobes moderate, rounded, sinus forming notch.

Antennae elongate, antenna 1 much larger than 2, ratio of peduncular articles = 26:26:9, of primary flagellum = 86, accessory flagellum 2-articulate. Antenna 2 slender.

Mandibular incisor poorly toothed, mandibular molar small but triturative, ratio of palp articles = 12:8:8, article 3 linear, setae = E, palp feeble. Inner lobes of labium [?present]. Maxillae poorly setose or naked medially, inner plate of maxilla 1 [?slender, apically setose, outer plate with 9 spines, palps symmetric]. Inner plate of maxilla 2 [?lacking facial and medial setae]. Outer plate of maxilliped [?medially spinose, palp article 3 weakly lobate, dactyl shorter than 3, unguiform, with nail].

Coxae long, poorly setose, coxa 1 expanded below, coxa 4 strongly lobate posteroventrally, coxa 5 shorter than 4. Gnathopods diverse, gnathopod 1 small, wrist elongate, unlobate, hand slightly shorter than wrist, palm oblique, short, female gnathopod 2 scarcely enlarged, wrist elongate, weakly lobate, hand about as long as wrist, thin, rectangular, palm oblique, scarcely excavate, male gnathopod 2 greatly enlarged, wrist short, lobate, hand large, ovate, palm oblique, weakly sculptured.

Article 2 of pereopods 5-7 expanded, lobate, poorly setose, posteriorly serrate; pereopods 5-7 otherwise short and stout.

Outer rami of uropods 1-2 slightly shortened, all rami marginally spinose, [?peduncle of uropod 1 with basofacial spine]. Uropod 3 not extended, short, magniramous, almost aequiramous, rami scarcely longer than peduncle, 1-articulate. Telson short, cleft halfway, lobes weakly tapering, weakly armed apically.

Coxal gills [?2-6]. Oostegites [?slender].

Relationship.--Like Pareiasmopus but dorsal carinae of urosome and serrations on epimeron 3 absent.

Species.--resacus (J.L. Barnard, 1965) [582];

Eniwetok, Marshall Islands, sublittoral, 1.

Beudettia J.L. Barnard

Figures 4, 5, 18, 20, 44

Beudettia J.L. Barnard, 1965: 514 (Beudettia palmeri J.L. Barnard, 1965, original designation).

Urosomites naked. Rostrum absent, lateral cephalic lobes moderate, softly quadrate, sinus forming notch.

Antennae of medium extent, antenna 1 much larger than 2, ratio of peduncular articles = 24:20:6, primary flagellum [probably about as long as peduncle], accessory flagellum 2-articulate. Antenna 2 small, slender.

Labrum ventrally truncate. Mandibular incisor poorly toothed, molar scarcely triturative but large, palp absent. Inner lobes of labium present. Maxillae not medially setose, inner plate of maxilla 1 slender, with several apical or subapical setae, outer plate with [?] spines, palps [?symmetrical]. Plates of maxilla 2 slender, without facial and medial setae. Outer plate of maxilliped poorly spinose, mostly setose medially, palp article 3 weakly lobate.

Coxae of medium extension, poorly setose, coxa 1 scarcely expanded apically, coxa 4 scarcely concave posteriorly, coxa 5 as long as 4. Gnathopods diverse, gnathopod 1 small, wrist of medium length, weakly lobate, hand slightly longer than wrist, rectangular, palm oblique, gnathopod 2 enlarged in female, wrist of medium length, lobate, hand ovate, palm very oblique, of medium length, member of male greatly enlarged, wrist very short, and strongly lobate, hand very large, ovate, palm oblique, long, weakly sculptured, strongly setose.

Article 2 of pereopods 5-7 expanded, lobate, poorly setose, posteriorly serrate; pereopods 5-7 otherwise short and stout.

Rami of uropods 1-2 extending equally, marginally spinose, peduncle of uropod 1 [?with basofacial spine]. Uropod 3 not extended, short, parviramous, outer ramus shorter than peduncle, 1-articulate, inner ramus thin, scale-like, naked. Telson short, broad, almost entire, apex weakly excavate, each lateral corner with thick spine.

Coxal gills [?2-6]. Oostegites [?slender].

Relationship.--Like Elasmopus and Ifalukia but mandibular palp absent, telson entire, uropod 3 reduced and essentially parviramous. Like Mallacoota and Pareiasmopus but lacking dorsal carinae of urosome. Differing from Pareiasmopus in absence of serrations on epimeron 3. Apparent derivative of Ifalukia.

Species.--palmeri J.L. Barnard, 1965 [582];

Eniwetok, Marshall Islands, sublittoral, 1.

#### Parapherusids

Inner lobes of lower lip full and fleshy. Maxillae fully setose medially. Gnathopod 1 of Ceradocid form, gnathopod 2 of Melitid form. Article 2 of pereopod 7 scarcely expanded, unlobate. Uropod 3 miniaturized, aequiramous, both rami similar in size and armaments but much shorter than peduncle, outer ramus with hasp-spine apically. Telson elongate, entire. Uropod 1 with interramal tooth.

Differing from all family groups in this vicinity by the elongate and uncleft telson, the very short rami on uropod 3, and the interramal tooth on uropod 1. Possibly derivative from Ceradocopsid ancestors but modifications of uropod 3 obscure the relationships. Retention of fully Melitid lower lip suggests affinities with that family are closer than to Ceradocopsids.

#### Parapherusa Stebbing

Figures 18, 20, 23, 45

Harmomia [lapsus for Harmonia] Haswell, 1879a: 330 [name unavailable as misspelling, ICZN article 19] (Harmomia crassipes Haswell, 1879a, monotypy).

Harmonia Haswell, 1879a: 349 [homonym, Coleoptera] (same type-species).

Chloris Haswell, 1880b: 33 [homonym, Aves] (no type-species).

Parapherusa Stebbing, 1906: 383 [new name for Harmonia].

Lateral cephalic lobes quadrate.

Antennae elongate, extending equally, ratio of peduncular articles on antenna 1 = 13:13:4, ratio of primary and accessory flagella = 55:17, accessory flagellum with 9+ articles.

Ratio of mandibular palp articles = 3:10:11, article 3 falcate, setae = ADE. Inner lobes of labium fleshy. Maxillae medially setose, inner plate of maxilla 1 pyriform, fully setose medially, outer plate with 11 spines, palps weakly asymmetrical. Inner plate of maxilla 2 with row of facial setae. Maxilliped dactyl nail short.

Coxae ordinary to short, poorly setose, coxa 1 quadrate or weakly protruding anteroventrally, coxa 4 short, rectangular, unexcavate. Gnathopod 1 of Melitid form, wrist of medium length, unlobate, hand scarcely longer than wrist, palm oblique; female gnathopod 2 enlarged, wrist weakly ovate, hand enlarged, ovate, palm oblique, unsculptured; male gnathopod 2 much enlarged, wrist relatively shortened and lobate, hand large, palm oblique, sculptured.

Article 2 narrow and almost unexpanded on pereopod 5, progressively slightly broadened to pereopod 7, posteroventral corner scarcely produced on pereopod 5, not on pereopod 7, posterior margins smooth or weakly serrate, remainder of pereopods thick but not flabellate.

All but inner ramus of uropod 2 with marginal spines, all spinose apically, outer rami slightly to moderately shortened, uropod 1 with large interramal tooth, no basofacial spine. Uropod 3 not extended, magniramous, thick but short, peduncle of ordinary size but rami reduced in length and shorter than peduncle, subovate, thickly spinose apically, spines greatly ornamented. Telson elongate, entire, weakly armed.

Coxal gills [2-6], sausage shaped. Oostegites of medium breadth.

Relationship.--Unusual Gammaridan because of greatly reduced rami on uropod 3, these rami resembling those of Ampithoidae, plus interramal tooth on uropod 1; elongate uncleft telson not necessarily creating affinity to Gammarellus; because of gnathopods ancestry probably similar to that of Elasmopus and Maera or especially of Paraceradocus; broadened oostegites somewhat unusual for marine Gammaridans.

Species.--crassipes (Haswell, 1879a) (Chilton, 1916b)  
(Stephensen, 1949) (J.L. Barnard, 1972b) [835];

circum-antiboreal, littoral-sublittoral, 1.

#### Ceradocopsids

Inner lobes of lower lip absent. Maxillae fully setose medially. Gnathopod 1 of Ceradocid form. Gnathopod 2 of Ceradocid form. Article 2 of pereopod 7 expanded and lobate but not of hatchet form. Uropod 3 essentially parviramous, miniaturized. Telson cleft.

Antenna 1 not geniculate.

Differing from Melitids in full loss of inner lobes on lower lip combined with miniaturization of uropod 3. See Gammarella, Beaudettia.

#### Ceradocopsis Schellenberg

Ceradocopsis Schellenberg, 1926: 364 (Ceradocopsis kergueleni  
Schellenberg, 1926, monotypy).

Maeracunha Stephensen, 1949: 22 (Maeracunha tristanensis  
Stephensen, 1949, monotypy).

Lateral cephalic lobes broadly rounded, sinus present but mandible inserted there, not antenna 2.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 14:12:6, flagellar ratio = 20:7, accessory flagellum with 4 articles. Antenna 2 slender.

Mandibular incisor almost smooth, molar small and poorly triturative, palp small, ratio of articles = 6:15:12, article 3 linear, setae = E and sparse. Inner lobes of labium absent. Maxillae medially setose, inner plate of maxilla 1 pyriform to triangular, with medial setae on apical half only, outer plate with 7-11 spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique row of facial setae. Outer plate with naked medial margin, palp article 3 weakly lobate, dactyl shorter than 3, unguiform, lacking or bearing nail.



Coxae of medium extension, poorly setose, coxa 1 expanded below, coxa 2 with anteroventral acuity, coxae 3-4 weakly shorter than 1-2, coxa 4 unexcavate posteriorly, coxa 5 as long as 4. Gnathopods diverse, gnathopod 1 small, of Melitid form, wrist scarcely elongate, scarcely lobate, hand longer, rectangular, palm weakly oblique, short, gnathopod 2 enlarged, wrist short to medium, lobate or weakly, hand elongate, large, rectangular, palm weakly oblique, weakly sculptured or strongly spinose.

Article 2 of pereopods 5-7 expanded, alike, lobate, poorly setose, serrate and straight posteriorly, appendages otherwise stout.

Rami of uropods 1-2 subequally extended, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 not extended, short, magniramous, dispariramous, outer ramus with small article 2. Telson of ordinary length, fully cleft, lobes tapering, moderately to strongly armed apically.

Coxal gills [2-6]. Oostegites [slender].

Variants.--Outer plate of maxilla 1 with 11 spines (peke) but other species poorly known; though uropod 3 stated as magniramous, actually appearing to be parviramous kind with reduced outer ramus now so small as to match inner.

Relationship.--Differing from Maera in the strongly setose maxilla 2 (facial) and the strong article 2 on the outer ramus of uropod 3. Differing from Ceradocus by uropod 3 in the same way stated for Maera. Differing from Paraceradocus in the short dispariramous uropod 3 and short, slender antenna 2. Differing from Ceradocoides in the short, dispariramous uropod 3 and fully cleft telson. Differing from Ceradocus in the short dispariramous uropod 3. Differing from various genera near Melita in the absence of inner lobes on the labium and the miniaturized uropod 3.

See Hurleya.

Species.--kergueleni Schellenberg, 1926 (Bellan-Santini and Ledoyer, 1974) [851];

peke J.L. Barnard, 1972a [774];

tristanensis (Stephensen, 1949) [731];

Antarctica and antiboreal, especially insular, 3.

#### Gammarellids

Inner lobes of lower lip absent. Maxillae strongly setose medially. Gnathopods 1-2 of Melitid form. Article 2 of pereopod 7 broadly expanded and hatchet-shaped. Uropod 3 parviramous, miniaturized. Telson cleft. Coxal gills not pediculate.

Eyes moderately developed to weak.

Antenna 1 geniculate between articles 1 and 2 or 2 and 3.

Differing from Ceradocopsids in the hatchet shape of article 2 on pereopod 7 and the geniculate antenna 1.

## Key to the Genera of Gammarellids

Maxilla 1 styliform . . . . . Tabatzius  
 Maxilla 1 not styliform . . . . . Gammarella

Gammarella Bate

Figures 9, 18, 44

- Pherusa Leach, 1814b: 432 (homonym, Polychaeta) (Pherusa fucicola Leach, 1814b, monotypy).  
Gammarella Bate, 1857b: 143 (Gammarella orchestiformis Bate, 1857b, monotypy, = Pherusa fucicola Leach).--Stebbing, 1906: 449.  
 --Karaman and Barnard, 1979: 155.  
Pherusana J.L. Barnard, 1964a: 62 (new name for Pherusa, same type-species).  
Nuuanu J.L. Barnard, 1970: 166 (Nuuanu amikai J.L. Barnard, 1970, original designation).  
Cottesloe J.L. Barnard, 1974: 27 (Cottesloe berringar J.L. Barnard, 1974, original designation).

Body laterally compressed, carinate or smooth, urosomites carinate or smooth, weakly spinose, urosomite 2 often with pair of dorsal spines. Lateral cephalic lobes acute at upper corner but actually forming large quadrate extension with narrow incision. Eyes often poorly developed.

Antennae elongate to medium, joints often geniculate, peduncular article 1 slender to stout, article 2 longer or shorter than article 1, article 3 shorter than 2, typical ratio of articles = 26:30:10; accessory flagellum 3+ articulate. Antenna 2 thin, shorter than antenna 1.

Mandibular palp article 1 weakly to strongly elongate, article 2 slender, elongate, article 3 falcate, shorter than or equal to article 2, typical ratio = 5:14:11, setae = DE. Inner lobes of labium absent or faintly marked. Maxillae strongly setose medially, inner plate of maxilla 1 leaf-like or subtriangular, heavily setose medially, outer plate with 9 spines, palps asymmetric, 2-articulate. Inner plate of maxilla 2 with oblique facial row of setae. Maxillipedal plates large, palp strong, dactyl with weak nail.

Anterior coxae of medium extension or long, coxa 1 scarcely expanded apically, coxa 4 lobed (coxa 3 rarely shortened), coxa 5 shorter than 4. Gnathopods subchelate, of female almost feeble, dissimilar, almost of equal size, wrists elongate, unlobed, hands narrow, rectangular or subrectangular, palm of gnathopod 1 usually transverse, of gnathopod 2 oblique and often obsolescent; male gnathopod 1 like female, male gnathopod 2 greatly enlarged, wrist very short, cryptic (type) or strongly lobed, hand elongate, ovate, palm oblique and long or merging with posterior margin, dactyl elongate, curved or short and stout.

Article 2 of pereopods 5-7 usually strongly serrate posteriorly, but not in type), otherwise dissimilar in shape, of pereopods 5-6 weakly expanded, tapering distally, moderately lobate posteroventrally, of pereopod 7 broadly expanded, shield-like, these pereopods usually short, pereopod 6 often slightly the longest.

Rami of uropods 1-2 extending equally, spinose marginally, uropod 1 with basofacial spine. Uropod 3 not extended, parviramous, inner ramus occasionally however with medial spine(s), outer ramus short (thus making inner ramus appear much larger than it is relative to genera such as Melita), spinose, article 2 small (possibly absent in male of type-species). Telson short, deeply cleft, lobes tapering sparsely, spinose apically.

Coxal gills 2-6, ovate, not pediculate. Oostegites slender.

Variants.--Articles of peduncle on antenna 1 often fixed in geniculate fashion in preserved material (especially species of Nuuanu); article 2 of antenna 1 varying between 0.55 and 1.25 times length of article 1; article 2 of pereopods 5-7 scarcely serrate (fucicola), or strongly serrate (all other species); urosomite 1 with dorsal tooth (fucicola, berringar) or not (most other species); body cuticle with straw-setules (fucicola, species of Nuuanu) or villose (berringar, merringannee).

Remarks.--When Nuuanu was originally described its affinity with Gammarella was overlooked because of the much more strongly developed expansions and serrations on pereopods 5-7 and the strange head shape not previously noted for Gammarella except by Sowinsky (1898) and overlooked by Barnard. Then Cottesloe was established with affinities to Nuuanu but strong differences in antenna 1 articular ratios, cuticle but especially robust body size and opaque cuticle (as seen in retrospect). Finally, Tabatzius McKinney and Barnard was described on the basis of parasitic maxillae and a specimen of Gammarella reappraised. We have now examined more specimens of G. fucicola and have concluded, despite a wide variety or paired extremes of urosomal teeth, cuticles, antennae, eyes, robust bodies, pereopodal shapes and serrations that no discontinuity exists among Gammarella, Nuuanu and Cottesloe. One species, Nuuanu mokari J.L. Barnard (1974) has a much shortened coxa 3 and could be elevated to generic status but we reserve this action until more exploration in the IndoPacific disproves any intergradation for this character. Meanwhile Tabatzius is retained but without strong conviction that it may also be found to have intergradational relatives to be discovered.

In McKinney and Barnard (1977, fig. 3) the middle gnathopod labeled "G2" should be labeled "G2c".

Species.--amikai (J.L. Barnard, 1970) [381];

berringar J.L. Barnard, 1974 [780];

fucicola (Leach, 1814b) (Sowinsky, 1898b) (Chevreux and Fage, 1925, but not well depicted) [352];

merringannee (J.L. Barnard, 1974) [782];

mokari (J.L. Barnard, 1974) [782];

numbadi (J.L. Barnard, 1974) [782];

eastern Atlantic, Mediterranean, IndoPacific, especially Australia and Hawaii (as yet explored), 6.

Tabatzius McKinney and Barnard

Tabatzius McKinney and Barnard, 1977: 163 (Tabatzius copillius McKinney and Barnard, 1977, original designation, = Nuuanu muelleri Ortiz, 1976b)

Like Gammarella but maxilla 1 styliform.

Species.--muelleri Ortiz, 1976b (= copillius McKinney and Barnard, 1977) [460];

Caribbean Sea, sublittoral, 1.

## Hadziids and Weckeliids

A Weckeliid lacks eyes and has aequiramous uropod 3. A Hadziid lacks ommatidial eyes though occasionally has ocular pigment but uropod 3 is dispariramous. Hadziids further differ from neighboring blind taxa in the elongate uropod 3, cleft telson and loss of inner lobes on the lower lip.

The two groups at times have been considered congruent but there remains the possibility that two or more ancestries occur, the Weckeliids from a Paraweckelia-Ceradocus ancestry and the Hadziids from a Melitid ancestry. As shown in the Key to the Groups of Hadzioids the groups are so contrived that elevation to family level is impossible.

## Key to Hadziids and Weckeliids

1. Outer ramus of uropod 3 with 2 articles . . . . . (Hadziids) 2  
Outer ramus of uropod 3 with 1 article. . . . . (Weckeliids) 10
2. Inner plate of maxilla 1 lacking medial setae, inner  
plate of maxilla 2 lacking oblique facial row of  
setae, medial margin setose or not . . . . . 3  
Inner plates of maxillae 1-2 strongly setose medially,  
maxilla 2 with oblique facial row of setae. . . . . 4
3. Uropod 3 magniramous. . . . . Paraweckelia (twice)  
Uropod 3 parviramous. . . . . Psammoniphargus
4. Coxa 4 with large posterodistal lobe. . . . . Saliweckelia  
Coxa 4 unlobed. . . . . 5
5. Wrists of gnathopods 1-2 unlobed, their setae marginal. . . . . 6  
Wrists of gnathopods 1-2 lobed, some of their lateral  
setae facial. . . . . 9
6. Telson shortened (uropod 3 variramous, gnathopods and  
telsonic spination like Metahadzia couplet below)  
. . . . . Metaniphargus  
Telson of ordinary length or elongate . . . . . 7
7. Gnathopod 1 lacking medial setal brush on article 5,  
palm of male gnathopod 2 densely spinose, palm  
of female gnathopod 2 distinct, weakly spinose,  
telson with medial spines, uropod 3 magniramous. . . . . Metahadzia

- Gnathopod 1 with medial setal brush, palm of male  
 gnathopod 2 poorly spinose, palm of female  
 gnathopod 2 indistinct, telson lacking medial  
 spines, uropod 3 parviramous . . . . . 8
8. Palm of male gnathopod 2 densely setose,  
 telson naked laterally . . . . . Dulzura  
 Palm of male gnathopod 2 not densely setose,  
 telson with lateral spines . . . . . Protohadzia
9. Telson with lateral spination, article 5  
 of gnathopod 1 elongate . . . . . Liagoceradocus  
 Telson naked laterally, article 5 of gnathopod 1  
 as long as 6 . . . . . Hadzia
10. [In contradistinction to couplet 1, uropod 3 actually with  
 vestigial article 2 on outer ramus], otherwise gnathopod 2  
 of both sexes of typical Ceradocid or Melitid form, hand  
 well inflated, palm long, minutely serrate, lacking Hadziid  
 setae, wrist very short, strongly lobed, maxilla 2 lacking  
 oblique facial row of setae, inner plate of  
 maxilla 1 with setae mostly apical . . . . . Paraweckelia (twice)  
 [Like couplet 1, uropod 3 lacking article 2 on  
 outer ramus], otherwise gnathopod 2 not typical of  
 Melitids or Ceradocids, hand either poorly inflated or  
 palm poorly defined in either sex or short, or not serrate, or  
 bearing Hadziid setae, wrist in either sex relatively elongate,  
 maxillae well setose medially, inner plate of  
 maxilla 2 with oblique row of facial setae. . . . . 11
11. Coxa 4 with posterodistal lobe. . . . . 12  
 Coxa 4 without posterodistal lobe . . . . . 13
12. Inner lobes of lower lip present, palp of  
 mandible 1-articulate. . . . . Weckelia  
 Inner lobes of lower lip absent, palp of  
 mandible 3-articulate. . . . . Alloweckelia
13. Coxa 1 not enlarged, right lacinia mobilis present. . . . . 14  
 Coxa 1 much larger than coxa 2, right lacinia mobilis absent . . . . 16
14. Wrist of gnathopods lobate. . . . . Mexiweckelia  
 Wrist of gnathopods not lobate. . . . . 15
15. Gnathopod 1 not merochelate . . . . . Paramexiweckelia  
 Gnathopod 1 merochelate . . . . . Mayaweckelia
16. Mouthparts projecting anteriorly as far as article 2  
 of antenna 1. . . . . 17  
 Mouthparts (except maxilliped) projecting less than  
 halfway along article 1 of antenna 1. . . . . 18
17. Dactyl of maxilliped short, article 3 stout, inner plates  
 of maxillae 1-2 elongate, outer plate of maxilla 1  
 with 7 spines, inner plate of maxilliped ordinary . . . Holsingerius  
 Dactyl of maxilliped elongate, article 3 thin, inner  
 plates of maxillae 1-2 ordinary, outer plate of maxilla 1  
 with 14 spines, inner plate of maxilliped  
 broadly expanded . . . . . Texiweckeliopsis
18. Hand of gnathopod 1 like that of gnathopod 2, longer  
 than wrist, gnathopods of sexes alike, article 2  
 of pereopods 3-4 strongly expanded . . . . . Allotexiweckelia

Hand of gnathopod 1 different from gnathopod 2,  
shorter than wrist, gnathopods of sexes strongly  
distinct, article 2 of pereopods 3-4 thin . . . . . Texiweckelia

Paraweckeliid (subgroup of Ceradocids)

Inner lobes of lower lip moderately developed, almost fleshy. Maxillae weakly setose medially. Gnathopod 1 of Melitid form. Gnathopod 2 in female of Melitid form, enlarged, wrist short, palm long and oblique, bearing tiny bifid spines. Uropod 3 magniramous, aequiramous, rami elongate, outer ramus 1-articulate. Telson cleft, midlateral setules at M. 67+. Coxal gills not pediculate, uniarticulate, gill 7 absent.

Accessory flagellum 4-articulate. Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 expanded, lobate, dactyls simple. Pleopods normal. Urosomite 2 with one dorsolateral spine on each side. Oostegites narrow.

Possibly belonging to group ancestral to Hadziids and Weckeliids, differing in the enlarged gnathopod 2 hand with very small bifid spines, thus gnathopod 2 not fully Hadziid, but transitional to Protohadzia. Inner lobes of lower lip somewhat more fleshy than in most Hadziids. Trend towards Hadziids marked by apicad shift in telsonic setules. Differing from most Melitids in the even distribution of weakly bifid spines on palm of gnathopod 2, but more significantly in the fully magniramous and aequiramous uropod 3.

Paraweckelia Shoemaker

Map 56

Paraweckelia Shoemaker, 1959: 279 (Paraweckelia silvai Shoemaker, 1959, original designation).

Urosomite 2 with 2 dorsal spines. Lateral cephalic lobes large, strongly protruding, mammillofalciform. Eyes absent.

Antennae 1-2 elongate, antenna 1 longer than 2, ratio of peduncular articles = 17:17:7, ventral margin of article 1 without spines. Accessory flagellum 4-articulate. Antenna 2 ordinary.

Labrum ["symmetrical"]. Ratio of mandibular palp articles = 13:20:12, article 2 setose, article 3 linear, with one D seta and 3 E setae, all distad. Labium with weak but fleshy inner lobes, not gaping. Maxillae 1-2 poorly setose medially; inner plate of maxilla 1 ovoid, with 7 setae but not fully setose medially, outer plate with 9 toothed spines, palps [?symmetric], with distal setae. Inner plate of maxilla 2 weakly setose medially but without oblique facial row of setae, plates moderately narrow. Maxilliped dactyl with weak nail.

Coxae long, coxa 1 not expanded, coxa 4 with strong posterodistal lobe, coxa 5 shorter than coxa 4. Gnathopods subchelate, gnathopod 1 small, Melitid, article 5 slightly elongate, unlobed, article 6 shorter, palm almost transverse; gnathopod 2 of female enlarged, article 5 short, strongly lobed, article 6 large, ovate, palm oblique but well defined, weakly setose and setulose, no Hadziid setae (like Melita).

Pereopod 5 much shorter than pereopods 6-7; article 2 of pereopods 5-7 expanded, weakly lobate, dactyl with one setule on inferior margin.

Outer rami of uropods 1-2 scarcely shortened, all rami marginally spinose, uropod 1 with basofacial spine. Uropod 3 elongate, peduncle slightly elongate, magniramous, almost aequiramous, outer ramus 2-articulate but article 2 vestigial. Telson of ordinary length, deeply cleft, lobes gaping, pointed, armed apically only with tiny spinule and setule, main setules at M. 65-80.

Coxal gills ovate, 2-6, unstalked. Oostegites narrow.

Relationship.--Close to Ceradocus but maxillae weakly setose.

Species.--silvai Shoemaker, 1959 [483]; Cuba, caves, 1.

#### Weckeliids

Inner lobes of lower lip formed by weak creases. Inner plates of maxillae fully setose or oblique row on maxilla 2 absent. Gnathopod 1 of Melitid form. Gnathopod 2 of female of Melitid form, very feeble, palm distinct, lined with small spines but lacking Hadziid setae except on posterior margin of hand. Uropod 3 aequiramous. Telson cleft.

Rami of uropods 1-2 marginally spinose except where stated.

Differing from Hadziids in the presence of a palm on female gnathopod 2 bearing small spines but lacking clumps of Hadziid setae and in the aequiramous uropod 3 lacking article 2 on the outer ramus.

See Metaceradocoides.

#### Weckelia Shoemaker

##### Map 56

Weckelia Shoemaker, 1942a: 11 (Gammarus caecus Weckel, 1907, original designation).

W. (Neoweckelia) Dancau, 1973c: 223 (Weckelia cubanica Dancau, 1973c, original designation, = Gammarus caecus Weckel).

Urosomite 2 with 2 dorsal spines. Rostrum obsolescent, lateral cephalic lobes subfalciform. Eyes absent.

Antennae elongate, antenna 1 longer than antenna 2, ratio of peduncular articles = 27:30:12, ventral margin of article 1 with only 1 apical spine. Accessory flagellum 3-4 articulate.

Mandibular palp reduced to small single article with 2 E-setae. Labium with weakly marked inner lobes, not gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 triangular, fully setose medially. Outer plate with 9 toothed spines, palps symmetric [interpretation] strongly setospinose. Plates of maxilla 2 moderately narrow, inner with oblique facial row of setae.

Coxae long, coxa 1 not expanded, coxa 4 with large posterodistal lobe, coxa 5 shorter than 4. Gnathopods subchelate, nearly feeble, gnathopod 1

small, article 5 slightly elongate, weakly lobed, some setae slightly facial, article 6 slightly shorter, palm weakly oblique. Gnathopod 2 of female with large article 5 of ordinary size, moderately lobed (Stock, 1977 notwithstanding), setae marginal, hand small but well formed, ovate, palm oblique, well defined, bearing spines and Hadziid setae; male gnathopods like female.

Article 2 of pereopods 5-7 expanded, poorly lobate, dactyls with one setule on inferior margin.

Pleopods [?ordinary]. Uropods 1-2 ordinary though outer rami slightly shortened, that of uropod 1 lacking marginal spines, uropod 1 with basofacial spine. Uropod 3 elongate, magniramous, almost aequiramous, apices truncate and spinose, outer ramus 1-articulate. Telson short, cleft to base, gaping, lobes pointed, with apicad spines slightly on medial sides of apices, main setules at M. 65-80.

Coxal gills 2-6, ovate, scarcely stalked. Oostegites slender.

Relationship.--Like Paraweckelia but mandibular palp vestigial and maxillae more strongly setose, female gnathopod 2 much smaller and bearing Hadziid setae. Differing from Alloweckelia in the vestigial mandibular palp.

Species.--41 caecus Weckel, 1907 (Shoemaker, 1942a) [483];

Cuba, caves, 1.

#### Alloweckelia Holsinger and Peck

Map 56

Alloweckelia Holsinger and Peck, 1968: 250 (Alloweckelia gurneei Holsinger and Peck, 1968 original designation).

Urosomites 1-2 each weakly spinulate dorsally. Rostrum absent, lateral cephalic lobes subrounded. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 23:19:12, ventral margin of article 1 with 3 weak spines. Accessory flagellum 2-articulate. Antenna 2 gland cone elongate.

Ratio of mandibular palp articles = 9:20:18, article 3 linear, with 2 weak D setae apicad and 3 E setae. Labium without inner lobes, weakly gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 rounded-triangular, almost fully setose medially, outer plate with 7 serrate spines (8 in figure), palps [?symmetric]. Plates of maxilla 2 narrow, inner with oblique facial row of setae.

Coxae long, anterior coxae tapering, coxa 4 with large posterodistal lobe, length of coxa 5 [unknown]. Gnathopods subchelate, scarcely dimorphic sexually, gnathopod 1 small, article 5 of ordinary length, unlobed, article 6 slightly longer than 5, palm short, almost transverse. Gnathopod 2 enlarged, article 5 of ordinary length, unlobed, setae marginal, palm oblique, densely furnished with weakly bifid spines, female gnathopod 2 with somewhat more linear hand than in male.

Pereopods 5-7 elongate, pereopod 6 longest, article 2 of pereopods 5-7 weakly expanded, weakly lobate, dactyls with one setule on inferior margin.



Uropods 1-2 ordinary, uncombed, outer rami not or scarcely shortened, uropod 1 with basofacial spine. Uropod 3 elongate, almost magniramous, outer ramus with article 2 fused to article 1 but junctional acclivities present, inner ramus then reaching about to base of fused article 2, both rami with thick spines, peduncle slightly elongate. Telson short, cleft about three fourths its length, lobes sharply notched apically, each with one apical spine, main setules at M. 70-80.

Coxal gills 2-6, suboval, biarticulate (stalks articulated). Oostegites narrow.

Relationship.--Differing from Paraweckelia in loss of inner lobes on the labium, strong maxillary setation, and stalked articulate gills. Differing from Saliweckelia in uniarticulate outer ramus of uropod 3.

Species.--51 guerneeii Holsinger and Peck, 1968 [489];

Puerto Rico, caves, 1.

Mexiweckelia Holsinger and Minckley

Figure 14, Map 56

Mexiweckelia Holsinger and Minckley, 1971: 426 (Mexiweckelia colei Holsinger and Minckley, 1971, original designation).

Urosomites 1-3 with 1-2 spines each side dorsally. Rostrum obsolescent, lateral cephalic lobes [unknown]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, peduncular articles = 20:11:8, ventral margin of article 1 lacking spines. Accessory flagellum vestigial or absent (smaller than in other Hadziids). Mandibular palp absent. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose, inner plate of maxilla 1 ovate to triangular, almost fully setose medially, outer plate with 7 serrate spines, palps weakly asymmetric. Plates of maxilla 2 narrow, inner plate with long oblique row of medial setae. Maxilliped dactyl as long as 3.

Coxae of medium size, coxa 4 unlobed, coxa 5 [?shorter than coxa 4]. Gnathopods subchelate, strongly dimorphic sexually, those of female almost feeble; article 5 broadly lobed on all gnathopods of both sexes and with facial (not marginal) setae; wrist of female gnathopod 1 elongate, hand slightly shorter than wrist, palm rounded-transverse, short; wrist of male gnathopod 1 short, hand more tumid than in female, palm slightly oblique; wrist of female gnathopod 2 slightly elongate, hand longer than wrist, slightly expanded, palm very oblique, with several simple spines and few Hadziid setae; male gnathopod 2 enlarged, wrist short, hand large, ovate, palm oblique, long, spinose, spines simple, Hadziid setae very few.

Pereopod 5 shorter than 6-7; article 2 of pereopods 5-7 slightly expanded, lobate or not, dactyls with one setule on inferior margin.

Uropods 1-2 with equally extending rami, or outer rami shortened, outer ramus of uropod 1 marginally naked, or all rami naked, peduncle with basofacial spine(s). Uropod 3 elongate, magniramous, almost aequiramous, outer ramus 1-articulate, inner ramus slightly longer than outer, each

ramus with long stout apical spine resembling article plus other apical spines. Telson slightly elongate, cleft about two-thirds, each lobe with about 3 large apical spines, main setules M. 60.

Coxal gills 2-6, at least some ovate, with long stalks, 2-articulate. Oostegites narrow.

Relationship.--Like Weckelia and Alloweckelia but coxa 4 unlobed; differing from Hadzia in the aequiramous uropod 3 lacking article 2 on outer ramus.

Species.--15 colei Holsinger and Minckley, 1971 [195];

16 mitchelli Holsinger, 1973 [195];

Mexico, Coahuila and Durango, springs, probably hypogean, 2.

### Paramexiweckelia Holsinger

Map 56

Paramexiweckelia Holsinger, 1981x:00 (Mexiweckelia particeps Holsinger, in Holsinger and Minckley, 1971, original designation).

Urosomites 1-3 with 3-2 spines each side dorsally. Rostrum absent, lateral cephalic lobes weakly protruding, subquadrate, weak anteroventral sinus present. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 25:12:9, ventral margin of article 1 lacking spines. Accessory flagellum 1-articulate.

Labrum [unknown]. Mandibular palp absent. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose, inner plate of maxilla 1 subovate, almost fully setose medially, outer plate with 9 serrate spines, palps asymmetric. Plates of maxilla 2 narrow, inner plate with oblique row of facial setae.

Coxae short, coxa 4 unlobed, coxa 5 [?as long as coxa 4]. Gnathopods subchelate, almost feeble, weakly dimorphic sexually; wrist of gnathopod 1 slightly elongate, unlobed, hand as long as wrist, thin, subrectangular, palm short, oblique; female gnathopod 2 with elongate unlobed wrist, hand as long as wrist, narrow, palm short, oblique, dactyl overlapping palm; male gnathopod 2 with hand slightly more elongate, slightly stouter, palm longer and more poorly defined but as long as dactyl, palms of all gnathopods with sparse, poorly bifid spines, second gnathopods with sparse Hadziid setae.

Pereopod 5 shorter than 6-7; article 2 of pereopods 5-7 poorly expanded, weakly lobate, dactyls with one setule on inferior margin.

Outer rami of uropods 1-2 slightly shortened, uropod 1 with 2 basofacial spines, peduncle of uropod 2 with medial comb. Uropod 3 elongate, magniramous, almost aequiramous, outer ramus 1-articulate, apex of each ramus truncate and strongly spinose, one middle spine scarcely enlarged. Telson elongate, almost fully cleft, each lobe with 3 apical spines and several lateral spines, main setules at M. 40.

Coxal gills 2-6, at least some ovate, with stalks, 2-articulate. Oostegites narrow [but full development unknown].

Relationship.--Differing from Alloweckelia in the unlobed coxa 4. Differing from Mexiweckelia in the absence of posterior lobes on gnathopodal wrists, the marginal setation of the wrists and the presence of lateral spines on the telson.

Species.--35 particeps Holsinger, 1971 (Holsinger and Langley, 1980) [195];

Mexico, Coahuila, hypogean, 1.

### Mayaweckelia Holsinger

Map 56

Mayaweckelia Holsinger, 1977c: 15 (Mayaweckelia yucatanensis Holsinger, 1977c, original designation).

Urosomites 1-3 each with 2-6 setules dorsally. Rostrum obsolescent, lateral cephalic lobes short, rounded, anteroventral sinus shallow. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 37:20:15, ventral margin of article 1 lacking spines. Accessory flagellum 3-articulate.

Mandibular palp absent. Labium with inner lobes small to vestigial but apparently present and slightly fleshy, not gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 elongate-triangular, with 4-6 medial setae but margin not fully occupied; outer plate with 9 serrate spines, palps [?asymmetric]. Plates of maxilla 2 narrow, inner pointed and with oblique facial row of setae. Outer plate of maxilliped medially setose (only), article 2 of palp not greatly elongate, dactyl almost as long as 3.

Coxae long to medium, coxa 1 not dilated, coxa 4 unlobed, coxa 5 [length unknown]. Gnathopods subchelate, almost feeble, gnathopod 1 small, merochelate (article 4 elongate and with ventral tooth projecting distad), article 5 also weakly elongate, weakly lobed, article 5 trapezoidal (expanding distad) or subrectangular, palm transverse to oblique; female gnathopod 2 like gnathopod 1 but not merochelate, article 4 short but article 5 with longer free posterior margin, palm well defined, with several Hadziid setae; male gnathopod 2 slightly to moderately enlarged, hand enlarged, ovate or elongate, rectangular, palm oblique, poorly to well spinose, with few Hadziid setae on palm, some spines on palms of all gnathopods bifid, most simple.

Pereopod 6 longest, article 2 of pereopods 5-7 expanded, lobate, dactyls with about 2 setules on inferior margin.

Uropod 1 lacking basofacial spine, rami equal or outer ramus shortened, outer ramus of uropod 2 shortened. Uropod 3 elongate, peduncle slightly elongate, magniramous, rami sublamelliform, scarcely dispariramous, outer ramus 1-articulate, setation sparse. Telson of ordinary length, cleft to base, spinose apically, medially, and laterally, main setules [unknown].

Coxal gills 2-6, ovate, stalked, jointed. Oostegites narrow.

Relationship.--Allied to Mexiweckelia and Paramexiweckelia but gnathopod 1 merochelate, inner plate of maxilliped with medial margin setose (not spinose).

Species.-- 25 cenoticola Holsinger, 1977c [198];

26 yucatanensis Holsinger, 1977c [198];

Mexico, Yucatan region, hypogean, 2.

### Texiweckelia Holsinger

Map 56

Texiweckelia Holsinger, 1980b: 7 (Mexiweckelia texensis Holsinger, 1973, original designation).

Body thin, urosomites 1-3 each with 2-6 dorsal spines. Rostrum small, lateral cephalic lobes broad, obsolescent but anteroventral sinus weak. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 15:9:6, ventral margin of article 1 lacking spines. Accessory flagellum vestigial (smaller than in other Hadziids) or absent.

Labrum apically incised but in grosser view subrounded. Mandibular right lacinia mobilis absent (unusual), palp absent. Labium without inner lobes, not gaping. Maxillae medially setose, inner plate of maxilla 1 falcato-triangular, fully setose medially, outer plate with 7 serrate spines, palps [?asymmetric]. Plates of maxilla 2 moderately narrow, inner plate with oblique row of medial setae. Outer plate of maxilliped medially spinose (but weakly); article 3 of palp thin, with lobe forming weak apical chela, dactyl very long, thin, with nail (maxilliped palp thus prehensile).

Coxae medium to short but coxa 1 larger than coxa 2 (unusual), coxa 4 unlobed, coxa 5 [?shorter than coxa 4]. Gnathopods subchelate, strongly dimorphic sexually, those of female feeble; article 5 broadly lobed on all gnathopods of both sexes and with facial setae; wrist of female gnathopod 1 elongate, hand thin, shorter than wrist, palm rounded-transverse, short; wrist of male gnathopod 1 slightly shorter, hand scarcely shorter than wrist, more tumid than in female, palm more oblique than in female; wrist of female gnathopod 2 elongate, anteriorly setose (unusual), hand thin, as long as wrist, palm rounded-oblique, very short, with 2 Hadziid setae; male gnathopod 2 scarcely enlarged but hand relatively slightly longer than in female and slightly longer than wrist, hand scarcely expanded, mostly linear, palm very oblique, of medium length, lined with weakly bifid spines, dactyl spinose.

Pereopod 7 especially elongate, article 2 of pereopods 5-7 weakly expanded, weakly lobate, elongate, dactyls with several setules on inferior margin.

Outer rami of uropods 1-2 slightly shortened, uropod 1 with several basofacial spines. Uropod 3 elongate, magniramous, almost aequiramous,

outer ramus 1-articulate, inner equal, each ramus with medium to small apical spine plus other apical spines. Telson short, cleft only halfway, cleft gaping, each lobe with 3 various spines-setae, main setules at M. 80. Coxal gills 2-6, ovate, stalked, biarticulate. Oostegites slender.

Relationship.--Differing from Mexiweckelia and its allies in the enlarged coxa 1 and absence of right lacinia mobilis.

Species.--45 insolita Holsinger, 1980b [185];

samacos Holsinger 1980b [185];

texensis Holsinger 1973 (Holsinger, and Langley, 1980) [185];

Texas, Hays County (including San Marcos Well), hypogean, 1.

#### Allotexiweckelia Holsinger

Map 56

Allotexiweckelia Holsinger, 1980b: 26 (Allotexiweckelia hirsuta Holsinger, 1980b, original designation).

Body slender, urosomites 1-3 with 2, 2 and 4 dorsal spines respectively. Lateral cephalic lobes mammilliform. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 25:12:8, ventral margin of article 1 lacking spines. Accessory flagellum vestigial or absent (smaller than in other Hadziids). Antenna 2 with relatively well spinose articles 4 and 5 (unusual).

Mandibular right lacinia mobilis absent (unusual), palp absent. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose, inner plate of maxilla 1 subtriangular, fully setose medially, outer plate with 7 poorly serrate spines, palps weakly asymmetric. Inner plate of maxilla 2 slightly broadened, with oblique facial row of setae. Maxilliped palp article 3 thin, with lobe forming weak apical chela, article 4 very long, thin, with nail (maxilliped palp thus prehensile).

Coxae of medium size, but coxa 1 larger than coxa 2, coxa 4 unlobed, coxa 5 [shorter than coxa 4]. Gnathopods subchelate, not sexually dimorphic, almost feeble; of both pairs of medium length, strongly lobate, with facial setation, hands longer than wrists on both pairs and palms identical, oblique, long, armed with weakly bifid spines, dactyls long, Hadziid setae poorly developed on gnathopod 1, present on gnathopod 2.

Article 2 of pereopods 3-4 strongly expanded and spinose. Pereopod 5 shorter than 6-7; article 2 of pereopods 5-7 expanded, lobate, dactyl short and with numerous setules on inferior margin, anterior margin of article 6 strongly spinose (spines fine), posterior margin of article 6 on pereopods 5-6 strongly setose.

Outer rami of uropods 1-2 slightly shortened, uropod 1 with several basofacial spines, comb of uropod 2 [unknown]. Uropod 3 elongate, magniramous, almost aequiramous, outer ramus 1-articulate, apices of rami scarcely truncate, weakly spinose. Telson scarcely elongate, cleft about

two thirds, each lobe with 2-3 apical spines, several medial, lateral and dorsal spines, main setules [unknown].

Coxal gills 2-6, at least some ovate, with long stalks, 2-articulate. Oostegites narrow.

Relationship.--Differing from Texiweckelia in the uniform gnathopods of the sexes, with palms of both pairs alike, oblique, long, densely spinose; and in the strongly expanded spinose article 2 of pereopods 3-4.

Species.--55 hirsuta Holsinger, 1980b [185];

Texas, hypogean, 1.

Texiweckeliopsis Karaman and Barnard

Map 56

Texiweckeliopsis Karaman and Barnard, 1982: 179-180 (Texiweckelia insolita Holsinger, 1980b, original designation).

Body slender, urosomites 1-3 each with 2, 4, and 2 dorsal spines respectively. Lateral cephalic lobes truncate, without sinus. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 23:8:6, ventral margin of article 1 lacking spines. Accessory flagellum vestigial or absent (smaller than in other Hadziids).

Mandibles and maxillae projecting forward as far as article 2 of antenna 1. Mandibular right lacinia mobilis absent, palp absent. Labium without inner lobes, not gaping. Mxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 14-15 serrate spines, palps [?asymmetric]. Plates of maxilla 2 slightly broadened, short, inner with oblique facial row of setae. Inner plate of maxilliped extremely broad, outer plate medially setose; article 3 of palp thin, with very small lobe forming weak apical chela, dactyl very long, thin, with nail (maxilliped palp thus weakly prehensile).

Coxae of medium size to short, but coxa 1 larger than coxa 2, coxa 4 unlobed, coxa 5 [?shorter than coxa 4]. Gnathopods subchelate, scarcely dimorphic sexually, feeble; gnathopods 1-2 almost alike, mittenform, wrists elongate, broadly lobate, setation facial, hands slightly shorter than wrists, narrow but not perfectly linear or rectangular, slightly expanded in middle and then tapering towards palm, palms weakly oblique, short, spines tiny or sparse, weakly bifid, Hadziid setae few, elongate only on gnathopod 2 and sparse on palm, male gnathopods slightly stouter than in female, especially on hands.

Pereopod 5 slightly shorter than 6-7, article 2 of pereopods 5-7 slightly expanded, weakly lobate, dactyls with several setules on inferior margin, article 6 weakly setose or spinose.

Rami of uropods 1-2 subequally extended, uropod 1 with 2 basofacial spines, comb of uropod 2 absent, outer ramus of uropod 2 dorsally naked. Uropod 3 elongate, magniramous, almost aequiramous, outer ramus 1-articulate, apices of rami weakly truncate, with several spines of which

one elongate. Telson of ordinary length, cleft about two thirds, each lobe with 2 apical spines, main setules M.90.

Coxal gills 2-6, ovate, with long stalks, 2-articulate. Oostegites narrow.

Relationship.--Differing from Texiweckelia in the strong forward projection of the mandibles and maxillae, and mittenform gnathopods. See Holsingerius.

Species.--61 insolita (Holsinger, 1980b) [185];

Texas, hypogean, 1.

Holsingerius Karaman and Barnard

Map 56

Holsingerius Karaman and Barnard, 1982: 180 (Texiweckelia samacos Holsinger, 1980b, original designation).

Body slender, urosomites 1-3 each with 2, 2 and 4 dorsal spines respectively. Rostrum obsolescent, lateral cephalic lobes sharply mammilliform. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 30:16:9, ventral margin of article 1 lacking spines. Accessory flagellum vestigial or absent (smaller than in other Hadziids).

Mandibles and maxillae projecting forward as far as article 2 of antenna 1. Mandibular right lacinia mobilis absent, palp absent. Labium without inner lobes, gaping. Maxillae medially setose, inner plate of maxilla 1 enlarged, triangular, fully setose medially, outer plate with 7 serrate spines, palps [?asymmetric]. Inner and outer plates of maxilla 2 greatly elongate, inner with oblique facial row of setae. Outer plate of maxilliped medially setose; article 3 of palp stout, apically expanded and weakly chelate, dactyl of ordinary length, thin, with nail (palp scarcely prehensile).

Coxae of medium size to short, but coxa 1 larger than coxa 2, coxa 4 unlobed, coxa 5 [?shorter than coxa 4]. Gnathopods subchelate, sexually dimorphic, those of female feeble; wrist of both pairs in both sexes of medium length, strongly lobate, with facial setation; hand of female gnathopod 1 shorter than wrist, rectangular, palm short, weakly oblique, minutely spinose, male hand enlarged, palm long, strongly oblique, well spinose; hand of female gnathopod 2 as long as wrist (thus elongate), thin, rectangular, palm short, weakly oblique, minutely spinose and with several Hadziid setae; anterior margin of hand lined with setae; hand of male gnathopod 2 enlarged, palm long, rounded-oblique, densely spinose (spines weakly bifid), with 2 Hadziid setae, dactyl very long.

Article 2 of pereopods 3-4 scarcely expanded, poorly spinose. Pereopod 5 shorter than 6-7; article 2 of pereopods 5-7 expanded, lobate, dactyls short, with several setules on inferior margin, article 6 weakly setose or spinose.

Rami of uropods 2-3 subequally extended, uropod 1 with several basofacial spines, comb of uropod 2 absent. Uropod 3 elongate, magniramous, almost aequiramous, outer ramus 1-articulate, apices of rami weakly truncate, with several spines, of which one elongate. Telson scarcely elongate, cleft almost three fourths, each lobe with 3 apical spines and occasional lateral spine, main setules M. 65.

Coxal gills 2-6, at least some ovate, with long stalks, 2-articulate. Oostegites narrow [but full adult unknown].

Relationship.--Differing from Texiweckeliopsis in the ordinary dactyl of the maxilliped, ordinary outer plates of maxillae and maxillipeds but the elongate inner plates of the maxillae.

Species.--65 samacos (Holsinger, 1980b) [185];

Texas, San Marcos Well, hypogean, 1.

#### Hadziids

Inner lobes of lower lip absent. Inner plates of maxillae fully setose medially. Gnathopod 1 of Melitid form. Gnathopod 2 of Hadziid form in female. Telson cleft. Uropod 3 dispariramous. Telson cleft.

Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 weakly expanded, lobate or not, dactyls simple. Pleopods normal. Urosomite 2 usually with apicolateral spine on each side, but variable. Brood plates narrow.

Accessory flagellum 1-4 articulate.

Differing from both Melitids and Paraweckelia in the special form of female gnathopod 2, with obsolescent palm and full development of stiff, apically curved setae in sparse groups. Unlike Melitids, the inner lobes on the lower lip of Hadziids are absent.

See Eoniphargus.

#### Saliweckelia Stock

##### Map 56

Saliweckelia Stock, 1977: 70 (Saliweckelia emarginata Stock, 1977, original designation).

Urosomites 1-2 each with 2 dorsal spines. Rostrum obsolescent, lateral cephalic lobes mammilliform. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 17:13:5, ventral margin of article 1 with one spine. Accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 11:36:36, article 2 setose, article 3 subfalciiform, with strongly marginal D setae and 3-4 E setae. Labium without inner lobes, ungaping. Maxillae 1-2 setose medially, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 spines, palps asymmetric. Plates of maxilla 2 narrow, inner with oblique facial row of setae.



Coxae of medium size, coxa 4 strongly lobed, coxa 5 [presumably shorter than coxa 4]. Gnathopods subchelate, gnathopod 2 closely similar in male and female, gnathopod 1 small, article 5 elongate, unlobed, with medial brush of setae, article 6 shorter, rectangular, palm short, transverse. Gnathopod 2 enlarged, article 5 slightly elongate, unlobed, setae marginal, palm extremely oblique, poorly or weakly defined, spinose in male (spines scarcely bifid), weakly setose in female, medial face of hand with strong to weak brush in both sexes.

Article 2 of pereopods 5-7 expanded, lobate, dactyls with setules on inferior margin.

Pleopods ordinary in female, rami with basal swellings in male. Uropods 1-2 with slightly shortened outer rami, uropod 1 with basofacial spine, outer ramus in male with fan-shaped spine not present in female. Uropod 3 elongate, magniramous, dispariramous, inner ramus as long as article 1 of outer ramus, article 2 of outer ramus about 25 percent as long as article 1. Telson somewhat shortened, almost fully cleft, spinose apically and weakly on medial margin, but not laterally, main setules at M. 65.

Coxal gills 2-6 ovate or trapezoidal, unstalked. Oostegites slender.

Relationship.--The basic Hadziid. Differing from Paraweckelia in loss of inner lobes on lower lip, strongly setose maxillae, dispariramous uropod 3. Differing from Dulzura in the strong lobe of coxa 4.

Species.--11 emarginata Stock, 1977 [462];

12 holsingeri Stock, 1977 [462];

Curacao and Bonaire, marine and salty anchialine, 2.

#### Metahadzia Stock

Map 55

Metahadzia Stock, 1977: 32 (Hadzia tavaresi A. Mateus and E. Mateus, 1972, original designation).

Urosomite 2 with 2 dorsal spines. Rostrum obsolescent, lateral cephalic lobes falciform. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 18:14:9, ventral margin of article 1 lacking spines. Accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 8:12:20, articles 1-2 without setae, article 3 scarcely subfalciform, with D and E setae (6-8 total) poorly distinguished, all apicad. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 triangular, fully setose medially, outer plate with 10 serrate spines, palps asymmetric (setose and spinose). Plates of maxilla 2 narrow, inner with oblique facial row of setae. Maxilliped dactyl with long nail.

Coxae of medium size, coxa 4 scarcely lobed (posterior margin weakly excavate), coxa 5 much shorter than coxa 4 [original body figures partially erroneous, note 8 segments in thorax]. Gnathopods subchelate, nearly feeble, gnathopod 1 small, article 5 of medium length, poorly lobed, article 6 subequal to article 5, palm short, transverse to weakly oblique. Male gnathopod 2 enlarged, article 5 of ordinary length, poorly lobed, setation barely submarginal, palm very oblique, armed with bifid spines and posterior Hadziid setae. Female gnathopod 2 slightly enlarged, palm excavate and defined, poorly spinose, with 2 long posterior Hadziid setae.

Article 2 of pereopods 5-7 expanded, only lobed on pereopod 7, dactyls with few setules on inferior margin.

Pleopods unmodified in male. Uropod 1 ordinary, with basofacial spine. Male uropod 2 with large distolateral tooth on peducle, absent in female; outer ramus slightly shortened and lacking dorsal spines (known for male, not described for female). Uropod 3 elongate, magniramous, dispariramous, inner ramus exceeding article 1 of outer ramus, article 2 of outer ramus about 20 percent as long as article 1.

Telson of ordinary length, cleft to base, spinose apically and medially but not laterally, main setules M. 50.

Coxal gills [?2-6], ovate, with distinct basal stalk but not articulate. Oostegites narrow.

Relationship.--Differing from Saliweckelia in loss of lobe on coxa 4; from both Saliweckelia and Hadzia in the short coxa 5, unlobed article 5 of gnathopod 2, sexually dimorphic uropod 2, clearly stalked gills, and somewhat shortened article 1 of mandibular palp. Scarcely differing from Metaniphargus except in slightly longer telson, sexually dimorphic uropod 2 ("elongate" article 3 of antenna 1 and magniramous uropod 3 also found in Metaniphargus).

Species.--4 acutus Andres, 1978 [442];

5 adriatica Pesce, 1979 [098];

6 ?minuta Ruffo, 1948b [098];

7 tavaresi A. Mateus and E. Mateus, 1972 [114];

Portugal to Greece, hypogean, 3 and ?1.

#### Protohadzia Zimmerman and Barnard

Map 56

Protohadzia Zimmerman and Barnard, 1977: 569 (Eriopisa schoenerae Fox, 1973, original designation).

Urosomites naked. Rostrum absent, lateral cephalic lobes obsolescent, rounded-quadrate. Eyes not ommatidial, formed of cuticular stain.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 19:18:6, ventral margin of article 1 lacking spines. Accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 11:22:28, article 2 with 2 setae, article 3 falciform, with many strongly marginal D and 3 E setae. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 10 serrate spines, palps asymmetric (setose and spinose). Plates of maxilla 2 narrow, inner with oblique facial row of setae.

Coxae short to moderately long, coxa 4 unlobed, coxa 5 as long as 4. Gnathopods subchelate but female gnathopod 2 almost simple, nearly feeble, gnathopod 1 small, article 5 elongate, unlobed, in male with setal brush, article 6 much shorter, palm short, almost transverse. Gnathopod 2 of female slightly enlarged, article 5 slightly elongate, poorly lobed, setae marginal, palm very oblique, not clearly defined, armed with long Hadziid setae, male gnathopod 2 much larger, article 5 short, setae marginal, article 6 large, ovoid and elongate, short falciform transverse palm differentiated from normal palmar extent as marked by extension of dactyl along posterior margin, palm with sparse short spines and setae, much of palm naked, then posterior margin more heavily setose, dactyl deeply curved.

Article 2 of pereopods 5-7 scarcely expanded, weakly lobate, pereopod 5 much smaller than pereopods 6-7, with few setules on inferior margin.

Pleopods unmodified in male. Outer rami of uropods 1-2 naked or poorly spinose dorsally, uropod 1 with basofacial spine. Uropod 3 elongate, parviramous, inner ramus scale-like, article 2 of outer ramus about 20 percent as long as article 1. Telson of ordinary length, cleft to base, spinose apically and laterally but not medially, main setules at M. 60.

Coxal gills 2-6, ovate, with distinct basal stalk but not articulate. Oostegites short, narrow.

Description.--Uropod 2 with apicomedial comb on peduncle.

Relationship.--Differing from Hadzia in the parviramous uropod 3 and reversed medial to lateral spination on the telson. Differing from Protohadzia in the setose palm of male gnathopod 2 and laterally naked telson. Differing from Metaniphargus in the unshortened telson, and much larger male gnathopod 2 with poorly armed palm.

Species.--schoenerae Fox, 1973 [460];

Caribbean, sublittoral; 1.

Dulzura J.L. Barnard

Figures 12, 13, 14, 41, Map 53

Dulzura J.L. Barnard, 1969<sup>a</sup>: 114 (Dulzura sal J.L. Barnard, 1969<sup>a</sup>, original designation).

Urosomites with 2 weak dorsal setae or spines. Rostrum absent, lateral cephalic lobes obsolescent, weak sinus present. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 15:13:5, ventral margin of article 1 with one spine. Accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 6:14:17, article 2 weakly setose, article 3 subfalciform, with strongly marginal D setae and 3 E setae. Labium without inner lobes, scarcely gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9 serrate spines, palps [?asymmetric]. Plates of maxilla 2 narrow, inner with oblique facial row of setae.

Coxa of medium size, coxa 4 unlobed, coxa 5 as long as 4. Gnathopods subchelate but female gnathopod 2 almost simple, nearly feeble, gnathopod 1 small, article 5 of medium length, unlobed, article 6 subequal to article 5, palm short, almost transverse. Male gnathopod 2 enlarged, article 5 of ordinary length, unlobed, setae marginal, palm very oblique, very densely setose, setae not of thick curled Hadziid form but slender and of moderate length; female gnathopod 2 with smaller hand, feeble palm with few setae and only 2 Hadziid setae, posterior margin with several Hadziid setae.

Article 2 of pereopods 5-7 scarcely expanded, scarcely lobate, dactyls with setule on inferior margins.

Pleopods [unknown]. Uropod 1 ordinary, with basofacial spine, uropod 2 with shortened outer ramus, rami of uropods 1 2 otherwise normally spinose. Uropod 3 elongate, parviramous, inner ramus scale-like. Article 2 of outer ramus less than 20 percent as long as article 1. Telson of ordinary length, not fully (or fully) cleft to base, only spinose apically (though with apicomedial spines nearly matching position in Metaniphargus), main setules M.50.

Coxal gills and oostegites [unknown].

Description.--Peduncle of uropod 2 with apicomedial comb; telson of laakona short and bearing only 2 spines per lobe.

Relationship.--Differing from Protohadzia in the setose palm of male gnathopod 2 and laterally naked telson.

Species.--A gal J.L. Barnard, 1977 [546];

B hamakua (J.L. Barnard, 1970) [381];

C ?laakona (J.L. Barnard, 1970) [381];

D sal J.L. Barnard, 1969a [373];

Hawaii, Galapagos, Pacific America, marine sublittoral; 4.

→ Metaniphargus - (by stock & later by Vong (in no.))

Metaniphargus Stephensen

Map 56

Metaniphargus Stephensen, 1933c: 426 (Metaniphargus curasavicus Stephensen, 1933c, monotypy.--Stock, 1977: 34.

Urosomite 2 with 2 dorsal spines. Rostrum obsolescent, lateral cephalic lobes subrounded. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 24:23:11, ventral margin of article 1 lacking spines. Accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 12:21:26, article 2 with setae, article 3 scarcely subfalciform, with strongly marginal D setae and 3-4 E setae. Labium without inner lobes. Maxillae 1-2 medially setose; inner plate of maxilla 1 triangular, fully setose medially, outer plate with 11 spines, palps asymmetric. Plates of maxilla 2 narrow, inner with oblique facial row of setae. Maxilliped dactyl with long nail.

Coxae of medium size, coxa 4 unlobed, coxa 5 as long as coxa 4. Gnathopods subchelate, but female gnathopod 2 almost simple, gnathopod 1 small, article 5 slightly elongate to medium in length, poorly lobed, article 6 shorter than 5, palm short, transverse to weakly oblique. Male gnathopod 2 enlarged, article 5 slightly elongate, unlobed, setae marginal, palm very oblique, lined with weakly bifid spines. Female gnathopod 2 slightly enlarged, palm poorly spinose or setose.

Article 2 of pereopods 5-7 weakly expanded, lobate or not, dactyls with several setules on inferior margin.

Pleopods ordinary or often modified in male by presence of accessory lobes on bases of rami. Uropod 1 with basofacial spine, outer rami of uropods 1-2 usually shortened, otherwise no sexual dimorphism. Uropod 3 elongate, variramous, length of inner ramus variable from species to species, article 2 of outer ramus variable, 15-40 per cent as long as article 1. Telson very short, not or fully cleft to base, spinose apically, medially and laterally, main setules M.40-70 and M.20.

Coxal gills [2-6], ovate, with long thin basal stalks only weakly or not articulate. Oostegites narrow.

Description.--Peduncle of uropod 2 with or without comb; inner ramus of uropod 3 with or without plumose setae.

Relationship.--Differing from other Hadziids in the short telson. Differing from Hadzia in the short article 1 of the mandibular palp and unlobed article 5 of gnathopod 2 with marginal armaments.

Species.--1 beattyi Shoemaker, 1942a [489];

2 bousfieldi Stock, 1977 [489];

3 christophorensis Stock, 1977 [462];

4 curasavicus Stephensen, 1933c [462];

5 jamaicae Holsinger, 1974c [486];

6 longipes Stock, 1977 [462];

7 nicholsoni Shoemaker, 1959 [491];

8 orientis Stock, 1977 [462];

9 palpator Stock, 1977 [491];

Caribbean Islands, hypogean, 9.

Liagoceradocus J.L. Barnard

Figures 4, 12, 17, 19, Map 53

Liagoceradocus J.L. Barnard, 1965: 504 (Liagoceradocus pusillus

J.L. Barnard, 1965, original designation).

Hadzia (Liagoceradocus) J.L. Barnard, 1977: 286.

Body ordinary to subvermiform, urosomites 1-2 each with 2 dorsal spines. Rostrum absent, lateral cephalic lobes short, broadly rounded. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 26:24:12, ventral margin of article 1 with at least one large apical spine. Accessory flagellum 2-articulate.

Ratio of mandibular palp articles = 11:21:24, article 2 weakly setose, article 3 subfalciform, with strongly marginal D setae and 3 E setae. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 triangular, fully setose medially outer plate with 10 serrate spines, palps asymmetric. Plates of maxilla 2 narrow, inner with oblique facial row of setae.

Coxae of medium size, coxa 4 unlobed, coxa 5 as long as 4. Gnathopods subchelate, nearly feeble, female gnathopod 2 like male, gnathopod 1 small, article 5 elongate, unlobed, article 6 much shorter than 5, palm short, transverse. Gnathopod 2 slightly enlarged, article 5 of ordinary length, with deep lobe bearing strongly submarginal setation, palm very oblique, with several simple (with triggers but not distinctly bifid) spines and sparse Hadziid setae.

Article 2 of pereopods 5-7 scarcely expanded, weakly lobate, dactyls with few setules on inferior margin. Pleopods unmodified in male. Uropods 1-2 ordinary, uropod 1 with basofacial spine, uropod 2 not sexually dimorphic. Uropod 3 elongate, magniramous, dispariramous, inner ramus well exceeding article 1 of outer ramus, article 2 of outer ramus about 30 percent as long as article 1. Telson of ordinary length, cleft to base, spinose apically, medially and laterally, main setules M.60.

Coxal gills 2-6, ovate, with poorly developed basal stalk but not articulate. Oostegites [undescribed].

Description.--Uropod 2 with apicomedial comb on peduncle.

Relationship.--Differing from Hadzia in presence of lateral spines on telson, shorter article 1 of mandibular palp, and elongate article 5 of gnathopod 1. Differing from Metaniphargus in lamellar expansion of article 5 on gnathopod 2 and longer telson.

Species.--K lonomaka J.L. Barnard, 1977 [381];

L pusillus J.L. Barnard, 1965 [591];

Hawaii to Caroline Islands, anchialine or atoll-lagoon, brackish to marine, 2.

Notes: J.L. Barnard, 1977: fig. 12G2 gnathopod 2 depiction of setae on article 5 not showing clearly true situation of deep submarginal attachment, confirmed by examination of original pencil drawings.

### Hadzia S. Karaman

Map 55

Hadzia S. Karaman, 1932: 214 (Hadzia fragilis S. Karaman, 1932, selected by G.S. Karaman, 1969c).--G.S. Karaman, 1969c: 75.  
--Stock, 1977: 29.

Urosomites free, naked. Rostrum obsolescent, lateral cephalic lobes subrounded. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 26:20:10, ventral margin of article 1 lacking spines. Accessory flagellum 1-2 articulate.

Labrum [unknown]. Ratio of mandibular palp articles = 16:17:19, article 2 with or without setae, article 3 subfalciform, with strongly marginal D setae and 3 E setae. Labium without inner lobes, not gaping. Maxillae 1-2 medially setose; inner plate of maxilla 1 triangular, fully setose medially, outer plate with 9-10 serrate spines, palps asymmetric (setose and spinose). Plates of maxilla 2 narrow, inner with oblique facial row of setae. Maxilliped dactyl with long nail.

Coxae of medium size, coxa 4 unlobed, coxa 5 as long as coxa 4. Gnathopods subchelate, nearly feeble, female gnathopod 2 almost simple, gnathopod 1 small, article 5 of medium length, poorly lobed, article 6 subequal to article 5, palm short, transverse to weakly oblique. Gnathopod 2 of both sexes alike, slightly enlarged, article 5 of ordinary length, with deep lobe bearing strongly submarginal setation, palm very oblique, with long Hadziid setae, spines few and not bifid.

Article 2 of pereopods 5-7 expanded, indistinctly lobed, dactyls with several setules on inferior margin.

Pleopods unmodified in male. Uropod 1 ordinary [basofacial spine unknown]; uropod 2 ordinary, not sexually dimorphic [comb unknown]. Uropod 3 elongate, magniramous, dispariramous, inner ramus exceeding article 1 of outer ramus, article 2 of outer ramus about 20 percent as long as article 1. Telson of ordinary length, cleft to base, spinose apically and medially but not laterally, main setules at M.55.

Coxal gills [?2-6], ovate, with poorly developed basal stalk but not articulate. Oostegites narrow.

Relationship.--Differing from Liagoceradocus in loss of lateral telsonic spines and shortened article 5 of gnathopod 1.

Species.--1 crispata G.S. Karaman, 1969c [087];

2 fragilis S. Karaman (G.S. Karaman, 1969c) [087];

3 gjorgjevici S. Karaman, 1932 (G.S. Karaman, 1969c) [087].

Yugoslavia, hypogean, 3.

### Psammoniphargus Ruffo

Map 54

Psammoniphargus Ruffo, 1956a: 89 (Psammoniphargus pauliani  
Ruffo, 1956a, original designation.

Body thin, urosomite 2 with 2 dorsal spines. Rostrum obsolescent, lateral cephalic lobes rounded, sinus [unknown]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, peduncular article 2 barely shorter than article 1, but article 3 much shorter, [spines on article 1 unknown]. Accessory flagellum 2-articulate.

Mandibular palp vestigial, 1-articulate, scale-like, with one apical setule. Labium without inner lobes, not gaping. Maxillae 1-2 moderately setose medially; inner plate of maxilla 1 subtriangular, with 6 apicomedial setae and many medial "hairs", outer plate with 7 spines, palps asymmetric. Plates of maxilla 2 narrow, inner lacking oblique facial row of setae but with 4 marginal medial setae. Outer plate of maxilliped strongly scalloped but weakly spinose medially.

Coxae of medium size, coxa 1 not dilated, coxa 4 with weak posterodistal lobe. Gnathopods subchelate, nearly feeble, gnathopod 1 small, article 5 of ordinary length, scarcely lobed, article 6 subequally long, palm transverse; female gnathopod 2 slightly enlarged, article 5 ordinary, scarcely lobed, hand subrectangular, palm oblique but well defined, poorly spinose (spines weakly bifid), with few Hadziid setae barely inside palm; male gnathopod 2 enlarged, article 5 ordinary, weakly lobed, setae marginal, hand enlarged, palm oblique, defined, spines few, small, simple, posterior margin with few short Hadziid setae.

Article 2 of pereopods 5-7 weakly expanded, poorly lobate, dactyls with one inferior setule.

Uropods 1-2 ordinary, uropod 1 with basofacial spine, outer ramus naked marginally. Uropod 3 elongate, parviramous, inner ramus scale-like, article 2 of outer ramus about 30 percent of article 1. Telson short, slightly broader than long, almost fully cleft, apices broad and jaggedly toothed, with apical and apicodorsal spines, main setules M.70.

Gills [?2-6]. Oostegites narrow.



Relationship.--Differing from various Hadziids and Weckeliids in the absence of oblique facial row of setae on the inner plate of maxilla 2 but mediomarginal setae remain in Psammoniphargus. Differing from Paraweckelia in the parviramous uropod 3.

Species.--62 pauliani Ruffo, 1956a [697];

Reunion, hypogean, 1.

#### Metacrangonigids

Lower lip without inner lobes. Maxillae fully setose medially. Gnathopod 1 of Melitid form. Female gnathopod 2 of Hadziid form. Uropod 3 parviramous or uniramous, outer ramus never longer than peduncle. Telson short, broad, entire. Coxal gills 2-6.

Differing from the Hadziids in the uncleft telson and from the northern Crangonyctoids in the absence of sternal gills and presence of Melitid gnathopod 1. Pleopods normal.

See Salentinellids.

#### Metacrangonyx Chevreux

Figures 5, 13, 18, 21, Map 58

Metacrangonyx Chevreux, 1909: 27 (Metacrangonyx longipes Chevreux, 1909, monotypy).

Rostrum obsolescent, lateral cephalic lobes protruding, rounded-falcate. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 26:32:23, ventral margin of article 1 lacking spines. Accessory flagellum 3-4 articulate.

Mandibular palp feeble, thin, 3-articulate or less, poorly setose. Labium without inner lobes, weakly gaping or not. Maxillae 1-2 well setose medially, inner plate of maxilla 1 triangular, fully setose medially, outer plate with 8-11 spines, palps asymmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped elongate, dactyl lacking [?type] or bearing nail.

Coxae elongate, coxa 1 not expanded, coxa 4 strongly lobed, coxa 5 much shorter than 4. Gnathopods almost feeble, subchelate, gnathopod 1 small, Melitid, article 5 elongate, unlobed, article 6 short, palm transverse, female gnathopod 2 slightly enlarged, article 5 weakly elongate, scarcely lobed, article 6 longer than 5, subrectangular, palm oblique, bearing bifid spines; male gnathopod 2 enlarged, article 5 like female, article 6 enlarged, subovate, palm oblique, lines with bifid spines, posterior margin with few Hadziid setae.

Article 2 of pereopods 5-7 expanded, weakly to strongly lobate or not.

Uropods 1-2 ordinary, uropod 1 with basofacial spine (new). Uropod 3 vestigial, with lamellar peduncle, inner ramus obsolescent, scale-like, outer ramus 1-articulate, shorter or longer than peduncle but rectangular,

weakly spinose or setulose, with 2 short apical setules. Telson short, broader than long, entire, apically setulose.

Coxal gills 2-6, moderately broad to thin, weakly stalked. Oostegites thin.

Description.--Gland cone long or short.

Relationship.--Differing from Hadziids in vestigial uropod 3 and uncleft telson.

Transfer.--M. remyi is transferred to Pygocrangonyx.

Species.--1 longicaudus Ruffo, 1954d [135];

2 longipes Chevreux, 1909 [100];

3 panousei Ruffo, in Balazuc and Ruffo, 1953, [135];

North Africa; Spain to Yugoslavia; Balearic Islands, hypogean, 3.

#### Pygocrangonyx Karaman and Barnard

Map 58

Pygocrangonyx Karaman and Barnard, 1979: 151 (Metacrangonyx remyi Ruffo in Balazuc and Ruffo, 1953, original designation).

Body [?slender], urosomites naked. Rostrum obsolescent, lateral cephalic lobes subrounded, sinus [?present]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 20:16:12, accessory flagellum [?2-articulate].

Mandibular palp vestigial, 1-articulate, setae = E. Labium without inner lobes. Maxillae 1-2 fully setose medially, inner plate of maxilla 1 triangular, outer plate with 10 spines, palps asymmetrically armed. Inner plate of maxilla 2 with oblique facial row of setae. Both plates of maxilliped of medium size, outer plate [?medially spinose], dactyl [?unguiform, ?with apical nail].

Coxae elongate, [?with short to medium setae], coxa 1 not expanded, coxa 4 unlobed, [?coxa 5 shorter than 4]. Gnathopods feeble, gnathopod 1 of Melita form, article 5 elongate, palm transverse; gnathopod 2 slightly larger, both articles 5 and 6 elongate and thin, palm very oblique, armed with bifid spines, posterior margin of hand with long curved Hadziid-like setae.

Pereopod 7 slightly longer than 5, article 2 of pereopods 5-7 lobate or not (7), weakly to strongly expanded, dactyls simple.

Rami of uropods 1-2 ordinary, evenly extended, marginally spinose, basofacial spine of uropod 1 [unknown]. Uropod 3 uniramous, very short, peduncle large, broader and longer than ramus; inner ramus absent, outer ramus 1-articulate, weakly longer than broad, stout, with 5 very long distal spines much longer than ramus itself. Telson very short, entire, broader than long, with 2 long distal spines longer than telson plus

several setules. Coxal gills 2-6, narrow. Oostegites [unknown]. No secondary sexual dimorphism.

Relationship.--Allied to Metacrangonyx Chevreux but differing by the loss of the inner ramus on uropod 3, the much shortened outer ramus, the elongate distal spine on that ramus (1-2 shorter spines found in Metacrangonyx), the presence of long spines on the telson (setae in Metacrangonyx) and by the absence of a lobe on article 2 of pereopod 7.

Species.--4 remyi (Ruffo in Balazuc and Ruffo, 1953) [135];

Morocco, hypogean, 1.

#### Melitids

Inner lobes of lower lip weakly developed to fleshy. Maxillae fully or not setose medially. Gnathopod 1 of Melitid form. Gnathopod 2 in female of Melitid form, palm distinct, male of enlarged Melitid form or like female, palm of gnathopod 2 in male lacking spines or spines irregularly distributed. Uropod 3 parviramous, rarely variramous. Telson cleft. Coxal gills various, gill 7 absent.

Accessory flagellum 2+ articulate. Pereopods 3-4 ordinary. Article 2 of pereopods 5-7 various, dactyls simple. Pleopods normal. Pleonites and urosomites occasionally dentate. Brood plates narrow.

Psammoniphargus of the Hadziids is included in the following key.

#### Key to the Genera of Melitids

1. Uropod 3 variramous . . . . . Psammogammarus (part)
- Uropod 3 parviramous. . . . . 2
2. Peduncle of uropod 3 elongate, gnathopod 2 feeble, wrist highly elongate . . . . . 3
- Peduncle of uropod 3 not elongate, or if so, gnathopod 2 not feeble or scarcely so, or wrist not elongate. . . . . 4
3. Female gnathopod 2 enfeebled, telsonic lobes turgid, outer plate of maxilla 1 with 6 spines . . . . . Galapsiellus
- Female gnathopod 2 not enfeebled, telsonic lobes not turgid, outer plate of maxilla 1 with 7 spines. . . . . Anchialella
4. Lower lip lacking inner lobes, mandibular palp 1- articulate. . . . . Psammoniphargus
- Lower lip with inner lobes, mandibular palp 2-3 articulate. . . . . 5
5. Telson with square to rectangular lobes, broad and excavate apices . . . . . 6
- Telson with tapering lobes. . . . . 7
6. Head notched, article 2 of pereopods 5-7 expanded and lobate. . . . . Nainaloa
- Head unnotched, article 2 of pereopods 5-7 scarcely expanded and scarcely lobate. . . . . Rotomelita
7. Uropod 3 not exceeding uropod 1 . . . . . Melitoides
- Uropod 3 exceeding uropod 1 . . . . . 8

8. Anterior coxae not longer than posterior coxae. . . . . 9  
 Some anterior coxae significantly longer than posterior coxae. . . . . 11
9. Basal articles of flagellum on antenna 2 fused together,  
 maxilla 2 lacking facial row of setae, article 4  
 of pereopod 7 dilated. . . . . Victoriopisa  
 Basal articles of flagellum on antenna 2 discrete,  
 maxilla 2 with facial row of setae, article 4 of  
 pereopod 7 not dilated. . . . . 10
10. Article 2 of pereopods 5-7 uniform,  
 article 1 of mandibular palp short . . . . . Psammogammarus (part)  
 Article 2 of pereopods 5-7 diverse,  
 article 1 of mandibular palp elongate . . . . . Eriopisa
11. Maxillae not setose medially. . . . . 12  
 Maxillae weakly to fully setose medially. . . . . 13
12. Article 2 of outer ramus on uropod 3 present, coxa 1  
 tapering, wrist of gnathopod 2 strongly lobate. . . . . Maleriopa  
 Article 2 of outer ramus on uropod 3 absent, coxa 3  
 not tapering, wrist of gnathopod 2 poorly lobate . . . Paraniphargus
13. Gnathopod 2 weakly or not diverse bilaterally, not chelate . . . . . 14  
 Gnathopod 2 strongly diverse bilaterally, one member  
 enlarged and strongly propodochelate . . . . . Dulichhiella
14. Mandibular palp 3-articulate . . . . . Melita  
 Mandibular palp 2-articulate . . . . . Tegano

Melita Leach

Figures 8, 12, 13, 17, 19, 43, Map 54

Melita Leach, 1814a: 403; 1814b: 432 (Cancer palmatus Montagu, 1804,  
 monotypy).--Stebbing, 1906: 421.

Boscia Leach, 1814a: 435 (nomen nudum).

Megamoera Bate, 1862: 224 (Gammarus dentatus Kroyer, 1842,  
 selected by J.L. Barnard, 1969c).

Caliniphargus Stout, 1913: 640 (Caliniphargus sulcus Stout,  
 1913, monotypy).

Body smooth or toothed, urosomites smooth or toothed. Rostrum small or absent, lateral cephalic lobes rounded, quadrate, sinus present or absent, often slit-like. Eyes present or absent.

Antennae elongate, slender, antenna 1 longer than 2, ratio of peduncular articles = 14:16:10, ratio of flagella = 50:10, accessory flagellum 2+ articulate. Antenna 2 gland cone often large.

Labrum weakly notched or entire. Mandibular incisor toothed, molar triturative, ratio of palp articles = 4:12:12, article 3 faintly falciform or linear, setae = DE or E. Inner lobes of labium well developed, fleshy. Maxillae medially setose, inner plate of maxilla 1 falcatotriangular, setose on at least distal half of medial margin, outer plate with 7+ spines, palps often asymmetric. Inner plate of maxilla 2 with or without oblique facial row of setae.

Maxilliped dactyl weakly unguiform, shorter than 3, with nail(s).

Coxae ordinary to short, without or with posteroventral notches, poorly to moderately setose, coxa 1 undilated or dilated, coxa 4 lobate, or lobe obsolescent, coxa 6 of female rarely hooked. Gnathopods 1-2 diverse, gnathopod 1 smaller, of "Melitid" form generally in female, wrist elongate, unlobed, hand short subrectangular, palm usually short and transverse, rarely oblique, male gnathopod 1 often with unusual palmar and dactylar formations; gnathopod 2 enlarged, of female slightly larger than gnathopod 1, wrist of medium length, scarcely lobed, hand ovate or subrectangular, slightly enlarged, palm oblique, short to long, male gnathopod 2 much enlarged, wrist usually very short, lobate, hand enlarged, sculptured or not, palm transverse to oblique, dactyl often overriding palm onto face of hand armed with ridges and setae or with smooth areas outlined by setae.

Article 2 of pereopods 5-7 moderately expanded, ventrally lobate or not, poorly setose.

Rami of uropods 1-2 extending equally or outer rami weakly shortened, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 extended, parviramous, outer ramus elongate, with or without short article 2. Telson of ordinary length, cleft to base, lobes gaping, tapering, spinose apically and often medially, laterally or dorsally.

Coxal gills 2-6, broad, not strongly pediculate. Oostegites narrow.

Relationship.--This is a basic kind of Gammaridan amphipod to which many other taxa bear comparison. The genus differs from Gammaroids, especially Echinogammarus, in the lack of coxal gill 7, and the small, almost mittenform gnathopod 1; from Crangonyx, Melita differs in the absence of sternal gills and coxal gill 7.

See Melitoides, Eriopisa, Psammogammarus, Rotomelita, Dulichhiella, Nainaloa, Victoriopisa and others following.

Species.--abyssorum Stephensen, 1944c [211];

aculeata Chevreux, 1911 [100];

amoena Hansen, 1888 (Gurjanova, 1951) [253];

awa J.L. Barnard, 1972b [774E];

bulla G.S. Karaman, 1978c [345]; ✓

californica Alderman, 1936 [371];

celericula Croker, 1971 [579];

coronini Heller, 1867 (Chevreux and Fage, 1925) [340];

dentata (Kroyer, 1842) (Sars, 1895b) (Bousfield, 1973) [200];

④ denticulata Nagata, 1965c [395];

desdichada J.L. Barnard, 1962a [379];

- festiva (Chilton, 1885) [791 + ?755];  
formosa Murdoch, 1885 (Gurjanova, 1951) [200];  
gayi (Nicolet, 1849) (?Ledoyer, 1967b) [760];  
gladiosa Bate, 1862 (Chevreux and Fage, 1925) [352];  
grandimana Chevreux, 1908a, 1935 [443];  
hergensis Reid, 1951 (Myers, 1969c) [352];  
inaequistylis (Dana, 1852) (J.L. Barnard, 1972b) [775];  
insatiabilis Fritz Muller, 1864 [unknown];  
• japonica Nagata, 1965c [395];  
kauerti J.L. Barnard, 1972a (ssp. of zeylanica);  
kodiakensis J.L. Barnard, 1964b [273];  
koreana Stephensen, 1944b [391];  
laevidorsum Stephensen, 1944b [391];  
lagunae Oliveira, 1953 [751];  
lignophila J.L. Barnard, 1961 [501];  
longicauda (Brandt, 1851, homonym) [389];  
machaera K.H. Barnard, 1955 (Griffiths, 1975) [740];  
mangrovi Oliveira, 1953 [751];  
matilda J.L. Barnard, 1972a [788];  
messalina Fritz Muller, 1865 [unk];  
n. cronata Griffiths, 1975 [740];  
nitida S.I. Smith, 1873 (Bousfield, 1973) [360];  
"99" nitidula Ruffo, 1958a [698F];  
oba J.L. Barnard, 1972a [795];  
obtusata (Montagu, 1813) (Chevreux and Fage, 1925) [352];  
oregonensis J.L. Barnard, 1954 [268];

• → abundomelita

orgasmos K.H. Barnard, 1940 (Griffiths, 1975) [690];

oxyura Catta, 1875 [348];

pahuwai J.L. Barnard, 1970 [381];

pallida Sars, 1879, 1885 (Gurjanova, 1951) [220AB];

palmata (Montagu, 1804) (Sars, 1895b) [352];

parvimana Holmes, 1905 (?Crangonyx by Bousfield, 1958) [254];

pellucida Sars, 1883, 1895b [335]; → now allomelatas

planaterga Kunkel, 1910 [367Q];

podager (Milne Edwards, 1830) (Bate, 1862) [353];

quadrispinosa Vosseler, 1889 (Gurjanova, 1951) [200];

reidi Hamond, 1965 [237];

richardi Chevreux, 1900 [240AB];

rylovæ Bulycheva, 1955 [391];

shimizui (Ueno, 1940b) [396]; - spring in coastal region

solada J.L. Barnard, 1961 [715B];

somovaë Bulycheva, 1952 [391];

subchelata Schellenberg, 1925a (Griffiths, 1975) [743];

sulca (Stout, 1913) (J.L. Barnard, 1969a) [379];

tenuicornis (Stimpson, 1856b, homonym) [398];

tristanensis K.H. Barnard, 1965 [731];

tuberculata Nagata, 1965c [395];

valida Shoemaker, 1955 [267];

valesi S. Karaman, 1955 [345]; ✓

zeylanica Stebbing, 1904 [600E];

marine cosmopolitan, littoral to abyssal, estuarine, anchialine, rarely freshwater, 61.

↑ Additional spp. since 1983

Stygalini ? →

Dulichchiella Stout

## Figure 45

Dulichchiella Stout, 1912: 140 (Dulichchiella spinosa Stout, 1912, monotypy).--Karaman and Barnard, 1979: 152.

Body somewhat slender, metasomites and urosomites transversely crenulated or toothed dorsally. Lateral cephalic lobes subquadrate.

Antennae elongate, well setose, antenna 1 longer than 2, ratio of peduncular articles = 16:18:4, ratio of flagella = 63:12, accessory flagellum multiarticulate (5-articulate in type). Ratio of peduncular articles 3,4,5 and flagellum on antenna 2 = 6:16:14:28.

Labrum ["slightly bilobed"]. Ratio of mandibular palp articles = 3:8:10 (approximate), article 3 weakly clavate, setae = ADE. Inner lobes of lower lip well developed, fleshy. Maxillary setae diverse; inner plate of maxilla 1 long, narrow, tapering, curved, with 1-2 strong apical plumose setae, medial margin hairy, outer plate with 9 spines, palp 2-articulate [symmetry unknown]. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially serrate and finally spinulose, dactyl nail weak.

Coxae medium to short, moderately setose, coxa 1 scarcely expanded apically, coxa 4 poorly lobed and scarcely longer than 5. Gnathopods subchelate, gnathopod 1 small, of Melita form, wrist elongate, unlobed, hand shorter than wrist, palm almost transverse; female gnathopod 2 slightly enlarged, wrist of same length as gnathopod 1 but hand much longer than wrist (thus wrist short), wrist scarcely lobate, palm weakly oblique, short, article 4 with tooth; one side (right or left) male gnathopod 2 like female gnathopod 2; other male gnathopod 2 (right or left) immensely enlarged and chelate, resembling crab claw as in fiddler crabs, articles 3-5 tiny, hand immense, with giant chela, dactyl immense and thick, closing on transversely extended palm.

Article 2 of pereopods 5-7 scarcely expanded, scarcely lobate ventrally.

Rami of uropods 1-2 extending equally, marginally spinose, uropod 1 with basofacial spine on peduncle. Uropod 3 extended, parviramous, outer ramus elongate, article 2 short. Telson of ordinary length, cleft to base, but partially gaping, apically and laterally spinose.

Coxal gills [2-6, ovate]. Oostegites [slender].

Relationship.--Like Melita but male gnathopod 2 of strong diversity right to left sides, part of body with numerous transverse dorsal serrations, inner plate of maxilla 1 with sickle form and setae 1-2 only and fully apical.

The species of this genus have been included with Melita since the late part of the 19th Century; Stout accidentally described this genus on the mistaken idea that uropod 3 lacked rami (because they had broken off) and thus compared the genus to Dulichia. Since Stout's time the genus has always been synonymized with Melita but we believe the unusual male gnathopods analogous to those of a fiddler crab deserve generic recognition. In this way we also believe that the several species heretofore synonymized with Melita fresneli or M. appendiculata must be



revived, reexamined and redescribed as there may be several valid species. For the moment, then, we revive the following species.

Species.--appendiculata (Say, 1818) [365];

australis (Haswell, 1879b) [781];

(exilii Fritz Muller, 1864) [type locality= ?453];

fresneli (Audouin, 1826) (?= cotesi Giles, 1890) (?= validus Dana, 1852) (= pilosus Dana, 1852) (= setipes Dana, 1852) (= ?panisochir Kroyer, 1845) (?= valida Dana, 1852) [600];

spinosa Stout, 1912 [373];

tropicopolitan in shallow seas, ?5+.

Psammogammarus S. Karaman

Figure 17, Maps 53-55

Psammogammarus S. Karaman, 1955: 223 (Psammogammarus caecus S. Karaman, 1955, original designation).--Karaman and Barnard, 1979: 147.

Body vermiform to subvermiform or ordinary. Rostrum obsolescent or small, lateral cephalic lobes rounded, shallow sinus obsolescent. Eyes absent or present.

Antennae elongate, antenna 1 much longer than 2, ratio of peduncular articles = 20:19:7, accessory flagellum 2-articulate. Antenna 2 flagellum short, articles free.

Labrum entire or weakly emarginate (type). Ratio of mandibular palp articles = 4:9:6, article 3 linear, setae = DE, very sparse. Labium with small but fleshy inner lobes partially fused together (like pleustid), gaping. Maxillae medially setose, inner plate ovate, not fully setose medially (3+ setae), outer plate with 9 spines, palps symmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose (or only setose), dactyl as long as 3, nail absent or obsolescent.

Coxae very short, coxa 1 blunt anteriorly, coxa 4 unlobed. Gnathopods 1-2 subchelate, gnathopod 2 enlarged, wrist of gnathopod 1 of medium length, ovate, poorly lobed, hand weakly trapezoidal, weakly expanding apically, palm oblique, wrist of gnathopod 2 short, weakly lobed, hand enlarged, elongate, ovate, palm very oblique, poorly defined, often sculptured, female gnathopod 2 smaller than male, unsculptured, occasionally with weak Hadziid setae.

Pereopods 5-7 progressively longer, last one elongate, article 2 of pereopods 5-7 alike, scarcely expanded, almost linear, scarcely to strongly lobate.

Outer rami of uropods 1-2 slightly shortened, of uropod 1 often lacking marginal spines, peduncle of uropod 1 with basofacial spine(s), of uropod 2 often with apicomedial comb. Uropod 3 highly extended, variramous or parviramous, outer ramus hugely elongate, article 2 usually as long as

article 1 but occasionally much shortened. Telson weakly elongate, deeply cleft, apices sharp, spinose, often with lateral spines, main dorsal setules highly apicad.

Coxal gills 3-6 on type-species!, ovate to sausage shaped, 2-6 on other species. Oostegites [unknown on type-species] slender.

Variants.--Species quite variable, for example; labrum rounded (philippensis); mandibular molar bulbous and poorly triturative (gracilis); article 3 of mandibular palp as long as article 2 (seurati); article 2 of antenna 1 shorter than article 1 (gracilis); lower lip normally Melitid with fully discrete fleshy inner lobes, no gape (longiramus); inner plate of maxilla 1 fully setose medially (longiramus and seurati); nail of maxilliped discrete and inner plate only setose medially (philippensis); gnathopod 1 palm transverse (philippensis) or parachelate (seurati); article 2 of pereopods 3-4 expanded (philippensis); article 2 of pereopods 5-7 well lobate (philippensis); uropods 1-2 poorly spinose (gracilis); inner ramus of uropod 3 as long as article 1 of outer ramus (longiramus) or half as long (caeca); article 2 on outer ramus of uropod 3 short (seurati); telson broadened (gracilis).

Relationship.--Differing from Eriopisa in the lack of diversity on article 2 of pereopods 5-7 and the shorter article 3 of the mandibular palp, which in Eriopisa is much longer than article 2 and which in Psammogammarus is shorter than article 2.

Species.--8 caeca S. Karaman, 1955 (= peresi Ledoyer, 1968) [105Q];

P garthi (J.L. Barnard, 1952b) [376];

9 gracilis Ruffo and Schiecke, 1976a [106];

76 longiramus (Stock and Nijssen, 1965), [677J];

77 philippensis Chilton, 1921b [641J];

10 seurati (Gauthier, 1936) [131J];

cosmopolitan in low latitudes, in inland wells, anchialine or near brackishwater or littoral, 6.

#### Victoriopisa Karaman and Barnard

Figures 13, 44, Map 54

Victoriopisa Karaman and Barnard, 1979: 149 (Niphargus chilkensis Chilton, 1921a, original designation).

Body subvermiform, urosomites short. Rostrum very short, lateral cephalic lobes subrounded, with poorly marked anteroventral lobe, sinus obsolescent. Eyes weak or absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 29:26:7 (or article 2 longer, epistomata); accessory flagellum

2-articulate. First article of flagellum on antenna 2 elongate and composed of several articles fused together, total free articles about 2-3.

Ratio of mandibular palp articles = 4:11:16, article 3 linear, setae = DE. Inner lobes of labium partially fused together, obsolescent. Maxillae well setose medially, inner plate of maxilla 1 ovatotriangular, fully setose medially, outer plate with about 7 distal spines, palps [?symmetric] [palp of epistomata shown to be 1-articulate]. Inner plate with several medial marginal setae only (none obliquely positioned). Maxilliped nail weak or absent.

Coxae very short, discontinuous, coxa 1 not produced, (or produced in epistomata), coxa 4 unlobed. Gnathopods 1-2 dissimilar, subchelate, gnathopod 2 enlarged, wrist of gnathopod 1 elongate, ovate, unlobed, hand trapezoidal, expanding distally, palm almost transverse but convex; wrist of gnathopod 2 short, weakly lobed or not, hand enlarged, elongate, ovate, palm very oblique, long, poorly defined, slightly sculptured, dactyl elongate.

Pereopods 5-7 almost equal in length and short, article 2 of pereopods 5-7 diverse, of 5 unexpanded and almost linear, of 6 weakly expanded, of 7 broadly expanded and lobate; article 4 of pereopod 7 dilated (unusual character).

Rami of uropods 1-2 subequally extended, with marginal spines, peduncle of uropod 1 with basofacial spine, of uropod 2 with weak apicomedial comb. Uropod 3 greatly extended, parviramous, outer ramus huge, article 2 also huge and nearly as long as article 1. Telson of ordinary length, cleft to base, lobes tapering, weakly armed apically or apicolaterally.

Coxal gills 2-6, some of them broadly pyriform. Oostegites [?slender].

Relationship: Allied to Eriopisa and Psammogammarus but differing by the basal fusion of articles on the flagellum of antenna 2, the obsolescence of inner lobes on the labium, the absence of the oblique facial row of setae on maxilla 2, the dilated article 4 of pereopod 7, and the subequal pereopods 5 and 7.

Species: 92 australiensis (Chilton, 1923a) [781, tidal lagoon];

93 chilkensis (Chilton, 1921a) [664];

94 epistomata (Griffiths, 1974a) [743];

Southern Australia west to South Africa and India, littoral to anchialine, 3.

#### Eriopisa Stebbing

##### Figure 17

Eriopis Bruzelius, 1859: 64 (homonym, Insecta) (Eriopis elongata Bruzelius, 1859, monotypy).

Eriopsis Wrzesniowsky, 1890: 632 (spelling variant).

Eriopisa Stebbing, 1890: 193 (new name); 1906: 411 (same type-species).--  
Karaman and Barnard, 1979: 146.

Body vermiform to subvermiform. Rostrum obsolescent, lateral cephalic lobes rounded, with deep thin sinus (notch). Eyes absent.

Antennae elongate, antenna 1 much longer than 2, ratio of peduncular articles = 24:26:8, accessory flagellum 2-articulate. Antenna 2 flagellum short; articles free.

Ratio of mandibular palp articles = 4:11:16, article 3 linear, setae = ADE. Labium with small but fleshy inner lobes, gaping. Maxillae medially setose, inner plate of maxilla 1 ovatotriangular, fully setose medially. Outer plate with 9 spines, palps almost symmetric. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially setose, dactyl about as long as article 3.

Coxae very short, often discontinuous, coxa 1 sharp anteriorly, coxa 4 unlobed. Gnathopods 1-2 dissimilar, subchelate, gnathopod 2 enlarged, wrist of gnathopod 1 of medium length, ovate, unlobed, hand trapezoidal, expanding distally, palm oblique, wrist of gnathopod 2 short, weakly lobed, hand enlarged, elongate, ovate, palm very oblique, long, poorly defined, often sculptured; female gnathopod 2 smaller than male, palm simple.

Pereopods 5-7 progressively longer but together not elongate, article 2 of pereopods 5-7 diverse, of 5 almost linear, of 6 slightly expanded, of 7 broadly expanded, 6-7 scarcely lobate.

Rami of uropods 1-2 equally extended, with marginal spines, peduncle of uropod 1 with basofacial spine, of uropod 2 with [?apicomedial comb]. Uropod 3 greatly extended, parviramous, outer ramus huge, article 2 also huge and nearly as long as article 1. Telson of ordinary length to elongate, deeply cleft, narrow, lobes tapering to apical notch, poorly spinose or setose.

Coxal gills 2-6, slender-ovate. Oostegites narrow.

Notes.--We reexamined type-species to find inner lobes of lower lip complete and fleshy (contrary to Sars, 1895b, sketchy depiction).

Relationship.--Differing from Melita in the elongate article 2 of outer ramus on uropod 3, extremely thin body, small coxae, with coxa 4 unlobed.

Species.--elongata (Bruzellius, 1859) (Sars, 1895b) [210];

bathyal north Atlantic, and ?Pacific (we question precise identification), 1.

#### Melitoides Gurjanova

Melitoides Gurjanova, 1934: 127 (Melitoides makarovi Gurjanova, 1934) monotypy).

One pleonite with dorsal hump, urosomites 1-2 each with dorsal tooth. Lateral cephalic lobes prominent, mammilliform. Eyes absent.

Antennae elongate, antenna 1 slightly longer than 2, ratio of peduncular articles = 20:20:8, ratio of primary flagellum = 55, accessory flagellum 3+ articulate. Antenna 2 slender, flagellum longer than article 5 of peduncle.

Ratio of mandibular palp articles = 3:4:8, article 3 linear, setae = DE. Inner lobes of labium present. Maxillae medially setose, inner plate

of maxilla 1 slender, outer plate with [?7 spines], palps [?symmetrical]. Inner plate of maxilla 2 with medial setae, none facial. Outer plate of maxilliped medially [?spinose], article 3 of palp lobate, dactyl [?without nail].

Coxae long and large, poorly setose, coxa 1 expanded and adz-shaped, coxa 4 lobate posteroventrally, coxa 5 much shorter than 4, coxa 6 weakly hooked. Gnathopods diverse, gnathopod 1 small, of Melitid form, wrist elongate, unlobed, hand shorter, rectangular, palm weakly oblique, short, gnathopod 2 very large, wrist short, lobate, hand huge, rectangular, palm almost transverse, sculptured; [sexes not distinguished].

Article 2 of pereopods 5-7 expanded, alike, weakly lobate, poorly setose, posterior margins convex or weakly sinuous, remainder of appendage elongate.

Rami of uropods 1-2 evenly extended, [?marginally spinose, peduncle of uropod 1 with basofacial spine]. Uropod 3 not extended (because uropods 1-2 also very long), but very long, parviramous, outer ramus elongate, 1-articulate. Telson slightly elongate, deeply cleft, lobes tapering, weakly armed apically.

Coxal gills [?2-6]. Oostegites [?slender].

Relationship.--Differing from Melita in the strange urosomal relationships: uropod 3 remains as long as in Melita but because uropods 1-2 are so elongate, uropod 3 does not overextend the others. The well developed medial setae of the maxillae and the attenuate mandibular palp complete the distinctions.

Species.--makarovi Gurjanova, 1934, 1951 [287];

Siberian and Bering Seas, sublittoral, 1.

Rotomelita J.L. Barnard

Figures 9, 19, Map 53

Rotomelita J.L. Barnard, 1977: 291 (Rotomelita lokoa J.L. Barnard, 1977, original designation).

Body smooth, urosomites poorly armed. Rostrum absent, lateral cephalic lobes weakly mammilliform or rounded, sinus weak. Eyes absent.

Antennae elongate, slender, antenna 1 longer than 2, ratio of peduncular articles = 14:15:9, ratio of flagella = 45:4, accessory flagellum 3+ articulate. Antenna 2 gland cone large.

Ratio of mandibular palp articles = 6:10:9, article 3 linear, setae = E. Inner lobes of labium moderately developed, fleshy. Maxillae not or scarcely setose medially, inner plate of maxilla 1 ovato-rectangular, with 2 apical and one apicomедial setae, outer plate with 9 spines, palps asymmetrical. Inner plate of maxilla 2 with 2-3 apicomедial setae, no facial setae. Outer plate of maxilliped medially toothed and facially spinose.

Coxae ordinary, poorly setose, coxa 1 undilated, coxa 4 posteroventrally lobate. Gnathopods 1-2 diverse, gnathopod 1 the smaller,

of Melitid form generally in female, wrist elongate, unlobed, hand short, subrectangular, palm short and transverse, gnathopod 2 enlarged, almost alike in both sexes, wrist of medium length, scarcely lobed (broadly), hand elongate, subrectangular, only of medium size, palm oblique, short to medium, well defined, dactyl fitting palm; male gnathopod 2 scarcely larger than in female.

Article 2 of pereopods 5-7 moderately expanded, scarcely lobate posteroventrally, poorly setose (only setulose).

Rami of uropods 1-2 extending equally, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 extended, parviramous, outer ramus elongate, with medium article 2. Telson of ordinary length but very broad, cleft to base, lobes quadrate, tightly appressed, apices very wide and excavate, with sparse spines apicomediaally, apicolaterally and dorsally.

Coxal gills 2-6, ovate, strongly pediculate. Oostegites slender.

Relationship.--Differing from Melita in the broad quadrate tightly appressed telsonic lobes, strongly pediculate coxal gills.

Species.--H ana J.L. Barnard, 1977 [381];

J. lokoa J.L. Barnard, 1977 [381];

Hawaiian Islands, anchialine, 2.

#### Nainaloa Karaman and Barnard

Map 53

Nainaloa Karaman and Barnard, 1979: 154 (Melita latimerus Bousfield, 1971, original designation).

Body smooth, urosomite 2 with 2 dorsal spines. Rostrum obsolescent, lateral cephalic lobes subrounded, prominent.

Antennae elongate, antenna 1 longer than 2, peduncle almost slender, ratio of peduncular articles = 29:29:17; accessory flagellum 2-articulate.

Mandibular palp slender, articles 2 and 3 subequally long, article 3 with 3 apical setae (E). Labium ordinary, with small fleshy inner lobes. Maxillae 1-2 not medially setose, inner plate of maxilla 1 with 3 apical setae, outer plate with 9 serrate spines, palp ordinary, 2-articulate, with distal setae and spines. Both plates of maxilla 2 narrow, inner lacking oblique facial row of setae. Both plates of maxilliped of medium size, outer plate setose along inner margin, palp article 2 elongate, article 3 short, slightly lobed, dactyl as long as article 3, nail [unknown].

Coxae of medium size, coxa 1 not expanded, coxa 4 with shallow posterodistal lobe. Gnathopods strongly diverse, subchelate, sexually dimorphic; article 5 of gnathopod 1 slightly longer than 6, unlobed, palm transverse; gnathopod 2 enlarged but weakly so in female, article 5 short to very short, with broad to narrow lobe, article 6 large, ovoid, palm strongly oblique, poorly defined.

Pereopods 5-7 not elongate, pereopod 5 weakly shorter than 7, article 2 of all expanded, ovoid, lobate. Pleopods weak but rami multiarticulate. Uropod 1 slightly reduced [?apparently peduncle without basofacial spine], outer ramus slender, naked dorsally, inner ramus slightly elongate, dorsally spinose. Uropod 2 ordinary, reaching as far as uropod 1, rami normally spinose. Uropod 3 strongly exceeding uropod 1, parviramous, peduncle shorter than outer ramus, inner ramus scale-like, outer ramus rectangular, with medium article 2. Telson short, cleft to base, each lobe quadrate, weakly excavate apically, weakly spinose.

Coxal gills simple, 2-6, ovate to linear, not strongly pediculate. Ootegites narrow.

Relationship.--Allied to Rotomelita J.L. Barnard (1977), but differing from it in the partially reduced uropod 1, subequally long pereopods 5-7, simple gills, sexual dimorphism of gnathopod 2, lobed article 2 of pereopods 5-7, presence of eyes and prominent lateral cephalic lobes.

Species.--N latimera (Bousfield, 1971) [595];

Bismarck Archipelago, brackish lakes and lagoons, 1.

Tegano Karaman and Barnard

Map 53

Tegano Barnard and Karaman, 1982: 176-177 (Melita seticornis Bousfield, 1970, original designation, here selected).

Body smooth, urosomite 1 with small middorsal posterior mucronation. Rostrum obsolescent, lateral cephalic lobes strongly mammilliform.

Antennae elongate, slightly thickened, antenna 1 scarcely longer than 2, ratio of peduncular articles = 12:15:5, ratio of flagella = 30:3, accessory flagellum 2-articulate. Antenna 2 gland cone large.

Ratio of mandibular palp articles = 4:8:0 or 3:10:0 (article 3 absent), apical setae of article 2 = D (one long only). Inner lobes of labium well developed, fleshy. Maxillae moderately setose medially, inner plate of maxilla 1 ovate, with 6 apical and medial setae, outer plate with "9-10" (but see figure) spines, palps [?asymmetric]. Inner plate of maxilla 2 with several marginal medial setae, nonfacial setae. Outer plate of maxilliped minutely spinose medially, dactyl with tiny nail.

Coxae of ordinary length, poorly setose, coxa 1 undilate, coxa 4 unlobed. Gnathopods 1-2 diverse, gnathopod 1 the smaller, of Melitid form, wrist weakly elongate, hand subrectangular, or trapezoidally expanded apically, palm transverse, convex in female, acquiring rugose process in terminal males, gnathopod 2 slightly enlarged, wrist of medium length, scarcely lobed (broadly), hand elongate, subrectangular in female, with oblique short palm, in male larger, more ovate, palm longer, softly excavate, dactyl longer and more curved.

Article 2 of pereopods 5-7 scarcely expanded, scarcely lobate or not posteroventrally, poorly setose (only setulose).

Rami of uropods 1-2 extending equally, marginally spinose, peduncle of uropod 1 with basofacial spine. Uropod 3 extended, parviramous, outer ramus elongate, with medium article 2. Telson short, cleft to base, lobes leaf-like, tapering apically, sparsely setose apically.

Coxal gills 2-6, ovate, that on pereonite 2 pediculate. Oostegites narrow.

Description.--Antennae of male with whorls of setae on peduncles and flagella.

Relationship.--Differing from Melita in the reduced mandibular palp.

Species.--seticornis (Bousfield, 1970) [596];

Solomon Islands (Rennell) and Bismarck Archipelago (Mussau), anchialine, 1.

### Paraniphargus Tattersall

Figure 5, Map 54

Paraniphargus Tattersall, 1925: 241 (Paraniphargus annandalei Tattersall, 1925, monotypy).

Body slender, urosomites with or without weak dorsal tooth. Rostrum weak or obsolescent, lateral cephalic lobes strongly protruding, rounded, sinus obsolescent or absent. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 18:18:12, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 flagellum not longer than article 4 of peduncle.

Ratio of mandibular palp articles = 5:16:16, article 3 linear, setae = E. Inner lobes of labium well developed and fleshy, no gape. Maxillae not medially setose, inner plate of maxilla 1 ovate, with 3-4 apical setae, outer plate with 9-7 spines, palps 2-articulate, apically setose [?symmetric]. Inner plate of maxilla 2 without facial or medial setae. Outer plate of maxilliped [?medially spinose], dactyl [?with nail].

Coxae elongate, poorly setose, coxa 1 rectangular, coxa 4 lobate. Gnathopod 1 small, of Melitid form, wrist weakly elongate, unlobed, hand short, rectotrapezoidal, palm transverse, dactyl fitting palm gnathopod 2 much enlarged, wrist of medium length, weakly lobate, hand large, ovatorectangular, palm oblique, smooth or weakly sculptured, poorly defined, palm lacking large spines; no sexual dimorphism.

Article 2 of pereopods 5-7 weakly to moderately expanded, not lobate to scarcely produced posteroventrally, posterior margin moderately to weakly serrate, lacking large setae.

Pleopods [?ordinary]. Rami of uropods 1-2 extending equally, marginally spinose, peduncle of uropod 1 with basofacial spine [assumed in type]. Uropod 3 strongly extended, peduncle weakly elongate, parviramous, outer ramus elongate, 1-articulate. Telson of ordinary length, fully cleft, lobes tapering, each with 2 long apical spine-setae.

Coxal gills [?2-6, ovate]. Oostegites [?slender].



Variants.--Mandibular lobes of lower lip strongly extended (annandalei); pleopods weak, inner rami longer than outer (ruttneri); gills well developed but simple, no sternal gills (ruttneri).

Relationship.--Scarcely distinct from Melita, differing mainly by loss of eyes and medial maxillary setae.

Species.--63 annandalei Tattersall, 1925 [662];

64 ruttneri Schellenberg, 1931b [648];

Andaman Isles and Java, jungle streams and springs, probably hypogean, 2.

Maleriopa Barnard and Karaman

Maleriopa Barnard and Karaman, 1982: 176 (Eriopisella dentifera Ledoyer, 1978, original designation).

Body slender, urosomites [?free, naked]. Lateral cephalic lobes weak, rounded, sinus absent.

Antennae moderately extended, ratio of peduncular articles = 26:19:8, primary flagellum slightly longer than peduncle, accessory flagellum 2-articulate.

Labrum [?entire, rounded]. Right mandible with only 3 rakers, molar weakly tritirative, ratio of palp articles = 3:10:9, article 3 linear, setae = E, sparse. Inner lobes of labium present, fleshy, mandibular lobes extended. Maxillae not setose medially, inner plate of maxilla 1 subrectangular, with 2 distal setae, outer plate with about 7 spines, palps 2-articulate, [?symmetric]. Inner plate of maxilla 2 without facial and medial setae. Outer plate of maxilliped [medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae of ordinary length, poorly setose, coxa 1 tapering, coxa 4 [?unlobed]. Gnathopods small to moderate, gnathopod 1 with elongate wrist, hand subrectangular, palm weakly oblique; gnathopod 2 moderately enlarged, wrist short, strongly lobed, lobe bending distad, hand subrectangular, weakly expanded apically, palm oblique, well defined, strongly spinose.

Article 2 of pereopods 5-6 weakly expanded, moderately lobate, posterior margin straight, of pereopod 7 expanded, lobate, posterior margin convex, all posterior margins weakly setose; dactyls ordinary.

Pleopods [?ordinary]. Rami of uropods 1-2 extending equally, marginally spinose except for outer ramus of uropod 1, latter [?with basofacial spine]. Uropod 3 slightly extended, parviramous, article 2 on outer ramus short. Telson short, deeply cleft, lobes broad but weakly tapering, each apex with subapical spine.

Coxal gills [?2-6, ovate]. Oostegites [?narrow].

Relationship.--Differing from Eriopisa, Victoriopisa and Psammogammarus in the loss of medial setae on the maxillae. Differing from Paraniphargus in the presence of eyes and article 2 on the outer ramus of uropod 3, the tapering coxa 1 and more strongly lobate bases of pereopods 5-7 and more strongly lobate wrist of gnathopod 2. Differing from Tegano in the presence of article 3 on the mandibular palp, the short article 2 of

antenna 1 and the loss of medial setae on maxilla 2. Differing from Eriopisella in the slightly enlarged gnathopod 2 with strong, spinose palm.

Species.--déntifera (Ledoyer, 1978) [697];

Mauritius, sublittoral, 1.

Anchialella J.L. Barnard

Map 53

Anchialella J.L. Barnard, 1979: 53 (Anchialella vulcanella, J.L. Barnard, 1979).

Body subvermiform, urosomite 2 with 2 spines. Rostrum obsolescent, lateral cephalic lobes rounded, sinus weak. Eyes absent.

Antennae of medium length, antenna 1 scarcely longer than 2, ratio of peduncular articles = 24:25:11, accessory flagellum 2-articulate. Antenna 2 flagellum short, articles free.

Ratio of mandibular palp articles = 6:12:9, article 3 almost fully linear, setae = DE, very sparse. Labium with obsolescent inner lobes, slightly gaping. Maxillae poorly setose medially, inner plate of maxilla 1 ovate, with about 4 apicomедial setae, outer plate with 7 spines, palps symmetrical. Inner plate of maxilla 2 without facial setae, medial setae poorly developed. Maxilliped dactyl almost as long as 3, with strong nail.

Coxae very short, weakly setose, coxa 1 rounded below, unproduced, coxa 4 unexcavate. Gnathopods (only female known) weak, wrist of gnathopod 1 scarcely elongate, unlobed, hand rectangular, stout, palm slightly oblique; wrist of gnathopod 2 scarcely elongate, thick, unlobed, hand rectangular, palm oblique, poorly defined, gnathopod 2 larger than gnathopod 1.

Article 2 of pereopods 5-6 weakly expanded, almost linear, of pereopod 7 more strongly expanded, unlobed, all poorly setose.

Rami of uropods 1-2 evenly extended, outer ramus of uropod 1 lacking marginal spines, peduncle of uropod 1 with facial spines. Uropod 3 greatly extended, parviramous, peduncle slightly elongate, outer ramus 1-articulate. Telson of ordinary length, almost fully cleft, lobes tapering, poorly armed or with one dorsomedial spine each.

Coxal gills 2-6, slender, ovate. Oostegites slender.

Relationship.--Transitional between Psammogammarus and Galapsiellus, differing from Eriopisa, Psammogammarus, and Victoriopisa in the elongation of the peduncle on uropod 3, weak inner lobes of lower lip, weak maxillary setation and absence of article 2 on the outer ramus of uropod 3. Differing from Paraniphargus in the short anterior coxae, slightly stronger maxillary setation, weak mandibular lobes of the lower lip. See Galapsiellus. Differing from Maleriopa in the absence of article 2 on the outer ramus of uropod 3, unlobed article 2 of pereopods 5-7, unlobate wrist of gnathopod 2; from Tegano in the presence of article 3 on the mandibular palp, and poorly developed inner lobes on the labium.

Species.--E vulcanella J.L. Barnard, 1979 [546Q]; Galapagos Islands, anchialine, 1.

Galapsiellus J.L. Barnard

Figures 6, 19, Map 53

Galapsiellus J.L. Barnard, 1976b: 422 (Paraniphargus leleuporum Monod, 1970, original designation).

Body subvermiform, urosomites naked. Rostrum absent, lateral cephalic lobes weak, broad, subquadrate, weak sinus present. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 20:23:9, primary flagellum much longer than peduncle, accessory flagellum 2-articulate. Antenna 2 flagellum short, 4-articulate, gland cone large.

Ratio of mandibular palp articles = 6:12:9, setae on linear article 3 = E (2 only). Inner lobes on labium weak, no gape. Maxillae not or scarcely setose medially, inner plate of maxilla 1 linear-ovate, armed with 4 apical setae, outer plate with 6 spines, palps symmetric. Inner plate of maxilla 2 without facial setae or possibly with one weak apical member, with one weak medial seta. Maxilliped dactyl with strong nail (contrary to Monod).

Coxae very short, barely contiguous, scarcely setulate, apices somewhat rounded and tapering, coxa 4 unlobate, coxa 5 as long as 4. Gnathopods small, almost mittenform, sexes alike, thin, wrists elongate, unlobed, hands shorter, subrectangular, weakly expanding (thus weakly trapezoidal), palms oblique, poorly armed, gnathopod 1 somewhat smaller and with slightly shorter hand than on gnathopod 2.

Article 2 of pereopods 5-7 scarcely expanded, weakly pyriform, slightly tapering apically, posterodistal corners sharp but scarcely produced, dactyls with one inferior setule.

Rami of uropods 1-2 extending subequally, naked dorsally, peduncle of uropod 2 with basofacial spine (Mark 45), apex of peduncle extended. Uropod 3 extended, parviramous, peduncle greatly elongate, as long as outer ramus, latter 1-articulate. Telson of ordinary length, cleft to base, lobes tapering, each armed with one apicomедial spine.

Coxal gills 2-6, ovate, weakly pediculate, not biarticulate. Oostegites narrow, sausage shaped.

Relationship.--Like Anchialella but outer plate of maxilla 1 with only 6 spines, female gnathopod 2 enfeebled, peduncle of uropod 3 even more greatly elongate, and telsonic lobes turgid.

Species.--G leleuporum (Monod, 1970) [546];

Galapagos Islands, Isla Santa Cruz, phreatic and anchialine, 1.

## Eriopisellids

Inner lobes of lower lip various. Maxillae not medially setose. Gnathopod 1 of Melitid form, gnathopod 2 mittenform; or both gnathopods mittenform. Uropod 3 parviramous or uniramous. Telson cleft.

## Key to the Genera of Eriopisellids

1. Gnathopod 1 with lobe on article 5 . . . . . 2  
    Gnathopod 1 lacking lobe on article 5. . . . . 3
2. Outer ramus of uropod 3 with 2 articles, mandibular  
    palp article 3 linear. . . . . Microniphargus ✓  
    Outer ramus of uropod 3 with one article, mandibular  
    palp article 3 falcate. . . . . Indoniphargus ✓
3. Inner ramus of uropod 3 absent . . . . . Giniphargus ✓  
    Inner ramus of uropod 3 present. . . . . 4
4. Article 2 on outer ramus of uropod 3 absent. . . . . Netamelita  
    Article 2 on outer ramus of uropod 3 present . . . . . 5
5. Wrist of gnathopod 2 lobate. . . . . Eriopisella  
    Wrist of gnathopod 2 unlobate . . . . . Eriopisella madagascarensis

Eriopisella Chevreux

Figures 5, 8, 14, Map 54

Eriopisella Chevreux, 1920: 81 (Eriopisella pusilla Chevreux, 1920, monotypy).

Body subvermiform. Rostrum obsolescent, lateral cephalic lobes rounded, sinus absent or poorly developed, or anteroventral corner of head produced. Eyes weak or absent.

Antenna 1 elongate, much longer than 2, ratio of peduncular articles = 30:31:10 [30:30-33:6-12], accessory flagellum 1-articulate. Antenna 2 short. Mandibular raker spines usually absent, ratio of palp articles = 5:10:12 (or article 3 shorter than article 2), article 3 slender, setae = E and few (2). Inner lobes of labium fleshy, often partly fused to outer lobes. Maxillae naked medially, inner plate of maxilla 1 ovate, with few apical setae, outer plate narrow, with 7-9 spines, palps [?symmetric]. Inner plate of maxilla 2 without medial and facial setae. Outer plate of maxilliped medially setose (type) or spinose, dactyl [?without, type, or] with nail.

Coxae very short, scarcely touching, coxa 1 anteriorly produced, coxa 4 unlobed. Gnathopods 1-2 feeble, mittenform, of similar size, wrists of medium length, hands usually shorter and rectangular, palms slightly oblique, short, wrist of gnathopod 1 unlobed, of gnathopod 2 lobed (except madagascarensis).

Pereopods 5-7 progressively longer but together not greatly elongate, article 2 of pereopods 5-7 alike, unexpanded, unlobate, almost linear (type) or article 2 of pereopod 7 expanded and ventrally lobate.

Outer rami of uropods 1-2 scarcely shortened or not, outer rami often without marginal spines, (uropod 1 often with basofacial spine [type unknown]). Uropod 2 occasionally with apicomedial comb row on peduncle. Uropod 3 greatly extended, parviramous, outer ramus elongate, article 2 of medium length (type) or shorter.

Telson of ordinary length, almost to fully cleft, with weak or slender apical armaments.

Coxal gill [?2-6], ovate and stalked [type unknown]. Oostegites narrow.

Notes.--Several species bear 2 elongate apicolateral setae on the outer plate of maxilla 2 (similar to Allocrangonyx).

Relationship.--The basic member of the Eriopisellid group including Indoniphargus, Microniphargus and Giniphargus. Netamelita differs only in the loss of article 2 on the outer ramus of uropod 3; E. madagascarensis deviates in the loss of the wrist lobe on gnathopod 2.

Differing from Eriopisa in the reduced mittenform gnathopods of both pairs and full loss of medial maxillary setae.

Species.--capensis K.H. Barnard (1916) [743];

✓ epimera Griffiths, 1974a [745];

madagascarensis Ledoyer, 1967a [698];

nagatai Gurjanova, 1965 [663],

✓ propagatio Imbach, 1969 [655];

✓ pusilla Chevreux (Chevreux and Fage, 1925) [353];

✓ 96 sechellensis (Chevreux, 1901) [600];

✓ upolu J.L. Barnard, 1970 [381]; eye of coral + algae / medium size  
circumtropical and warm-temperate, marine and brackish, 0-300 m, 8.

#### Netamelita J.L. Barnard

Netamelita J.L. Barnard, 1962a: 110 (Netamelita cortada J.L. Barnard, 1962a, original designation).

Body subvermiform. Rostrum absent, lateral cephalic lobes rounded, sinus absent. Eyes moderately developed.

Antenna 1 elongate, much longer than 2, ratio of peduncular articles = 20:15:4, primary flagellum slightly longer than peduncle, accessory flagellum 1-articulate. Antenna 2 very small, article 5 shorter than 4.

Mandibular raker spines [?absent], ratio of palp articles = 7:13:11, palp feeble, article 3 linear, setae = sparse, E. Inner lobes of labium fleshy, well developed. Maxillae naked medially, inner plate of maxilla 1

(8)

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Stygofauna  
Mundi

not stygofauna

ovate, with 2 apical setae, outer plate with [?spines, palps ?symmetric]. Inner plate of maxilla 2 without facial and medial setae. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae short, scarcely touching, coxa 1 anteriorly produced, coxa 4 unlobed, scarcely longer than coxa 5. Gnathopods 1-2 feeble, mittenform, of similar size, wrists elongate, hands shorter than wrists, rectangular, palms slightly oblique, short, wrist of gnathopod 1 unlobed, of gnathopod 2 lobed.

Pereopods 5-7 progressively longer but together not greatly elongate, article 2 of pereopods 5-7 alike, moderately to strongly expanded, progressively unlobate.

Outer rami of uropods 1-2 scarcely shortened, not marginally spinose, uropod 1 with [?basofacial spine], uropod 2 with weak apicomедial comb row on peduncle. Uropod 3 greatly extended, parviramous, outer ramus elongate, 1-articulate. Telson of ordinary length, almost fully cleft, with weak and strong apical armaments.

Coxal gills [?2-6, ovate, stalked]. Oostegites [?narrow].

Relationship.--Differing from Eriopisella in the loss of article 2 on the outer ramus of uropod 3.

Species.--cortada J.L. Barnard, 1962a [370];

California, sublittoral 1.

#### Indoniphargus Straskraba

Figure 14, Map 54

Indoniphargus Straskraba, 1967: 127 (Niphargus indicus Chilton, 1923b, original designation).

Body weakly subvermiform, sparsely setose dorsally, urosomites with scattered setae. Rostrum absent, lateral cephalic lobes mammilliform. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 24:16:12, primary flagellum longer than peduncle, with rhabdal calceoli (or aesthetes?) accessory flagellum 2-articulate. Antenna 2 relatively long.

Ratio of mandibular palp articles = 8:20:10, article 3 strongly falcate, setae = DE (numerous). Inner lobes of labium absent, no gape. Maxillae almost naked medially, inner plate of maxilla 1 slender, elongate, with 2 apical setae, outer plate with 8 spines, palps 2-articulate, asymmetrical. Inner plate of maxilla 2 with one medial seta on margin at apex, medially hairy.

Coxae 1-4 longer than broad, contiguous or overlapping, each with several long apical setae, coxa 4 lobate. Gnathopods 1-2 feeble, mittenform, of similar width, but gnathopod 2 longer than gnathopod 1, hands subrectangular, palms weakly oblique, short, wrists lobate (or weakly on gnathopod 2), wrist of gnathopod 1 of medium length, hand slightly

shorter, wrist of gnathopod 2 elongate, hand also elongate and scarcely shorter than wrist.

Pereopods 5-7 of medium size, progressively longer, article 2 weakly expanded, small posteroventral lobe progressively slightly stronger, posterior margins convex, densely setuloserrate; dactyls short, with one inferior setule.

Pleopods [?ordinary]. Rami of uropods 1-2 extending subequally, rami well spinose marginally except outer ramus of uropod 2, apical spines notably dense, uropod 1 with at least 4 facioventral spines, uropod 2 with 4 apicolateral spines. Uropod 3 extended, parviramous, outer ramus elongate, uniarticulate. Telson of ordinary length, cleft about three fourths, lobes appressed, untapered, apically and dorsally spinose.

Coxal gills [?2-6], ovate, pedunculate. Oostegites [unknown]. Sternal gills [?].

Relationship.--Differing from Eriopisella, Netamelita and Giniphargus in the lobate wrist of gnathopod 1; from Microniphargus in the falcate article 3 of mandibular palp and loss of article 2 on outer ramus of uropod 3.

With the facies of certain Crangonyctids, or Oriental Gammarids, because of multiple facial spination on peduncle of uropod 3, general appearance and spinosity of pereopods and uropods and urosomites, strongly falcate mandibular palp, well developed and spinose plates of maxillipeds; thus, differing from Neoniphargus in the broadness of wrist lobes on gnathopods; differing from Asiatic Gammarids and Crangonyctids in the mittenform gnathopods. Sternal gills have not been reported and Crangonyctid affinities cannot be confirmed. See Eoniphargus.

Species.--86 indicus (Chilton, 1923b) (Stephensen, 1931) [963];

India, mines, springs and wells, 1.

#### Microniphargus Schellenberg

Map 65

Microniphargus Schellenberg, 1934b: 215; 1942: 80 (Microniphargus leruthi Schellenberg, 1934b, monotypy).

Body [?slender]. Rostrum [?absent], lateral cephalic lobes subrounded, [?sinus present]. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles [unknown, but article 1 as long as articles 2-3 together], primary flagellum longer than peduncle, accessory flagellum 1-articulate.

Labrum strongly incised. Ratio of mandibular palp articles = 4:12:7, article 3 linear, setae sparse, E. Inner lobes of labium large, thereby widely spreading outer lobes. Maxillae not medially setose, inner plate of maxilla 1 slender, with one apical seta, outer plate with 7 spines, palp [?2-articulate], reaching to middle of spines on outer plate, with 3 apical setae [apparently palps symmetric]. Inner plate of maxilla 2 shortened, lacking facial setae. Outer plate of maxilliped [?medially spinose, article 3 of palp unlobed, dactyl shorter than 3, unguiform, ?with nail] [maxilliped said to be normal].

Coxae 1-4 longer than broad, with about 2 long apical setae each, coxa 4 weakly lobed. Gnathopods 1-2 feeble, mittenform, of similar size, wrists of medium length, wrist of gnathopod 1 with distinct lobe pointing weakly apicad, of gnathopod 2 lobate, hands slightly longer than wrists, rectangular, palms weakly oblique, short.

Pereopods 5-7 elongate, slender, alike, article 2 moderately expanded, lobate posteroventrally, dactyls elongate, almost becoming flagellate.

Rami of uropods 1-2 extending subequally, not marginally spinose, [apparently not basofacially armed]. Uropod 3 strongly extended, parviramous, outer ramus elongate, article 2 of medium length (slightly less than half as long as article 1), both articles almost naked. Telson short, as broad as long, cleft almost halfway, gaping, each lobe armed with one apical setule.

Coxal gills 2-4 short and slender, 5-6 ovate. Oostegites [?slender].

Relationship.--Like Indoniphargus but mandibular palp article 3 linear, outer ramus of uropod 3 with 2 articles. Differing from Eriopisella and Giniphargus in the presence of a lobe on the wrist of gnathopod 1.

Species.--leruthi Schellenberg, 1934b [108];

Belgium, hypogean, 1.

#### Giniphargus Karaman and Barnard

Figures 5, 14, Map 8

Giniphargus Karaman and Barnard, 1979: 150 (Niphargus pulchellus Sayce, 1899 original designation).

Body subvermiform, segments with weak posterodorsal setules. Rostrum obsolescent, lateral cephalic lobes shallow, rounded, with sinus below and then extended bulbous corner. Eyes absent.

Antennae slightly elongate, antenna 1 scarcely longer than 2, ratio of peduncular articles = 30:24:9; accessory flagellum 4-articulate. Article 4 of peduncle on antenna 2 slightly inflated, longer than article 5, flagellum ordinary, articles free.

Ratio of mandibular palp articles = 10:18:15 (article 1 thus elongate), article 3 weakly falcate, setae = CDE. Inner lobes of labium discrete, small, fleshy. Maxillae moderately setose medially, inner plate of maxilla 1 ovate, with about 5 medial setae near apex, outer plate with about 8 serrate spines, palps [?symmetric]. Inner plate of maxilla 2 with oblique facial row of setae (as stated by description).

Coxae very short, barely touching each other, coxa 1 not produced, coxa 4 unlobed. Gnathopods 1-2 similar to each other, feeble, subchelate, mittenform, wrists unlobed, hands trapezoidal, small, expanding apically, palms transverse, short, wrist of gnathopod 1 of ordinary length, wrist of gnathopod 2 elongate, gnathopods otherwise identical in size.

Pereopods 5-7 progressively longer than each other but together not of elongate form, article 2 unexpanded, ovato-linear, unlobate, dactyls apparently with only one setule on inferior margin.



Rami of uropods 1-2 extending subequally, marginally spinose, peduncle apparently lacking basofacial spine. Uropod 3 greatly extended, of "parviramous" form because inner ramus absent, outer ramus huge, article 2 also huge and nearly as long as article 1. Telson short, broad, cleft halfway, apices broadly rounded, dorsally spinose.

Coxal gills 2-6, ovoid, pedunculate, 2-articulate. Oostegites [unknown].

Relationship.--Differing from Indoniphargus and Microniphargus in the absence of a lobe on the wrist of gnathopod 1; from Eriopisella in the absence of the inner ramus on uropod 3, the presence of an oblique setal row on maxilla 2, the elongate article 2 on the outer ramus of uropod 3 and in the absence of a lobe on the wrist of gnathopod 2.

Species.--45 pulchellus (Sayce, 1899) [943];

Australia, Victoria, Gippsland, presumed hypogean, 1.

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#### Bathyonigids

Head enlarged; antennae medium; body ordinary but all coxae short, scarcely contiguous, irregular in shape; gnathopods feeble, almost mittenform, wrists elongate, spination [unknown]; all pereopods 3-7 very slender, short. Uropod 3 variramous, article 2 on outer ramus well developed; telson elongate, deeply cleft, lateral setules shifted apicad; pleopods normal; gills and broodplates [unknown].

Outer plate of maxilla 1 with only 4 spines.

Probably juveniles of Gammarus.

#### Bathyonyx Vejdovsky

Bathyonyx Vejdovsky, 1905: 2 (Bathyonyx devismesi Vejdovsky, 1905, original designation); 1907: 228.--Stebbing, 1906: 729.

Possibly brood juveniles of Gammarus (Schellenberg, 1937:270). Urosomites free, weakly setulose dorsally. Head large, rostrum obsolescent, lateral cephalic lobes broadly rounded-truncate, sinus absent. Eyes incompletely developed.

Antennae medium to short, antenna 1 slightly longer than 2, ratio of peduncular articles = 18:14:12, primary flagellum scarcely longer than peduncle, each middle article with aesthetasc, accessory flagellum 2-articulate. Antenna 2 gland cone long and slender.

Labrum [unknown]. Ratio of mandibular palp articles = 8:15:11, article 3 clavate, setae = E, about 6 in row across apex. Inner lobes of labium [unknown]. Inner plate of maxilla 1 [unknown], outer plate narrow, weak, with 4 pectinate spines of 2 kinds, palp large, 2-articulate, article 2 elongate, with 5 thin apical spines [palps ?symmetric]. Inner plate of maxilla 2 with medial row of setae not apparently submarginal or oblique. Maxilliped [?palp article 3 unlobed, dactyl shorter than 3, unguiform, with nail].

Coxae very short, barely contiguous, anterior coxae not longer than posterior coxae, anterior coxae rounded and tapering (1 and 4) or weakly and softly bilobed (2-3) below, aetose; coxae 5-7 not bilobed. Gnathopods feeble, mittenform, wrists of medium length, weakly lobate, hands about as long as wrists, subrectangular, palms weakly oblique, short, hand of gnathopod 1 larger than of gnathopod 2, palm thus longer and more oblique than on gnathopod 2.

Pereopods 5-7 of medium length, alike, article 2 ovatolinear, aetose.

Rami of uropods 1-2 extending equally, not marginally setose, basofacially naked. Uropod 3 extended, variramous, inner ramus more than half as long as article 1 of outer ramus, with 1 medial and 2 apical setae, article 2 of outer ramus elongate, about 0.40 times as long as article 1, outer ramus sparsely armed with long setae. Telson elongate, deeply cleft, lobes tapering, almost acute, each with 2 apical setal spines, one setule, lateral setule pairs highly apicad.

Coxal gills [?2-7, ovate]. Oostegites [broad or slender].

Relationship.--Probably juveniles of another genus; most characters of neotenic facies. To be held in reserve near mittenform genera such as Eriopisella until rectified.

Species.--devismesi Vejdovsky, 1905 [126];

Ireland, Lough Mask, freshwater, 1.

#### Pseudoniphargids

Inner lobes of lower lip well developed; maxillae not medially setose; gnathopod 1 Melitid, hammer-shaped; gnathopod 2 enlarged, Melitid, wrist short, palm oblique, with mixture of setae and spinules; uropod 3 parviramous, sexually dimorphic, female lacking article 2, male with elongate article 2; telson weakly emarginate; coxal gills 2-6.

#### Pseudoniphargus Chevreux

Figures 14, 20, 48, Map 58

Pseudoniphargus Chevreux, 1901a: 211 (Pseudoniphargus africanus Chevreux, 1901a, original designation).

Body slender. Lateral cephalic lobes mammilliform.

Antennae elongate, antenna 1 much longer than 2, ratio of peduncular articles = 15:11:7, primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 article 1 enlarged.

Ratio of mandibular palp articles = 6:13:13, article 3 almost linear or weakly clavate, setae = ACDE, but only E setae well developed. Inner lobes of labium well developed. Maxillae not medially setose, inner plate of maxilla 1 ovato-rectangular, only setose apically, outer plate with 7 spines, palps [?symmetrical]. Inner plate of maxilla 2 without facial setae, bearing only thin hair-like medial armaments, outer plate with 2 kinds of setae (like Allocrangonyx). Outer plate of maxilliped setose medially, with apical spines.

Coxae of ordinary dimensions, poorly setose, coxa 1 slightly expanded apically, coxa 4 scarcely lobate. Gnathopods diverse; gnathopod 1 small, hammer-like, wrist short, unlobate, hand short, subrectangular, palm almost transverse; gnathopod 2 enlarged, wrist short, unlobate, hand subrectangular, palm oblique, armed with setae and spinule-setules, defined by spines, smooth; no sexual differences.

Article 2 of pereopods 5-7 expanded, scarcely to weakly lobate serratosetulate posteriorly.

Rami of uropods 1-2 extending equally, not marginally spinose, peduncle of uropod 1 with basofacial spine [fide J.R. Holsinger]. Uropod 3 extended, parviramous, peduncle slightly elongate, outer ramus very long, with one article in female and 2 long articles in male. Telson short, almost entire, apex with weak incision, sublobes strongly spinose apically.

Coxal gills 2-6, ovate, some pediculate, 2-articulate. Oostegites slender.

Variants.--Only sexual differences found on uropod 3, female lacking long article 2 on outer ramus.

Relationship.--Probably evolved laterally from ancestors similar to those of Niphargids but gnathopods diverse.

Species.--adriaticus S. Karaman, 1955 (G.S. Karaman, 1978d)  
[129] (not mapped);

africanus Chevreux, 1901a (Margalef, 1970) [129] (mapped);

circum-Mediterranean, anchialine, in Africa 100+ km inland, wells, 1.

#### Niphargids

Inner lobes of lower lip present; maxillae not medially setose or weakly so; both pairs of gnathopods hammer-like, wrists unlobed, hands mittenform to expanded, palmar slopes alike in both pairs, lacking densely packed spines; uropod 3 variramous to parviramous; telson cleft to entire.

#### Key to the Genera of Niphargids

1. Uropod 3 variramous. . . . . Pontoniphargus  
Uropod 3 parviramous . . . . . 2
2. Maxilla 1 and rakers of mandible of filtrative form . . . . Niphargopsis  
Maxilla 1 and mandible ordinary. . . . . 3
3. Uropod 3 minute, inner ramus absent. . . . . Carinurella  
Uropod 3 large, inner ramus present. . . . . 4
4. D-setae of mandibular palp absent. . . . . Niphargellus  
D-setae of mandibular palp present . . . . . 5
5. Article 2 on outer ramus of uropod 3 present . . . . . Niphargus  
Article 2 on outer ramus of uropod 3 absent . . . . . Haploginglymus

Pontoniphargus Dancau

## Map 65

Pontoniphargus Dancau, 1970: 276 (or 2) (Pontoniphargus racovitzai Dancau, 1970, original designation).

Body slender, urosomite 2 with 2 dorsal spines. Rostrum [obsolescent], lateral cephalic lobes [?weakly protuberant, rounded, sinus present]. Eyes absent.

Antennae greatly elongate, antenna 1 longer than 2, ratio of peduncular articles = [?16:12:8], primary flagellum with 28-30 articles [?longer than peduncle], accessory flagellum 2-articulate. Antenna 2 flagellum with 8 articles.

Labrum [?broader than long, rounded, entire]. Mandibular molar small but triturative, ratio of palp articles = 5:12:13, article 3 weakly falciform, setae = ABDE. Inner lobes of labium [?present]. Inner plate of maxilla 1 very small, subrectangular, with one apical seta, outer plate very broad, armed with 7 curved and strongly pectinate spines, palp 2 articulate, article 2 flabellate, moderately but broadly setose apically, [?palps symmetric]. Inner plate of maxilla 2 much narrower than outer, with row of 3 medial setae. Outer plate of maxilliped apically spinose, medially naked; palp large, dactyl as long as 3, unguiform, with fused flagellate nail.

Coxae of medium length, weakly setose, coxa 1 unexpanded, coxa 4 weakly lobate. Gnathopods small to feeble, hammer-like, of similar form and size, wrists elongate but longer on gnathopod 2, unlobate, hands trapezoidal, expanded apically, palms short, transverse-parachelate (hands definitively chelate), dactyls fitting palms.

Article 2 of pereopods 5-7 moderately expanded and lobate, posterior margins weakly convex, setose, faces setose. Dactyls slightly elongate, with 2 inferior setules.

Rami of uropods 1-2 extended evenly marginally spinose, peduncle of uropod 1 with several outer facial spines. Uropod 3 extended, variramous, outer ramus elongate, 2-articulate, second article about one third as long as first, inner ramus reaching M. 60-75 on article 1 of outer ramus, with side setae; peduncle elongate. Telson slightly elongate, deeply cleft, lobes tapering, sparsely spinose apically, medially, laterally, dorsally.

Coxal gills [?2-6, ovate]. Oostegites [?slender].

Variants.--Right lacinia mobilis not distinguished from raker spines.

Relationship.--Probably plesiomorphic to Niphargus owing to the enlarged inner ramus of uropod 3.

Species.--racovitzai Dancau, 1970 [071];

Rumania, near the Black sea, hypogean, 1.

Niphargus Schiodte

Figures 14, 26, 47, 48, Maps 59-64

- Niphargus Schiodte, 1849: 26 (Niphargus stygius Schiodte, 1849, monotypy).--Stebbing, 1906: 405.
- Stygodytes Absolon, 1913: 104 (nomen nudum); 1927: 293 (Stygodytes balcanicus Absolon, 1927, original designation).
- Antroplotes Absolon, 1916 [not seen] (?nomen nudum) (Antroplotes herculeanus Absolon, 1916, ?monotypy).
- Martynovia Derzhavin, 1945b: 33 (Martynovia submersus Derzhavin, 1945b, monotypy).
- N. (Phaenogammarus) Dudich, 1941d: 72 (Niphargus thermalis Dudich, 1941a, original designation).
- N. (Supraniphargus) S. Karaman, 1950b: 80 (Niphargus illidzensis Schaferna, 1923b, selected by S. Karaman, 1960b).
- N. (Orniphargus) S. Karaman, 1950b: 120 (Niphargus orcinus Joseph, 1869, here selected).
- N. (Stygoniphargus) S. Karaman, 1952a: 5 (Niphargus stygius Schiodte, 1849, here selected).
- N. (Protoniphargopsis) Sket, 1957a: 485 (no type-species).
- ?Haploginglymus A. Mateus and E. Mateus, 1958: 7 (Haploginglymus bragai A. Mateus and E. Mateus, 1958, original designation) (= valid subgenus).
- N. (Carpathoniphargus) S. & G.S. Karaman, 1959b: 152 (Niphargus carpathicus Dobreanu and Manolache, 1939, here selected).
- N. (Jovaniphargus) S. Karaman, 1960b: 77 (Niphargus jovanovici S. Karaman, 1931d, here selected).
- Karamaniella Sket, 1962: 27 (Karamaniella pupetta Sket, 1962, original designation).

Body ordinary to vermiform, urosomites free, or partly coalesced, smooth or body grossly spinose. Rostrum strong to absent, lateral cephalic lobes strong to absent, sinus present or absent. Eyes absent (or rarely present and non-ommatidial).

Antennae medium to elongate, antenna 1 longer than 2, ratio of peduncular articles = 19:15:7, primary flagellum longer than peduncle, accessory flagellum 1-2 articulate.

Ratio of mandibular palp articles = 5:11:9, article 3 weakly falciform, setae = (ABC)DE. Inner lobes of labium present. Maxillae not setose medially, inner plate of maxilla 1 ovate, sparsely setose apically, outer plate with 6-7 spines, palps symmetric. Inner plate of maxilla 2 lacking facial and medial setae (or medial hairs present). Maxilliped dactyl longer or shorter than 3.

Coxae long to short, strongly overlapping to barely touching, poorly setose or glabrous, coxa 1 rectangular or weakly dilated, coxa 4 strongly lobate or unlobate. Gnathopods various, typically large, similar, or gnathopod 1 smaller than 2, both usually hammer-like, wrists short, poorly lobed, hands broad, short, palms transverse or weakly oblique, thick palmar spines absent, sexually dimorphic or not.

Article 2 of pereopods 5-7 narrow and unlobed or weakly expanded and lobate.

*U.1 without basofacial spine*

Rami of uropods 1-2 extending equally or one or the other slightly shortened. Uropod 3 very long or somewhat shorter, parviramous, article 2 of outer ramus usually very elongate, rarely short or absent. Telson short to long, cleft halfway or more, apically spinose, often laterally.

Coxal gills 2-6, ovate, often pediculate and 2-articulate. Oostegites broad.

Variants.--Article 2 on outer ramus of uropod 3 absent (Haploginglymus bragai, valid subgenus); body multispinose (balcanicus); dactyls of pereopods multispinose (occasional); gnathopods with Eusirid attachment between articles 5 and 6 (often); head enlarged (Haploginglymus bragai); article 2 on outer ramus of uropod 3 shortened in female (stygius).

Relationship.--Like Eriopisa and its allies but maxillae without major medial setae; gnathopods often appearing as enlarged mittenforms like those of Eriopisella and allies.

Species.--See Chevreux and Fage, 1925; Balazuc, 1954, 1957; Hoffmann, 1962; Schellenberg, 1937b, 1942; Carausu et alia, 1955; Sket, 1972; Stock, 1972d; G.S. Karaman, 1963, 1972c, 1973f, 1973g, 1974c; Dedju, 1967a; Ruffo, 1972b. N = unknown subspecies.

- 1 aberrans Sket, 1972 [087];
- 2A ablaskiri Birstein, 1940 [066], 2B a. inermis Birstein, 1940 [066],  
2C a. georgievi S. and G.S. Karaman, 1959a [089];
- 3 abricossovi Birstein, 1932 (Derzhavin, 1938) [066],  
a. inornatus Derzhavin, 1945b [066];
- 4 adbipus G.S.Karaman, 1973f [087];
- 5 adei S. Karaman, 1933a [088];
- 6 alasonius Derzhavin, 1945b [066];
- 7 altagahizi Alouf, 1973 [049];
- 8 alutensis Dancau, 1971 [083];
- 9 ambulator G.S. Karaman, 1975a [098];
- 10 anatolicus G.S. Karaman, 1950b [068];
- 11 andropus Schellenberg, 1940c, (Carausu et alia, 1955) [083];
- 12A aquilex Schiodte, 1855 (Chevreux and Fage, 1925), 12B a. vej dovskyi  
Wrzesniowski, 1890 (Schellenberg, 1942), 12C a. moldavicus  
Dobreanu, Manolache and Puscariu, 1953 (Carausu et alia, 1955), 12D  
a. pretneri Sket, 1959 [107];

- 13 asper G.S. Karaman, 1972b [087];
- 14 balazuci Schellenberg, 1951a [108];
- 15 balcanicus (Absolon, 1913, 1927) (Carausu et alia, 1955) [087];
- 16 bilecanus S. Karaman, 1953b [087];
- 17 bitoljensis S. Karaman, 1943a [088];
- 18 boskovici S. Karaman, 1952c, 1953b, b. borkanus S. Karaman, 1960b,  
b. alatus G.S. Karaman 1973a [087];
- 19 boulangei Wichers, 1964 [108];
- 20 bragai A. Mateus & E. Mateus, 1958 (Haploginglymus) [114];
- 21 brevicuspis Schellenberg, 1937d (G.S. Karaman, 1968a),  
b. sketi G.S. Karaman, 1966a [087];
- 22 brevirostris Sket, 1971a [087];
- brusinae Grochowsky, 1904 [not seen] (Schellenberg, 1935a) [poorly known];
- 24 buresschi Fage, 1926 (S. & G.S. Karaman, 1959a) [089];
- 25 buturovici S. Karaman, 1958 [087];
- 25C canui G.S. Karaman, 1976d [098];
- 26A carpathicus Dobreanu and Manolache, 1939, 1948 (Carausu et alia, 1955),  
26B c. meridionalis (homonym) and 26C c. romanicus Dobreanu and  
Manolache, 1943, 26D c. affinis and 26E c. variabilis Dobreanu  
et alia, 1953; 26F c. cavernicolus [see Dancau, 1972b] [081];
- 28 castellanus S. Karaman, 1960b [087];
- 29 cepelarensis S. and G.S. Karaman, 1959a [089];
- 30A ciliatus Chevreux in Peyerimhoff, 1906 (Chevreux and Fage, 1925),  
30B c. cismontanus Margalef, 1952a, 1970 [111];
- 31 corsicanus Schellenberg, 1950 [101] (Stock, 1972 --->longicaudatus);
- 32 costozzae Schellenberg, 1935a, 1937b (S. Karaman, 1954, incl. unisetosa)  
[098];
- 33 croaticus (Jurinac, 1887) (S. Karaman, 1950), c. pachytelson Sket, 1960  
[087];
- 34 cubanicus Birstein, 1954 [061];

- 35 cvijici S. Karaman, 1950b (G.S.Karaman, 1976c) [087];
- 36 dacicus Dancau, 1963a [083];
- 37 deelemanae G.S. Karaman, 1973e [087];
- 38 delamarei Ruffo, 1953d [108];
- 39 dimorphus Birstein, 1961 [071];
- 40 dobrogicus Dancau, 1964 [083];
- 41 dudichi Hanko, 1924 (Schellenberg, 1935a) [082];
- 41S duplus G.S. Karaman, 1976d [098];
- 42A elegans Garbini, 1894, 1895b (including var. imperfectus, technically a senior synonym) (S. Karaman, 1954b), 42B e. zagrebensis S. Karaman, 1950b (G.S. Karaman 1977d) [092];
- 43 eugeniae Derzhavin, 1945b [066] (See Birstein, 1952:35);
- 44 fontanus Bate, 1859b (Chevreux and Fage, 1925) [080];
- 45A foreli Humbert, 1876 (Chevreux and Fage, 1925), 45B f. thienemanni Schellenberg, 1934a, 45C f. transylvanicus Schellenberg, 1934a, 45D f. gebhardti Schellenberg, 1934a, 45E f. vornatscheri Schellenberg, 1934a, 45F f. speziae Schellenberg, 1937b, 45G f. setiferus Schellenberg, 1937d, 45H f. apuanus Ruffo 1937b, 45I f. dubius Dobreanu and Manolache, 1939a, 45J f. bihorensis Schellenberg, 1940c, 45K f. effosus Dudich, 1943, 45L f. korosensis Dudich, 1943, 45M f. somesensis Motas, Dobreanu & Manolache, 1948 [reference unknown, see Carausu et alia, 1955], 45N f. carsicus Straskraba, 1956a [060];
- 46 galenae Derzhavin, 1939 [066];
- 47 gallicus Schellenberg, 1935a (Dancau, 1963b) (Balazuc, 1954) [108];
- 48 galvagnii Ruffo, 1953a [098];
- 49 gineti Bou, 1965 [108];
- 50 glenniei Spooner, 1952 [124];
- 51 glontii Behning, 1940a [066];
- 52 godeti Wrzesniowsky, 1890 [108];
- 53 graecus S. Karaman, 1933a [088];
- 54 gurjanovae Birstein, 1941 [066];



- 55 hadzii (Rejic, 1956) (Sket, 1958a) [087];
- 56 hebereri Schellenberg, 1933b (G.S. Karaman, 1974f) [087];
- 57 hrabei S. Karaman, 1932 (Straskraba, 1959b) [081];
- 58 hvarensis S. Karaman, 1952b, 1952c, 1958 [087];
- 59A illidzensis Schaferna, 1923b, 59B i. dalmatina Schaferna, 1923b,  
59C i. slovenicus S. Karaman, 1932, 59D i. orientalis  
S. Karaman, 1950b, 59E i. pannonicus S. Karaman, 1950b,  
59F i. montenigrinus G.S. Karaman, 1962 [087];
- 60 inclinatus G.S. Karaman, 1973a [087];
- 61 inopinatus Schellenberg, 1932a [085];
- 62 ivanovi Schaferna, 1933 (nomen nudum), 1935 [083];
- 63A jovanovici S. Karaman, 1931d, 63B j. bajuvaricus Schellenberg, 1932b,  
63C j. kieferi Schellenberg, 1936d, 63D j. grandii Ruffo, 1937b,  
63E j. incertus Dobreanu et alia, 1951, 63F j. multipennatus Sket,  
1957b, 63G j. ponoricus Dancau, 1963a, 63H j. burgundus Graf and  
Straskraba, 1967 [060];
- 64A kochianus Bate, 1859b (= casparianus Wrzesniowsky, 1890),  
64B k. irlandicus Schellenberg, 1932c, 64C k. petrosani  
Dobreanu & Manolache, 1933, 64D k. pachypus Schellenberg, 1933e,  
64E k. wolfi Schellenberg, 1933e, 64F k. polonicus Schellenberg,  
1936d, 64G k. longidactylus Ruffo, 1937c, 64I k. tamaninii Ruffo,  
1953b, 64J k. minor Sket, 1957b, 64K k. labacensis Sket, 1957b,  
64L k. melticensis Dancau and Andreev, 1973, 64M k. dimorphopous  
Stock and Gledhill, 1977 [060];
- 65A kolombatovici (S. Karaman, 1950b, 1953b), 65B k. subtypicus Sket,  
1960 [087];
- 66 krameri Schellenberg, 1935a, (= spinulifer S. Karaman, 1954b),  
s. timavi S. Karaman, 1954b (Sket, 1958a), [087];
- kurdus Derzhavin, 1945b [066];
- 67 ladmiraulti Chevreux, 1901a (Chevreux and Fage, 1925) [108];
- 68 laisi Schellenberg, 1936d [082];
- 69 leopoliensis Jaworowski, 1893 (Skalski, 1970) [063];
- 70 lindbergi (S. Karaman, 1956) [088];

- 72A longicaudatus Costa 1851a:45 (= longicauda, 1851a:23, nomen nudum) (Ruffo, 1948a) (= montanus Costa, 1851 [see Stebbing, 1906]); 72B l. plateaui Chevreux, 1901a (Chevreux and Fage, 1925) (= elongatus Chevreux, 1901a) (= meridionalis Vire, 1902); 72C l. robustus Chevreux, 1901a (Schellenberg, 1937d), 72D l. remyi S. Karaman, 1934b, 72E l. thuringius Schellenberg, 1934a, 72F l. anticolanus D'Ancona, 1934; 72G l. hungaricus Mehely, 1937; 72H l. debilis Ruffo, 1937b, 72I l. magnus Birstein, 1940, 72J l. versluyi S. Karaman, 1950a (Balazuc, 1954, 1957) [005];
- 73 lori Derzhavin, 1945b [066];
- 74 macedonicus S. Karaman, 1929a, 1954a [088];
- 75A maximus S. Karaman, 1929a (G.S. Karaman, 1963), 75B m. tenuicaudatus Schellenberg, 1940, 75C m. laticaudatus Schellenberg, 1940, 75D m. petkovskii G.S. Karaman, 1963, 75E m. vulgaris G.S. Karaman, 1968a [090];
- 77 microcerberus Sket, 1972 [092];
- 78 miljeticus Straskraba, 1959a [087];
- 79 minutus (Gervais, 1835) (Stebbing, 1906) [dubious] [108];
- 80 molnari Mehely 1927 [not seen] (Carausu et alia, 1955) [084];
- 81 moniezi Wrzesniowski, 1890 (Stebbing, 1906) [dubious] [108];
- 82 nadarini Alouf, 1972 [049];
- 83 nicaeensis Isnard, 1916 (Chevreux and Fage, 1925) [108];
- 84 ohridanus S. Karaman, 1929a, 1943a (= fontophilus S. Karaman, 1943a) [139];
- 85A orcinus Joseph, 1869 [not seen] (Ruffo and Vigna-Taglianti, 1968b), 85B o. vjeternicensis S. Karaman, 1932 (= herculeanus Absolon, 1928, nomen nudum), 85C o. steueri Schellenberg, 1935a, 85D o. hercegovinensis S. Karaman, 1930, 85E o. kusceri S. Karaman, 1950b, 85F o. longiflagellum S. Karaman, 1950b, 85G o. redenseki Sket, 1959, 85H o. patrizii Ruffo and Vigna-Taglianti, 1968a, 85I o. parenzani Ruffo and Vigna-Taglianti, 1968a [099];
- 86 pachypus Schellenberg, 1933e (Stock, 1972) (Stock and Gledhill, 1977) [107];

- 87 pancici S. Karaman, 1929a (= jakupicae S. Karaman, 1960a)  
(= peristerica S. Karaman, 1960a) (= prespensis S. Karaman,  
1960a), p. vlkanovi S. and G.S. Karaman, 1959a, p. dojranensis  
G.S. Karaman, 1960b [088];
- 88 parvus S. Karaman, 1943a [088];
- 89 pasquinii Vigna-Taglianti, 1966 [098];
- 89V pavicvici G.S. Karaman, 1976c [087];
- 90 pectenicauda Sket, 1971a [087];
- 91 pellagonicus S. Karaman, 1943a (G.S. Karaman, 1960b) [088];
- 92 pliginskii Martynov, 1931b [071];
- 93 podgoricensis S. Karaman, 1934b, 1950b [087];
- 94 ponticus Czerniavsky, 1868 [not seen] [089];
- 95 potamophilus Birstein, 1954 [071];
- 96 pseudocaspius G.S. Karaman, 1979x (= caspius Derzhavin, 1945a,  
homonym) [332];
- 97 pseudkochianus Dobreanu, Manolache and Puscariu, 1953 (Carasu et alia,  
1955) [071];
- 98 pulevici G.S. Karaman (1967b) [087];
- 99 pupetta Sket, 1962) (G.S. Karaman, 1975a) [092];
- 100A puteanus (Koch, 1835) (Stock, 1974a), 100B p. komareki S. Karaman, 1932,  
100C p. spoeckeri Schellenberg, 1933e, 100D p. banaticus Dobreanu  
and Manolache, 1936, 100E p. pater Mehely, 1927 [not seen], 1941  
[not seen] (= baloghi Dudich, 1940), 100F p. iniochus Birstein,  
1941, 100G p. derzhavini Birstein, 1952, 100H p. otharicus Birstein,  
1952, 100I, p. carpathorossicus Straskraba, 1956b, 100J p. abchasicus  
Martynov, 1932) (= stadleri S. Karaman, 1932) [005];
- 101 rajecensis Schellenberg, 1938c [085];
- 102 rejici Sket, 1958a [087];
- 103 rhenorhodanensis Schellenberg, 1937d (Ginet, 1972) [107];
- 104 rhodi S. Karaman, 1950a [088];
- 105 romuleus Vigna-Taglianti, 1967 [098];
- 106 rostratus Sket, 1971a [087];

- 107 rucneri G.S. Karaman, 1962 [087];
- 107F ruffoi G.S. Karaman, 1976d [098];
- 108 salonitanus (S. Karaman, 1950, 1953) [087];
- 109 sanctinaumi S. Karaman, 1943a (G.S. Karaman, 1963) [088];
- 109A schellenbergi S. Karaman (1932) (was aguilex) (Stock, 1972) (Straskraba, 1972) [107];
- 110 serbicus S. Karaman, 1960b (Sket, 1972) [087];
- 111A skopljensis (S. Karaman, 1929b), 111B s. angelieri (Ruffo, 1953d), 111C s. danconai (Benedetti, 1943), 111D s. phreaticolus (Motas, Dobreanu and Manolache, 1948) (Carausu et alia, 1955) [081 + 099];
- 112 smederevanus S. Karaman, 1950b [084];
- 113 smirnovi Birstein, 1952 [066];
- 114 sphagnicolus (Rejic, 1956) [087];
- [stadleri--->putaneus, not tatrensis];
- 115 stankoi G.S. Karaman, 1974c [088];
- 116 stebbingi Cecchini, 1928c, 1929) [098];
- 117 stefanelli Ruffo and Vigna-Taglianti, 1968a [098];
- 118 stenopus Sket, 1960 [087];
- 119 strouhali Schellenberg, 1933b [082];
- 120A stygus (Schiodte, 1847) (= borutzkyi Birstein, 1933), 120B s. dolegnaniensis Lorenzi, 1898 [not seen] (= danconae S. Karaman, 1954b, 120C s. karamani Schellenberg, 1935a, 120D s. brixianus Ruffo, 1937b, 120E s. pedemontanus Ruffo, 1937b, 120F s. bosniacus S. Karaman, 1943b, 120G s. ravanicanus S. Karaman, 1943b, 120H s. brachytelson S. Karaman, 1952a, 120I s. kenki S. Karaman, 1952a, 120J s. likanus S. Karaman, 1952a, 120K s. savensis S. Karaman, 1952a, 120L s. novomestanus S. Karaman, 1952a, 120M s. gabrovceci S. Karaman, 1952a, 120N s. podpecanus S. Karaman, 1952a, 120-O s. valvasori S. Karaman, 1952a, 120P s. latimanus Birstein, 1952, 120Q s. caelestis G.S. Karaman, 1979 (= longidactylus Birstein, 1952, homonym), 120R s. pseudolatimanus Birstein, 1952, 120S s. polonicus Straskraba, 1956b, 120T s. birsteini Dedju, 1963a, 120U s. corinae Dedju, 1963b, 120V s. hoverlicus Dedju, 1963b, 120W s. jaroschenkoi Dedju, 1963a, 120Z borutzkyi Birstein, 1933 (Sket, 1974) [005];

- 121A stygocharis Dudich, 1943, 121B s. italicus G.S. Karaman, 1976d [098, 084, 089];
- 121R submersus (Derzhavin, 1945b) [066];
- 122 subterraneus (Leach, 1814a) (Kane, 1904) [124];
- 123A tatrensis\* Wrzesniowski, 1888, 1890, 123B t. aggtelekiensis Dudich, 1932 (Schellenberg, 1938d), 123C t. reyersdorfensis Schellenberg, 1935a, 123D t. schneebergensis Schellenberg, 1935a, 123E t. otscherensis Schellenberg, 1935a, 123F t. lurensis Schellenberg, 1935a, 123G t. lunszensis Schellenberg, 1935a, 123H t. salzburgensis Schellenberg, 1935a [085];
- 
- \*apuanus of foreli, pedemontanus of stygius, romuleus and speziae of foreli belong to a ?tatrensis group (fide Vigna-Taglianti, 1972).
- 
- 124A tauri Schellenberg, 1933b, 124B, t. kragujevensis S. Karaman, 1943b, 124C t. jurinaci S. Karaman, 1950b, 124D t. medvednicae S. Karaman, 1950b, 124E t. osogovensis S. Karaman, 1959a, 124F t. pecarensis S. and G.S. Karaman, 1959a, 124G t. carniolicus Sket, 1960a [005];
- 125 thermalis Dudich, 1941a [083];
- 126 toplicensis Andreev, 1966 [089];
- 127 transitivus Sket, 1971a (G.S. Karaman, 1975a) [098];
- 127X trullipes Sket, 1958b [087];
- 128 vadimi Birstein, 1961 [071];
- 129 valachicus Dobreanu and Manolache, 1933 (= mediodanubialis Dudich, 1941d) (including aschizotelson) (G.S. Karaman, 1974f) [081];
- 130 vandeli Barbe, 1961 [108];
- 131 velesensis S. Karaman, 1943a (G.S. Karaman, 1960) [088];
- 132 virei Chevreux, 1896b (= enslini S. Karaman, 1932) (= bispinosus Barbe, 1961) (= auerbachii Schellenberg, 1934a, 1942) [107];
- 133 vodnensis S. Karaman, 1943a (v. banjanus and v. kosanini S. Karaman, 1943a) [088];
- 134 vranjinae G.S. Karaman, 1967c [087];
- 135 zavalanus S. Karaman, 1950b [087];

136 zorae G.S. Karaman, 1967c [087];

Palaearctica, predominantly western, south of farthest line of glaciation but absent in most of Iberia and southern Italy, hypogean to epigean, 139 species and 126 additional subspecies.

Haploginglymus A. Mateus and E. Mateus

Figure 48, Map 64

Haploginglymus A. Mateus and E. Mateus, 1958: 7 (Haploginglymus bragai Mateus and Mateus, 1958, original designation).

Like Niphargus but article 2 on outer ramus of uropod 3 absent. See Niphargus where this genus is placed at subgeneric level.

Species.--20 bragai A. Mateus and E. Mateus, 1958 [114];

Portugal, hypogean, 1.

Niphargopsis Chevreux

Figures 5, 7, 48, Map 65

Niphargopsis Chevreux, 1922: 487 (Niphargopsis legeri Chevreux, 1922, monotypy, = Gammarus caspary Pratz, 1866).

Lateral cephalic lobe rounded, sinus present, but often weak. Eyes absent.

Antennae moderately elongate, antenna 1 longer than 2, ratio of peduncular articles = 18:15:7, primary flagellum much longer than peduncle, accessory flagellum 2-articulate.

Labrum [?entire, rounded]. Mandibular raker row immense, ratio of palp articles = 7:10:15, article 3 scarcely falciform, setae = DE. Inner lobes of labium vestigial. Maxillae not medially setose, inner plate of maxilla 1 narrow, subrectangular, with 1-2 apical setae, outer plate very broad, superspinose, with 10-11 pectinate spines in groups and 17-26 simple spines in outer group; palps symmetric, 2-articulate, feeble. Inner plate of maxilla 2 with few apicomedial marginal setae, no setae on face. Outer plate of maxilliped sparsely spinose medially, dactyl nail present [in trispinosus at least].

Coxae of ordinary size, anterior coxae rounded below, poorly setose, coxa 1 unexpanded, coxa 4 lobate. Gnathopods small, alike, hammer-like, wrist of gnathopod 1 short, of 2 elongate, unlobed, hands short, stout, rectotrapezoidal, parachelate, palms short, lacking spines.

Article 2 of pereopods 5-7 slightly expanded and lobate, posterior margins convex, poorly setose.

Outer rami of uropods 1-2 scarcely shortened, all rami marginally spinose, peduncles [?without basofacial armaments]. Uropod 3 extended, parviramous, outer ramus elongate, with small article 2. Telson slightly elongate, deeply cleft, lobes tapering, apically spinose.

Coxal gills [?2-6], ovate. Oostegites very broad.

Variants.--Telson laterally spinose (trispinosus); wrists of gnathopods alike (trispinosus).

Relationship.--Differing from Niphargus in the filtrative maxilla 1 and large mandibular raker row. Possibly descended from same ancestors as Niphargus skopljensis.

Species.--caspari (Pratz, 1866) (as legeri in Chevreux and Fage, 1925) [060];

trispinosus Dancau and Capuse, 1959 (Motas and Capuse, 1965) [083];

midsouthern and eastern Europe, hypogean, 2.

### Niphargellus Schellenberg

Map 65

Niphargellus Schellenberg, 1938b: 246 (Niphargus arndti Schellenberg, 1933b, original designation).

Body slender, urosomites weakly setospinose dorsally. Rostrum obsolescent, lateral cephalic lobes rounded. Eyes absent.

Antennae of moderate extent, antenna 1 longer than 2, ratio of peduncular articles = [?00:00:00], primary flagellum longer than peduncle, accessory flagellum 2-articulate. Antenna 2 article 1 enlarged.

Ratio of mandibular palp articles = 6:11:8 or 10:14:14, article 3 linear, setae = E. Inner lobes of lower lip [?present]. Maxillae not setose medially, inner plate of maxilla 1 subrectangular, thin, armed with 2 apical setae, outer plate with 7 spines, palps symmetric. Inner plate of maxilla 2 without facial and medial setae. Maxilliped palp article 3 weakly lobed.

Coxae short, broad, barely contiguous, poorly setose, coxa 1 rectangular, coxa 4 unlobed, coxa 5 almost as long as 4. Gnathopods of medium size, similar, hammer-like, wrists weakly elongate, unlobed, hands subquadrate, or subcircular, palms almost transverse.

Article 2 of pereopods 5-7 unexpanded, ovatorectangular, weakly setose posteriorly, unlobate.

Rami of uropods 1-2 extending subequally or outer shortened, [?not marginally spinose, ?lacking peduncular basofacial armaments]. Uropod 3 extended, parviramous, outer ramus with small or medium article 2. Telson slightly elongate, deeply cleft, apices tapering, weakly armed.

Coxal gills 2-6 or 2-5, [?ovate]. Oostegites [?narrow].

Relationship.--Like Niphargus but D setae of mandibular palp absent.

Species.--arndti (Schellenberg, 1933b) (Wichers, 1964) [082];

nolli Schellenberg, 1938b, 1942 (Wichers, 1964) [079];

central Europe, hypogean, 2.

Carinurella Sket

Map 65

Carinurella Sket, 1971a: 21, 24 (Karmaniella paradoxa Sket, 1964, original designation).

Body able to roll up like isopod, pereopods 5-7 and pleopods being very short for this adaptation; urosomite 1 enlarged, laterally plate-like, largely covering poorly defined and small urosomites 2-3. Rostrum small, lateral cephalic lobes huge, adziform, strong sinus present. Eyes absent.

Antennae of medium extension, antenna 1 longer than 2, ratio of peduncular articles = 14:7:3, article 1 with crest (not of generic value), primary flagellum as long as peduncle, accessory flagellum 1-articulate. Antenna 2 small, article 5 shorter than 4, flagellum about as long as article 4, about 3-articulate.

Labrum [?broader than long, entire, rounded]. Mandibular incisor [?toothed], molar [?tritulative], ratio of palp articles = [?00:00:00], article 3 [?weakly falciform, setae = ADE]. Inner lobes of labium [?absent, present]. Inner plate of maxilla 1 lanceolate, with 1 apical seta, outer plate with 7 spines, palps symmetric. Inner plate of maxilla 2 [?without facial and medial setae]. Outer plate of maxilliped [?medially spinose, palp article 3 unlobed, dactyl as long as 3, unguiform, with nail].

Coxae medium to long, poorly setose, coxa 1 rectangular or tapering, coxa 4 poorly lobate. Gnathopods feeble, almost alike, wrists elongate, unlobed, hands small, weakly trapezoidal, hand of gnathopod 1 slightly larger than 2, palm transverse or weakly parachelate, hand of gnathopod 2 ovate, palm weakly oblique.

Article 2 of pereopods 5-7 weakly expanded, strongly lobate, posterior margins weakly concave or sinuous, articles 4-5 slightly expanded, these pereopods short.

Pleopods short but rami 4-6 articulate. Rami of uropods 1-2 short, not marginally spinose, outer slightly shorter than inner, [?lacking basofacial peduncular armaments]. Uropod 3 not extended, minute, uniramous, ramus short, uniarticulate. Telson of ordinary length to short, deeply cleft, ungaping, lobes tapering, apically spinose.

Coxal gills [?2-6, ovate]. Oostegites [?slender].

Variants.--Crested antenna 1 and elongate coxa 5 (as long as 4) not of generic value as these attributes approached in Niphargus (through synonym Karamaniella).

Relationship.--Like Niphargus but inner ramus of uropod 3 absent, uropod 3 otherwise minute; urosomite 1 enlarged and strongly dominant.

Species.--paradoxa (Sket, 1964) [092];

Yugoslavia and Northeast Italy, hypogean, 1.



## Salentinellids

Accessory flagellum 1-articulate; antennae medium short; mandibular palp article 3 very short; lower lip lacking inner lobes; maxillae lacking medial setae; coxae 1-3 very short, coxa 4 elongate; gnathopods small, not sexually dimorphic, almost mittenform, with medial fuzz, wrists elongate, palms oblique; article 2 of pereopods 5-7 weakly to moderately expanded, strongly lobate; uropod 3 short, vari- to parviramous to uniramous; telsonic lateral setules shifted apicad; coxal gills 2-6, sternal gills absent.

Differing from Metacrangonigids in the elongate coxa 4, and medially naked maxillae.

## Key to the Genera of Salentinellids

Uropod 3 biramous, telson elongate, cleft. . . . . Salentinella  
 Uropod 3 uniramous, telson short, entire. . . . . Parasalentinella

Salentinella Ruffo

Figure 46, Map 57

Salentinella Ruffo, 1948b: 181 (Salentinella gracillima Ruffo, 1948b, original designation).--Coineau, 1963: 120.--G.S. Karaman, 1967a: 15 (key).

Body ordinary or somewhat slender. Lateral cephalic lobes mammilliform, sharp or rounded. Eyes absent.

Antennae of medium extension, extending equally, ratio of peduncular articles on antenna 1 = 24:12-17:4-11, primary flagellum subequal to peduncle, accessory flagellum 1-articulate. Antenna 2 flagellum short, gland cone often large.

Labrum entire, rounded (concave in Coineau, 1963). Mandibular molar triturative (or becoming bulbous and flagellate (denticulata), ratio of palp articles = 5:17:6 (thus article 3 very short), article 3 linear or clavate or tapering, setae sparse, = DE. Inner lobes of labium absent, poorly gaping. Maxillae not medially setose, inner plate of maxilla 1 ovatotriangular, with 2-3 apical plumose setae, outer plate with 8-9 spines, palp 2-articulate, asymmetric. Inner plate of maxilla 2 shortened, without medial setae, without oblique facial row of setae, or with one facial seta. Plates of maxilliped large, poorly armed, outer plate medially setose or spinose sparsely, palp thin, long, dactyl weakly unguiform, with long nail, short body.

Coxae poorly setose, 1-2 short, broader than long, 3 slightly longer, then 4 longer than broad, unlobed, 5 slightly shorter than 4, not bilobed, 6-7 progressively smaller. Gnathopods feeble, subchelate, gnathopod 2 very slightly stouter but shorter than 2, wrists elongate (or not on gnathopod 1), unlobed, as long as hand on gnathopod 1, longer on gnathopod 2, hands mittenform, posterior margin swollen, palms oblique, long, weakly defined, or almost absent, often excavate, often almost absent, poorly armed, dactyls fitting weakly defined palmar area.

Pereopods 3-4 elongate. Pereopods 5-7 weakly diverse, generally of similar length, short, article 2 moderately to strongly (7) expanded, with moderate to strong (7) posteroventral lobe progressively, poorly setose (mainly sparse setules), pereopod 5 (6-7) with long setae on apex of article 6.

Pleopodal rami 3-4 articulate. Outer rami of uropods 1-2 shortened and generally lacking marginal dorsal spines, inner rami with marginal spines; basofacial armaments absent. Uropod 3 moderately extended, variramous to parviramous, inner ramus very thin, outer ramus subflabellate, poorly armed with small article 2. Telson of ordinary length or weakly elongate, cleft about two thirds or slightly more (rarely one third), apices tapering, notched, weakly armed, main dorsolateral setule pairs apicad.

Coxal gills 2-6, ovate. Oostegites [?slender].

Variants.--Dactyls of pereopods becoming flagellate (prognatha); spines on outer plate of maxilla 1 simple (prognatha); telsonic lobes unnotched (petiti).

Relationship.--Like Argissa in shortness of anterior coxae, with short coxa 3 and longer coxa 4 and in lobate article 2 of pereopods 5-7 but differing from Argissa in robust proportions of mandibular palp, article 2 being longest, in the lack of facial setae on maxilla 2 and the distinctness of gnathopodal subchelation.

Species.--1A angelieri Deboutteville and Ruffo, in Ruffo and Deboutteville, 1952 (= denticulata Salvador, 1952) [105],  
1B a. balcanica S. Karaman, 1953b [087],  
1C a. pisana Ruffo, 1953b [098];

2A delamarei Coineau, 1962 [112], 2B d. macrocheles Coineau, 1968 [112];

3 franciscoloi Ruffo, 1953b [096];

4 gineti Balazuc, 1957 [112];

5 gracillima Ruffo, 1948b [092];

6 juberthieae Coineau, 1968 [109];

7 lescherae Coineau, 1968 [108];

8 major Barbe, 1965 [108];

9 petiti Coineau, 1963 [108];

10 prognatha Barbe, 1963 [112];

Western and southern Europe, hypogean, 10.

Parasalentinella Bou

Figure 46, Map 65

Parasalentinella Bou, 1971a: 482 (Parasalentinella rouchi Bou, 1971a, original designation).

Body somewhat slender. Lateral cephalic lobes sharply mammilliform. Eyes absent. Antennae of medium and equal extension, ratio of peduncular articles on antenna 1 = 30:13:5 (or 28:10:5 without cusps), articles 1-2 cuspidate, primary flagellum about as long as peduncle, accessory flagellum 1-articulate. Antenna 2 flagellum short, gland cone large.

Labrum [?broader than long, entire, rounded]. Ratio of mandibular palp articles = 7:21:7, article 3 linear, setae = BDE. Inner lobes of labium absent, poorly gaping. Maxillae not setose medially, inner plate of maxilla 1 ovatotriangular, with one apical and one apicomедial seta, outer plate with 9 spines, palps 2-articulate, [?asymmetric]. Inner plate of maxilla 2 shortened, without medial setae, without oblique facial row of setae. Plates of maxilliped large, moderately armed, palp thin, long, dactyl as long as article 3, weakly unguiform, with long nail, short body.

Coxae 1-2 short, poorly setose, broader than long, 3 slightly longer, then 4 longer than broad, unlobed, 5 about as long as 4 and weakly bilobed, 6-7 progressively shorter. Gnathopods feeble, subchelate, of similar robustness but 2 slightly the longer, wrists elongate, unlobed, as long as hand on gnathopod 1, longer on gnathopod 2, hands mittenform, posterior margin swollen, palms oblique, long, weakly defined, poorly armed, dactyls fitting weakly defined palmar area.

Pereopods 3-4 elongate. Pereopods 5-7 weakly diverse, generally of similar length, short, article 2 moderately to strongly (7) expanded, with moderate to strong posteroventral lobe progressively, poorly setose (mainly sparse setules), apices of article 6 with short-medium setae (pereopods 5-7), dactyls weakly flagellate.

Pleopodal rami 3-articulate. Rami of uropods 1-2 extending equally, without marginal spines, basofacial armaments absent. Uropod 3 not extended, very short, uniramous, peduncle and ramus short and of equal length, ramus uniarticulate, with apical notch and sparse setae. Telson very short and broad, entire, with broadly spread apical setules.

Coxal gills [?4-6], ovate. Oostegites [?slender].

Relationship.--Differing from Salentinella in the uniramous uropod 3 with uniarticulate ramus and the short, broad, uncleft telson.

Species.--T rouchi Bou, 1971a [112];

mid-Pyrenees, France, hypogean, 1.

## APPENDIX VII

## Handbook of Other Freshwater Amphipod Genera

These are listed in alphabetical order so as to facilitate their location from discussion in Part I.

Descriptions appear for several of the taxa most closely related to Gammaridans. The same basic descriptive method used for Gammaridans applies to these descriptions. Remote taxa are not described but simply listed with their synonymy, list of species and distribution.

Afrochiltonia K.H. Barnard

Maps 18, 68

Afrochiltonia K.H. Barnard, 1955: 93 (Chiltonia capensis K.H. Barnard, 1916, original designation).--Griffiths, 1976: 31.  
Austrochiltonia Hurley, 1958: 767 (Hyalella australis Sayce, 1901a, original designation).

Species.--41 australis (Sayce, 1901a) (Williams, 1962) [944];

42 capensis (K.H. Barnard, 1916) (Griffiths, 1974b, 1974c, 1975) [917]  
[capensis = subtenuis by Griffiths, 1976, but doubtful here];

43 subtenuis (Sayce, 1902) (Williams, 1962) [945];

southern Australia, Tasmania, South Africa, epigeal, 3.

Awacaris Ueno

Map 22

Awacaris Ueno, 1971d: 241 (Awacaris kawasawai Ueno, 1971d, original designation).

Urosomites unarmed. Rostrum obsolescent, lateral cephalic lobes weak, rounded, weak sinus present. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 20:14:9, flagellum much longer than peduncle, accessory flagellum 1-articulate, longer than broad, antenna 2 gland cone large.

Mandibular molar large and triturative, ratio of palp articles = 4:12:12, article 3 scarcely subfalcate, setae = ADE. Inner lobes of labium absent, weak gape present. Maxillae medially setose, inner plate of maxilla 1 triangular, fully setose medially, outer plate broad, with 9-10 S-shaped apicomediaally pectinate spines forming weak mop, palp reduced, thin, scarcely reaching apex of outer plate or strongly failing apex, article 1 elongate, article 2 very short, button-shaped, bearing one apical setule.

Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose (but spines apparently thin), article 3 of palp linear, apical nail [?obsolescent].

Coxae of medium size, poorly setose, coxa 1 undilated, coxa 4 weakly lobate posteroventrally. Gnathopods small, slender, wrist of gnathopod 1 moderately elongate, unlobed, hand narrow, subrectangular, almost as long as wrist, tapering distally, palm transverse, very short, dactyl short but strongly overlapping palm; wrist of gnathopod 2 elongate, unlobed, hand thin, rectangular, scarcely tapering distally, but much shorter than wrist, palm oblique but very short, dactyl short but overlapping palm.

Pereopods 3-4 dactyls with 1-2 inferior setules. Article 2 of pereopods 5-7 scarcely expanded, alike, weakly pyriform, posteriorly setulose, posteroventral corners weakly extended but not distinctly lobate.

Outer rami of uropods 1-2 shorter than inner rami, all rami dorsally spinose (weakly). Uropod 3 not exceeding uropod 1 but nevertheless long and thin, magniramous, aegiramous, peduncle short, apices of rami slightly blunted and bearing setules, sides of rami with sparse short spines and sparse long setae (rami more like those of Bogidiellids than of Eusirids). Telson elongate, cleft three fourths, weakly gaping, lobes tapering but weakly truncate, each with apical setule and lateral setule at M. 70.

Coxal gills 2-6, elongate-ovate to finger-like to long and slender. Oostegites [unknown, absent from specimens studied].

Description.--Right and left palps of maxilla 1 differing in length and position of attachment to outer plate.

Relationship.--Awacaris is very close to Laothoes; the two genera resemble each other in head (special shape), antennae, coxae, pereopods, epimera, urosome, uropods 1-2, gnathopods and in mouthparts other than those discussed below. Awacaris differs from Laothoes in the absence of eyes, broader outer plate of maxilla 1 with S-shaped spines, cleft telson, thinner rami of uropod 3, facial setae of maxilla 2, longer article 3 of the mandibular palp and the presence of an accessory flagellum. Like Relictomoera but palp of maxilla 1 reduced, head abnormal and hand and palm of gnathopod 1 weaker.

Species.--31 kawasawai Ueno, 1971d [028];

Japan, Shikoku, cave, stream, 1.

#### Chiltonia Stebbing

Map 53

Chiltonia Stebbing, 1899c: 408 (Hyaella mihiwaka Chilton, 1898, original designation).--Hurley, 1954a: 565.

Species.--See Hurley, 1954a;

F enderbyensis Hurley, 1954a [843];

M mihiwaka (Chilton, 1898) [937];

Q minuta Bousfield, 1964 [844];

R rivertonensis Hurley, 1954a [937];

New Zealand, Auckland Is., Campbell Is., freshwater and beach kelp, 4.

#### Caspicola

#### Figure 50

Caspiella Derzhavin, 1944: 21, 24 (homonym, Mollusca) (Caspiella knipovitschi Derzhavin, 1944, monotypy).

Caspicola Derzhavin 1945y: [not seen] (same type-species).--Birstein and Romanova, 1968: 285.

Species.--knipovitschi (Derzhavin, 1944) [332];

Caspian Sea; 1.

#### Corophium Latreille

Corophium Latreille, 1806: 58 (Corophium longicorne Latreille, 1806, monotypy, = Oniscus volutator Pallas, 1776).--Crawford, 1937a: 591.

Species.--Many marine species; only freshwater and PontoCaspian species follow:

aquafuscum Heard and Sikora, 1972 [365B];

chelicorne Sars, 1895a (Carausu, 1943) (Carausu et alia, 1955) [335];

curvispinum Sars, 1895a (=devium Wundsch, 1912) (=spongiicola Welitchkovsky, 1914) (Carausu, 1943) (Carausu et alia, 1955) [335, 235, 239];

lacustre Vanhoffen, 1911 (Bousfield, 1973) [250] (species extends almost to freshwater in many estuaries);

maeoticum Sowinsky, 1898a (Carausu, 1943) (Carausu et alia, 1955) [333];

minutum Dang Ngoc Thanh, 1965 [653B];

monodon Sars, 1895a (Birstein and Romanova, 1968) [332];

mucronatum Sars, 1895a (Mordhukhai-Boltovskoi, 1969) [332];

multisetosum Stock, 1952 (Ingle, 1963) (Jazdzewski, 1976) [240];

nobile Sars, 1895a (Carausu, 1943) (Mordhukhai-Boltovskoi, 1969) [335];

- orientalis Schellenberg, 1928 (Carausu et alia, 1955) (Stock, 1960) [343S];  
rioplatense Giambiagi, 1929 (Shoemaker, 1947) [751];  
robustum Sars, 1895a (= bidentatum Sars, 1895a) (Carausu, 1943) [336];  
salmonis Stimpson, 1857 (Shoemaker, 1949a) [368];  
sowinskyi Martynov, 1924a (= villosus Carausu et alia, 1955)  
 (Straskraba, 1962) [334];  
spinicorne Stimpson, 1857 (Shoemaker, 1949a) [371];  
spinulosum Sars, 1896 (Birstein and Romanova, 1968) [332];  
spongicolum (Welitchkowsky, 1914) (= sowinskyi Martynov, 1924a)  
 (= villosus Carausu et alia, 1955) (Straskraba, 1962) [334];  
stimpsoni Shoemaker, 1941b, 1949a [371];  
volutator (Pallas, 1766) (Sars, 1895b, as grossipes) (Bousfield,  
 1973) [250];
- almost cosmopolitan (antipolar), marine (40) and freshwater-PontoCaspian  
 (18), total 58.

Dogielinotus Gurjanova

Map 67

Dogielinotus Gurjanova, 1953: 235 (Allorchestes moskvitini Derzhavin,  
 1930a, original designation).

Species.--23 cimbaluki Kudrjaschov, 1972 [283];

24 loquax J.L. Barnard, 1967 [379];

25 moskvitini (Derzhavin, 1930a) (Gurjanova, 1962) [390F];

boreal north Pacific margins and proximate streams [1] and estuaries, 3.

Grandidierella Coutiere

Map 66

Grandidierella Coutiere, 1904: 3 (Grandidierella mahafalensis Coutiere,  
 1904, monotypy).--Myers, 1970: 136.--J.L. Barnard, 1977: 270.

1 africana Schellenberg, 1936b [445];

2 bispinosa Schellenberg, 1938a (Bousfield, 1971) [595];

- 2 bispinosa Schellenberg, 1938a (Bousfield, 1971) [595];
- 3 bonnieri Stebbing, 1908a (Nayar, 1956, 1959, 1967) (Monod, 1951) [664E];
- 4 bonnieroides Stephensen, 1947b (Myers, 1970) [421E];
- 5 chelata K.H. Barnard, 1951 [743E];
- 6 dentimera Myers, 1970 [381];
- 7 gilesi Chilton, 1921a (?Imbach, 1969) [640 to 670];
- 8 gravipes K.H. Barnard, 1935 [666F];
- 9 grossimana Ledoyer, 1967b (Myers, 1972) [698];
- 10 japonica Stephensen, 1938a (Chapman and Dorman, 1975) [395E];
- 11 koa J.L. Barnard, 1977 [381Q];
- 12 lignorum K.H. Barnard, 1935, 1952 (Griffiths, 1975) [743E];
- 13 lutosa K.H. Barnard, 1952 (Griffiths, 1975) [743E];
- 14 macronyx K.H. Barnard, 1935 [664Q];
- 15 mahafalensis Coutiere, 1904 (Myers, 1972) [919Q];
- 16 megnae (Giles, 1888) (Tattersall, 1922a) [663];
- 17 nottoni Shoemaker, 1935 [537E];
- 18 palama J.L. Barnard, 1977 [381Q];
- 19 perlata Schellenberg, 1938a [576];
- 20 spinicoxa Myers, 1972 [698];
- 21 vietnamica Dang, 1968 [954F];

circumtropical and warm-temperate, littoral, brackish, anchialine,  
21 [not counted as freshwater].

#### Haustorioides Oldevig

Haustorioides Oldevig, 1958: 343 (Haustorioides munsterhjelmi  
Oldevig, 1958, original designation)  
Species.--munsterhjelmi Oldevig, 1958 (J.L. Barnard, 1967) [?285].<sup>1</sup>

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<sup>1</sup> Sakashama, Sakhalin, not located



Hyalella S.I. Smith

Hyalella S.I. Smith, 1874: 645 (Hyalella dentata S.I. Smith, 1874, here selected, = Amphitoe aztecus Saussure, 1858, = Allorchestes Knickerbockeri Bate, 1862, ? = A.[mpithoe] dentata Say, 1818).-- Stebbing, 1906: 574.

Lockingtonia Harford, 1877: 53 (Lockingtonia fluvialis Harford, 1877, monotypy).

Species.--anophthalma Ruffo, 1957 [927C];

armata (Faxon, 1876) [934];

azteca (Saussure, 1858) (= knickerbockeri Bate, 1862) (= dentata S.I. Smith, 1874) (= inermis S.I. Smith, 1875b) (= fluvialis Lockington, 1877) (= faxoni Stebbing, 1903) (= ornata Pearse, 1911) (? = dentata Say, 1818) (Bousfield, 1973) [150];

cuprea (Faxon, 1876) (Chevreux, 1907a) [934];

curvispina Shoemaker, 1942d (= simplex Schellenberg, 1943c) (= cangallensis Schellenberg 1943c) (both fide Oliveira, 1953) [927];

dybowski (Wrzesniowsky, 1879) [921];

echinus (Faxon, 1876) [934];

fossamancinii Cavalieri, 1959 [924];

gracilicornis (Faxon, 1876) (?= andina Philippi, 1860) [934] (not dentatus, not inermis, mihi);

jelskii (Wrzesniowsky, 1879) [927];

lalage Brehm-Lunz, 1925 [924];

latimana (Faxon, 1876) [934];

longipalma (Faxon, 1876) (Chevreux, 1907a) [934];

longipes (Faxon, 1876) [934];

longistilus (Faxon, 1876) [934];

lubomirskii (Wrzesniowsky, 1879) [921];

lucifugax (Faxon, 1876) [934];

meinerti Stebbing, 1899c (Spandl, 1924) [927];

montezuma Cole and Watkins, 1977 [182];

- montforti Chevreux, 1907a [934];  
neveulemairei Chevreux, 1904, 1907a [934];  
pampeana Cavalieri, 1968 [924];  
patagonica (Cunningham, 1871) (= patagonica Ortmann, 1911,  
homonym) (Schellenberg, 1931a) [924];  
pernix (Moreira, 1903) [927];  
pteropus Schellenberg, 1943c (Monod, 1970) [921];  
robusta Chevreux, 1907a [934];  
sapropelica Brehm, 1939 [198];  
solida Chevreux, 1907a [934];  
texana Stevenson and Peden, 1973 [185];  
thomsoni Brehm, 1928 [924];  
warmingi Stebbing, 1899c [927];

Neotropica, especially Lake Titicaca; Nearctica, widespread but poorly diverse, freshwater, 31.

Kamaka Derzhavin

Map 52

Kamaka Derzhavin, 1923a: 188 (Kamaka kuthae Derzhavin, 1923a, monotypy).

- Species.--1 biwae Ueno, 1943 [027];  
2 derzhavini Gurjanova, 1951 [013];  
3 kuthae Derzhavin, 1923a (Gurjanova, 1951) [013];  
4 palmata Dang, 1968 [954];

east Asia from Viet Nam to Kamchatka, Japan, fresh or brackish, 4.

Metoediceropsis Dang

Metoediceropsis Dang, 1968: 212 (Metoediceropsis dadoensis Dang, 1968, original designation).

Species.--69 dadoensis Dang, 1968 [954].

Viet Nam, freshwater, 1.

Monoculodes Stimpson

Map 67

Monoculodes Stimpson, 1853: 54 (Monoculodes demissus Stimpson, 1853, monotypy).

Kroyera Bate, 1857b: 140 (Kroyera carinata Bate, 1857b, monotypy).

Species.--Many marine species, freshwater species follow:

21 limnophilus Tattersall, 1922a (Shen, 1955) [031ER];

22 1. japonicus Nagata, 1965a [395E];

China and Japan, rivers near sea and estuaries, (2) plus 51 marine species, 53.

Onisimus Boeck (Pseudalibrotus Della Valle)

Onisimus Boeck, 1871: 111 (Anonyx litoralis Kroyer, 1845, selected by Boeck, 1876).

Pseudalibrotus Della Valle, 1893: 798 (Anonyx litoralis Kroyer, 1845, monotypy).

Species.--See Gurjanova, 1951; Stephensen, 1935; Holmquist, 1965; caspius (Sars, 1896) (Birstein and Romanova, 1968) [332];

glacialis (Sars, 1900) (Just, 1970) [200];

litoralis (Kroyer, 1845) (= birulai Gurjanova, 1929a) (Sars, 1895b) [200];

nanseni (Sars, 1900) (J.L. Barnard, 1959d) [200];

platyceras (Sars, 1896) (Birstein and Romanova, 1968) [332];

circumarctic marine shallows, Caspian Sea [2], 5 [No maps].

Orchestia Leach

Orchestia Leach, 1814a: 402; 1814b: 432 (Cancer [Gammarus] littoreus Montagu, 1808, monotypy, = Oniscus gammarellus Pallas, 1766). [Scamballa White, 1847: 86; name unavailable by ICZN 11d, name originally published as synonym].  
Parorchestia Stebbing, 1899a: 402 (Orchestia tenuis Dana, 1852, here selected).

Several species of this genus have been reported from freshwaters; some records may be accidental drownings or fall-ins but others such as those of Hurley (1975) are accompanied by confirmed habitat data. We have not taken time to peruse the vast literature on this genus for aquatic members other than those brought to our attention in the past few years. A full list of species will be presented by Barnard and Karaman (in prep.).

Representative freshwater species.--ochotensis Brandt, 1850 (=ditmari Derzhavin, 1923a) (Bulycheva, 1957) [020];

recens (G.M. Thomson, 1884) (Hurley, 1975) [936];

remyi Schellenberg, 1950 [347H];

species A Hurley, 1975 [936]; species B Hurley, 1975 [936];

circumtropical strand and terrestrial, 67 [No maps].

Paracalliope Stebbing

Maps 53, 54, 68

Paracalliope Stebbing, 1899a: 210 (Calliope fluviatilis Thomson, 1879a, original designation).--J.L. Barnard, 1972b: 70.

Species.--1 australis (Haswell, 1880a) [781];

2 fluviatilis (Thomson, 1879a) (J.L. Barnard, 1972b) [935];

3 indica K.H. Barnard, 1935 (Nayar, 1959) (Sivaprakasam, 1968) [670E];

4 karitane J.L. Barnard, 1972b [936];

larai Knott, 1975 [783];

5 novaecaledoniae Ruffo and Paiotta, 1972 [586F];

V,6 novizealandiae (Dana, 1852, 1853) (?J.L. Barnard, 1972b) [775];

7 sp. Chilton, 1921c (as fluviatilis) [641M];

southeast Asia and Australasia, freshwater [4] and marine shallows, 7.

Paracorophium Stebbing

Maps 18, 53

Paracorophium Stebbing, 1899b: 350 (Corophium excavatum Thomson, 1884, monotypy).--Hurley, 1954c: 450.

Species.--2 excavatum (Thomson, 1884) (Hurley, 1954c) [770E];

66 hartmannorum Andres, 1975 [765E];

Y lucasi Hurley, 1954c [936];

New Zealand, southeastern Australia, Chile, brackish to freshwater epigeal,  
3.

Paraleptamphopus Stebbing

Maps 6, 7

Paraleptamphopus Stebbing, 1899a: 209 (Calliope subterranea Chilton, 1882, here selected).--Stebbing, 1906: 294.--Chilton, 1924: 273.

Lateral cephalic lobes weakly mammilliform, sinus absent. Eyes absent.

Antennae elongate, antenna 1 longer than 2, ratio of peduncular articles = 30:20:10, primary flagellum much longer than peduncle, accessory flagellum 1-articulate, elongate. Both pairs of antennae with tympanic calceoli in male.

Labrum broader than long [?fused to epistome], entire, truncate. Ratio of mandibular palp articles = 5:17:15, article 3 sickle-shaped (curved), setae = DE. Inner lobes of labium [?present]. Maxillae medially setose, inner plate of maxilla 1 ovate, partially setose medially, outer plate with 11 spines, palps asymmetrical. Inner plate of maxilla 2 with oblique facial row of setae. Outer plate of maxilliped medially spinose (poorly), dactyl stubby but subunguiform, nail small.

Coxae of medium size, poorly setose, coxa 1 not expanded, coxa 4 unlobate. Gnathopods diverse; male gnathopod 1 huge, wrist short, unlobed, hand giant, ovate, palm oblique, poorly defined, occupying most of posterior margin of hand, lined with tufts of setae, defined by weak hump and thick spines, gnathopod 2 smaller, wrist more elongate and weakly lobate, hand elongate, ovate, palm oblique, of medium length, armed with tiny setules, defined by several spines (Acanthogammarus-type hand); female gnathopods feeble, gnathopod 1 with medium weakly lobate wrist, small rectangular hand with short oblique palm, gnathopod 2 thinner, elongate, wrist and hand elongate, unlobed, palm transverse, short, article 3 slightly elongate as in Lysianassids.

Article 2 of pereopods 5-7 slightly expanded, slightly lobate, weakly setulose posteriorly.

Rami of uropods 1-2 marginally spinose, outer of both slightly shortened, peduncle of uropod 1 [?without basofacial spines]. Uropod 3 slightly extended, magniramous, almost aequiramous, peduncle elongate, rami

1-articulate, lanceolate. Telson of ordinary length, entire, weakly emarginate apically, poorly armed.

Coxal gills [?2-6], ovate, [?some pediculate]. Sternal gills [?absent]. Oostegites broad.

Variants.--Gnathopods 1-2 of female closely similar, wrists elongate (caeruleus); inner lobes of labium absent (caeruleus); dactyls of maxillipeds not stubby, with well developed nails (caeruleus); anterior coxae elongate (caeruleus); eyes present (caeruleus); cephalic sinus present (caeruleus).

Relationship.-- Like Phreatogammarus but accessory flagellum reduced, telson entire, and calceoli tympanic, not paddle-shaped.

Species.--See Hurley (1975);

41 caeruleus (Thomson, 1885) (Stebbing, 1887) [937];

42 subterraneus (Chilton, 1882, 1894) [935];

New Zealand, epigeal and subterranean.

#### Paramoera Miers

Maps 67, 68

Paramoera Miers, 1875: 75 (Paramoera australis Miers, 1875, monotypy).

Stebbingia Pfeffer, 1888: 110 (Stebbingia gregaria Pfeffer, 1888, monotypy).

Aucklandia Walker, 1908: 35 (Aucklandia enderbyi Walker, 1908, monotypy).

Species.--Many marine species; only freshwater or inland or brackish species listed;

1 carlottensis Bousfield, 1958 [155E];

2 columbiana Bousfield, 1958 [155E];

3 lokowai J.L. Barnard, 1977 [381Q];

4 paakai J.L. Barnard, 1977 [381Q];

5 rua J.L. Barnard, 1977 [381Q];

6 udehe (Derzhavin, 1930a) (Birstein, 1939) [024];

11 sp. (= aucklandicus of Chilton, 1909a) [843F];

biboreal littoral and sublittoral, anchialine and estuarine, 42 [not counted as freshwater in various tables].

Paramoerella Ruffo

## Map 18

Paramoerella Ruffo, 1974b: 412 (Paramoerella interstitialis Ruffo, 1974b, original designation).

Species.--39 interstitialis Ruffo, 1974b [743K];

interstitial on beach, South Africa (Cape Town), 1.

Parhyale Stebbing

Parhyale Stebbing, 1897: 26 (Parhyale fascigera Stebbing, 1897, monotypy).

Hyaloides Schellenberg, 1939b: 126 (Hyaloides dartevillei Schellenberg, 1939b, monotypy).

Species.--Several marine species and one species of mixed habitat:

hawaiensis (Dana, 1853) (= brevipes Chevreux, 1901b) (= trifoliadens Kunkel, 1910) (= dartevillei Schellenberg, 1939b) [421];

circumtropical, marine, brackish and occasionally into freshwater, 10 [no maps] [not counted as freshwater].

Pseudomoera Schellenberg

## Map 8

Pseudomoera Schellenberg, 1929: 281 (Atyloides gabrieli Sayce, 1901a, monotypy).

Species.--21 fontana (Sayce, 1902) [943];

44 gabrieli (Sayce, 1901a) [943];

Victoria, epigeal, 1500-3000 feet altitude, 2.

Relictomoera Barnard and Karaman

Map 67

Relictomoera Barnard and Karaman, 1982: 168 (Paramoera relicta Ueno, 1971a, original designation).

Species.--11 relicta (Ueno, 1971a) [029gC];

12 tsushimana (Ueno, 1971b) [029tJ];

Islands of Tsushima and Goto, off Kyushu, Japan, hypogean or cave dwelling,  
2.

Seborgia Bousfield

Maps 20, 53, 56

Seborgia Bousfield, 1970: 164 (Seborgia minima Bousfield, 1970, original designation).

Species.--W minima Bousfield, 1970 [595L];

S, 81 relicta Holsinger, 1980b [185];

Rennell Island, Bismarck Archipelago, in a lake; Texas, in Edwards aquifer;  
2.

Spelaeorchestia Bousfield and Howarth

Map 67

Spelaeorchestia Bousfield and Howarth, 1976: 144 (Spelaeorchestia koloana Bousfield and Howarth, 1976, original designation).

Species.--18 koloana Bousfield and Howarth, 1976 [381C];

Kauai, Hawaii, lava-tube cave, 1 [not counted as freshwater].

Stenocorophium G.S. Karaman

Stenocorophium G.S. Karaman, 1979b: 580 (Stenocorophium bowmani G.S. Karaman, 1979b, original designation).

Species.--bowmani G.S. Karaman, 1979b [594];

Palau, freshwater, 1.



Sternomoera Barnard and Karaman

## Map 67

Sternomoera Barnard and Karaman, 1982: 169 (Paramoera yezoensis Ueno, 1933a, original designation).

Species.--13 hayamenensis (Stephensen, 1944) [027];

14 japonica (Tattersall, 1922a) [017];

15 yezoensis (Ueno, 1933a) [026];

Japan, lakes and torrents, 3.

## LIST OF OTHER FRESHWATER GAMMARIDEANS

Ampelisca sp. (?pusilla Sars); Chilton, 1920c [963]; Ganges River, 600 miles from mouth at Buxar;

98 Hyale milloti Ruffo, 1958a [694F]; Comores Islands, Map 54;

97 Microphotis blachei Ruffo, 1952b [655 E]; Lower Mekong River, Map 54;

Talitroides alluaudi Chevreux, 1901b (Bousfield and Howarth, 1976) [421]; almost tropicopolitan; lava-tube caves of Kauai, Hawaii [no maps];

Talitroides topitotum Burt, 1934 (Bousfield and Howarth, 1976) [421]; almost tropicopolitan; lava-tube caves of Kauai, Hawaii [no maps];

?Talorchestia fernandoi (Wignarajah, 1958) (originally placed in Paracalliope, obviously a Talitrid) [665F]; Ceylon, tapwater [no maps].

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#### METHODS OF PRESENTATION IN BIBLIOGRAPHY

Italics are omitted on Latin names if omitted by author.

Diacritical marks are omitted as being a waste of time.

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First letters of words of titles in English are given as capitals, except for articles and connectives. This is not our preference but we decided time was not useful to reduce these to their proper state. This was a style we have now abandoned as being tedious and superfluous.

