

# *Cymodetta gambosa*, a New Sphaeromatid Isopod (Crustacea) from Australia, with Notes on its Mating Behaviour

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Plate 8. Figures 1-27.

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## SUMMARY

*Cymodetta gambosa*, a new genus and species of the isopod family Sphaeromatidae, is described from specimens in a culture derived from the Clarence River at South Grafton, New South Wales, Australia. The new genus belongs to Hansen's Hemibranchiatae, and apparently to his section Sphaeromini, but in contrast to known genera of Sphaeromini has uniramous uropods. The 5th pereopods exhibit a striking sexual dimorphism; in the male the propus is expanded into a prominent lobe overriding the dactyl. Mating behaviour is described, including the function of the propal lobe in preventing the female from rolling up.

## INTRODUCTION

The isopod described herein is one of several species that was collected from wood in Australian waters and maintained in culture in the Bundesanstalt für Materialprüfung (BAM) in Berlin. It was originally incorrectly assigned to the genus *Cilicæopsis* by Kühne (1973). It is noteworthy not only because it represents a

new species in a new genus of uncertain affinities among the hemibranchiate Sphaeromatidae, but also because of the unusual sexual dimorphism, especially in the 5th pereopods. We felt confident that the conspicuous process of the propus of the male 5th pereopod must have a role during mating. Our belief was confirmed by observations of the mating behaviour made at the BAM, an account of which follows the description of the new isopod.

## TAXONOMY

### *Cymodetta*, new genus

A member of the hemibranchiate group of Sphaeromatidae; pleopods 4 and 5 with bimerous membranous exopods and with undivided fleshy endopods, the latter with fewer transverse folds than in most Hemibranchiatae. Pleotelson pointed apically; apical part solid below, without a notch or longitudinal excavation. Pereon, pleon, and pleotelson without dorsal processes in either sex. Uropods with narrow exopods; endopods lacking in both sexes. Mouth-parts normal in female. Pereopods slender, without long setae; propus of male pereopod 5 produced into broad lobe overriding dactyl. Male pleopod 2 with complex stylet. Oostegites small, on pereonites 2-5. Penes well developed, separate to base.

#### *Etymology*

The name is derived by adding the diminutive suffix "etta" to the first part of the sphaeromatid generic name *Cymodoce*. Gender, feminine.

#### *Type-species*

*Cymodetta gambosa*, new species.

#### *Relationships*

*Cymodetta* is clearly a hemibranchiate and appears to belong to Hansen's (1905) section Sphaeromini rather than to his section Cymodocini. In the Cymodocini the telson is notched apically and the mouthparts of the adult female are reduced. *Cymodetta* differs from other genera of Sphaeromini in having uniramous uropods. Among the Hemibranchiatae the males of *Cilicaeopsis* and *Paracilicaea* (both Cymodocini) have short or rudimentary endopods, but in other genera both rami are usually well developed.

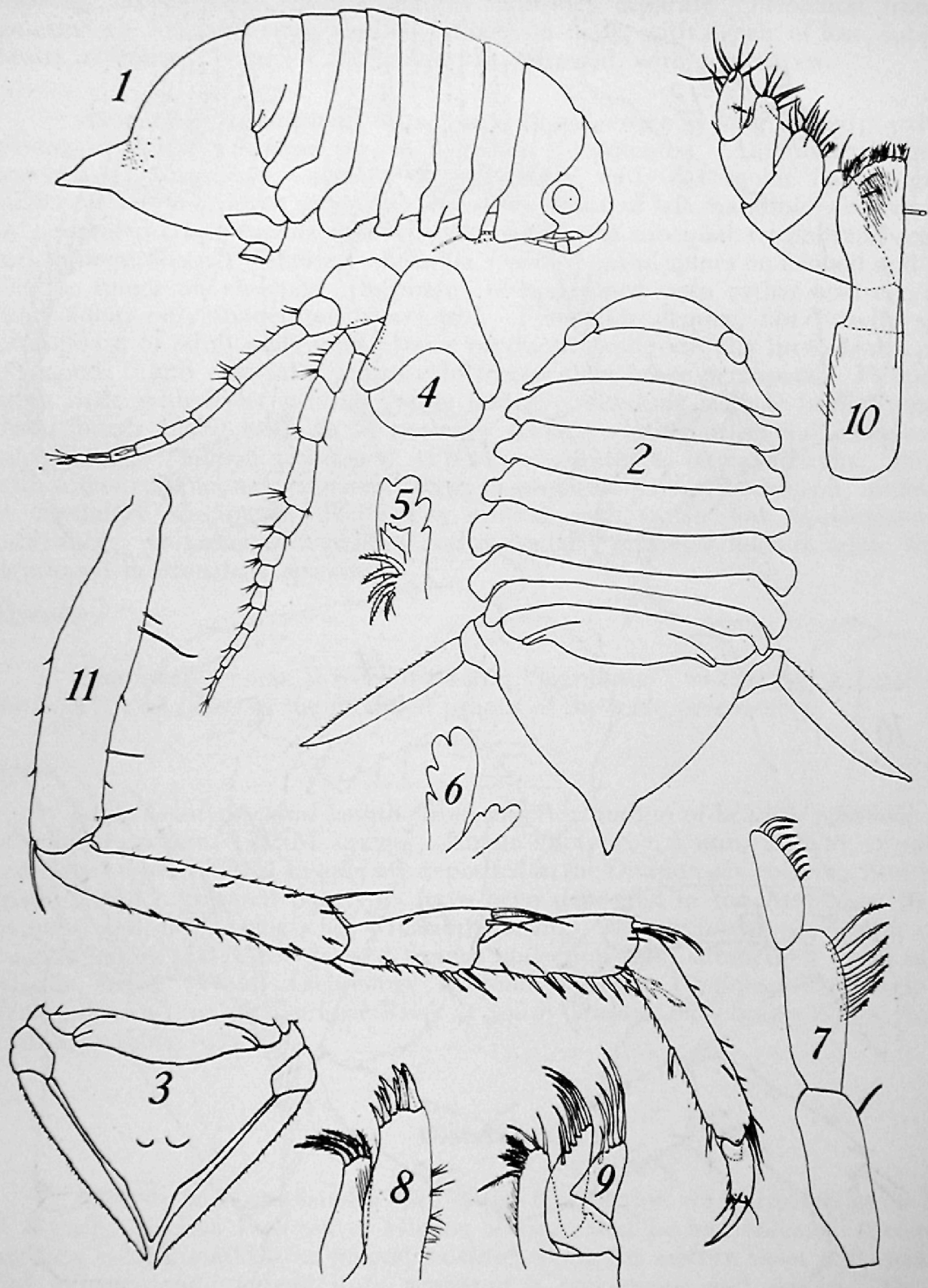
### *Cymodetta gambosa* new species

Figures 1-27, Plate 1

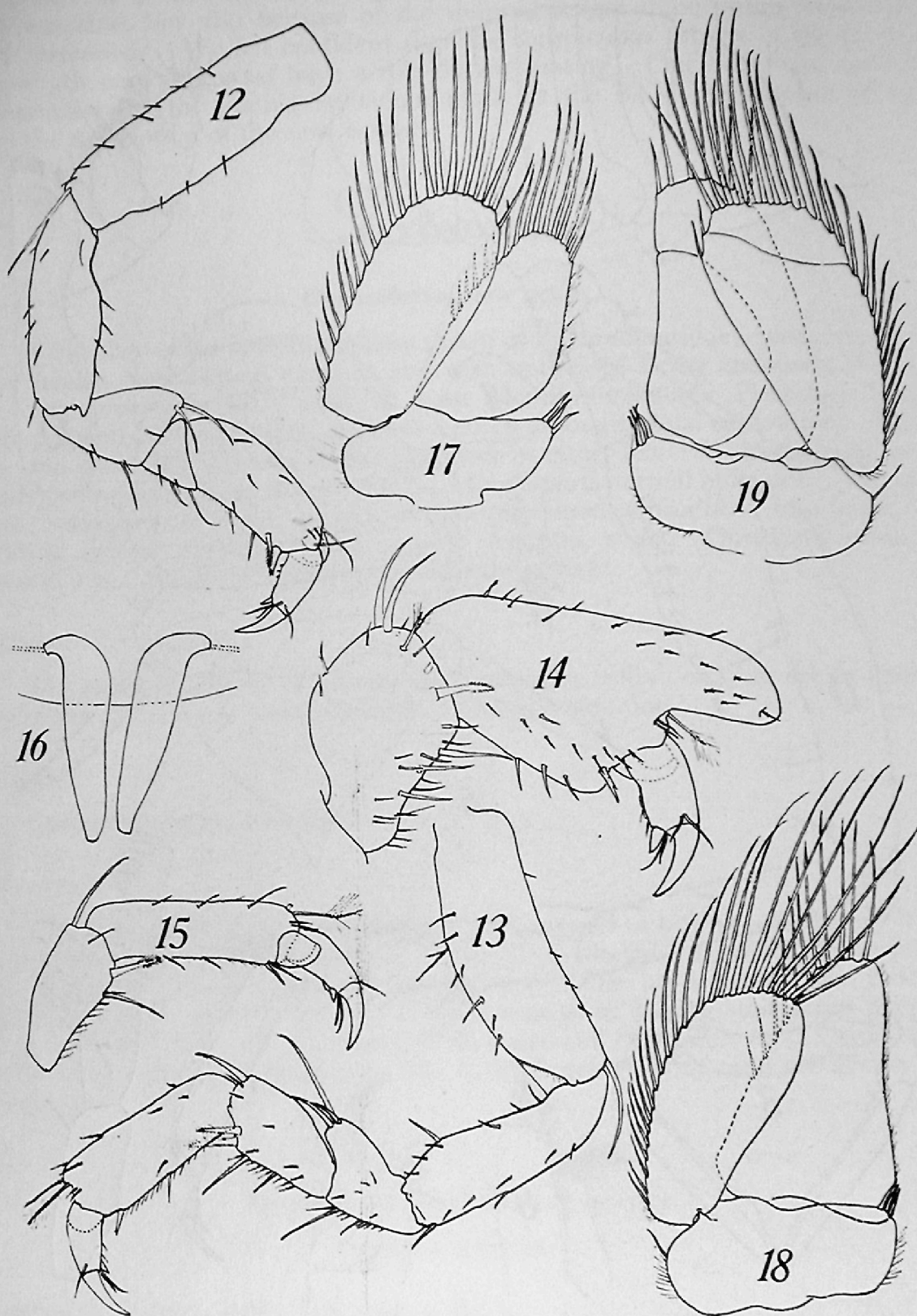
*Cilicaeopsis* sp. Kühne, 1973: 816, table 2, fig. 9.

#### *Description*

Body rather flat, about 1.7 times as long as wide. Pereonite 1 about as long as head, with transverse depression behind posterior margin of head. Pereonites gradually widening posteriorly, greatest width at pereonite 5; pereonites 6 and 7 narrower; anterior epimera narrow, separated by distinct gaps; posterior epimera



Figures 1-11. *Cymodetta gambosa*. Fig. 1, ♂ lateral; fig. 2, ♂ dorsal; fig. 3, ♀ pleotelson, dorsal; fig. 4, ♀ labrum, clypeus, antenna 1 and 2, ventral; fig. 5, ♂ right mandible, incisor and spine row; fig. 6, ♂ left mandible, incisor and lacinia; fig. 7, ♂ mandibular palp; fig. 8, ♂ maxilla 1; fig. 9, ♂ maxilla 2; fig. 10, ♂ maxilliped; fig. 11, ♂ left pereopod 7.



Figures 12-19. *Cymodetta gambosa*. Fig. 12, pereopod 1, 3 mm ♂; fig. 13, pereopod 5, 3 mm ♂; fig. 14, distal segments of pereopod 5, 4 mm ♂; fig. 15, same, ♀; fig. 16, penes; fig. 17, left pleopod 1, 3 mm ♂; fig. 18, left pleopod 2, 3 mm ♂; fig. 19, right pleopod 3, 3 mm ♂.

broader, overlapping. Pleonal sutures indistinct, separate. Pleotelson triangular; anterior  $2/3$  hemispherical, vaulted, smooth in male, with a pair of low, submedian bosses in female; posterior third abruptly narrowed, with acute apex.

Antenna 1, 1st segment of peduncle broad, twice as long as 2nd; 3rd article slender, its length subequal to 1st, flagellum 6-segmented. Antenna 2 longer than antenna 1; flagellum 9-segmented. Mandible with flat molar having grinding ridges on surface, ridges more prominent on molar of left mandible; incisor ending in 4 rounded cusps, lacinia with 3 cusps; palp with subequal 1st and 2nd segments, 3rd segment about  $1/3$  shorter. Maxilla 1 with 9 apical spines on exopod and 4 more slender spines on endopod. Segments of maxilliped palp rather sparsely armed; inner lobes only moderately developed. Pereopods slender, not heavily spinose; pereopod 5 of adult male with propus produced posterodistally into oblong process; pereopods 6 and especially 7 distinctly longer than other pereopods. Pleopod 2 of adult male with stylet curving gently laterally, reaching slightly beyond endopod; distal fourth folded back on its posterior surface, ending in several complex fleshy setose lobes. Pleopod 3 endopod with suture parallel to lateral margin. Pleopod 4 with a few rudimentary transverse folds in proximal part of both rami, undeveloped in immature specimens. Pleopod 5 exopod with rather low squamiferous protuberances; endopod with shallow and irregularly arranged folds in adult, folds not developed in immature specimens.

#### *Etymology*

The specific name is from the Latin "gambosus", = "having a swelling near the hoof", and refers to the modified propus of the male pereopod 5.

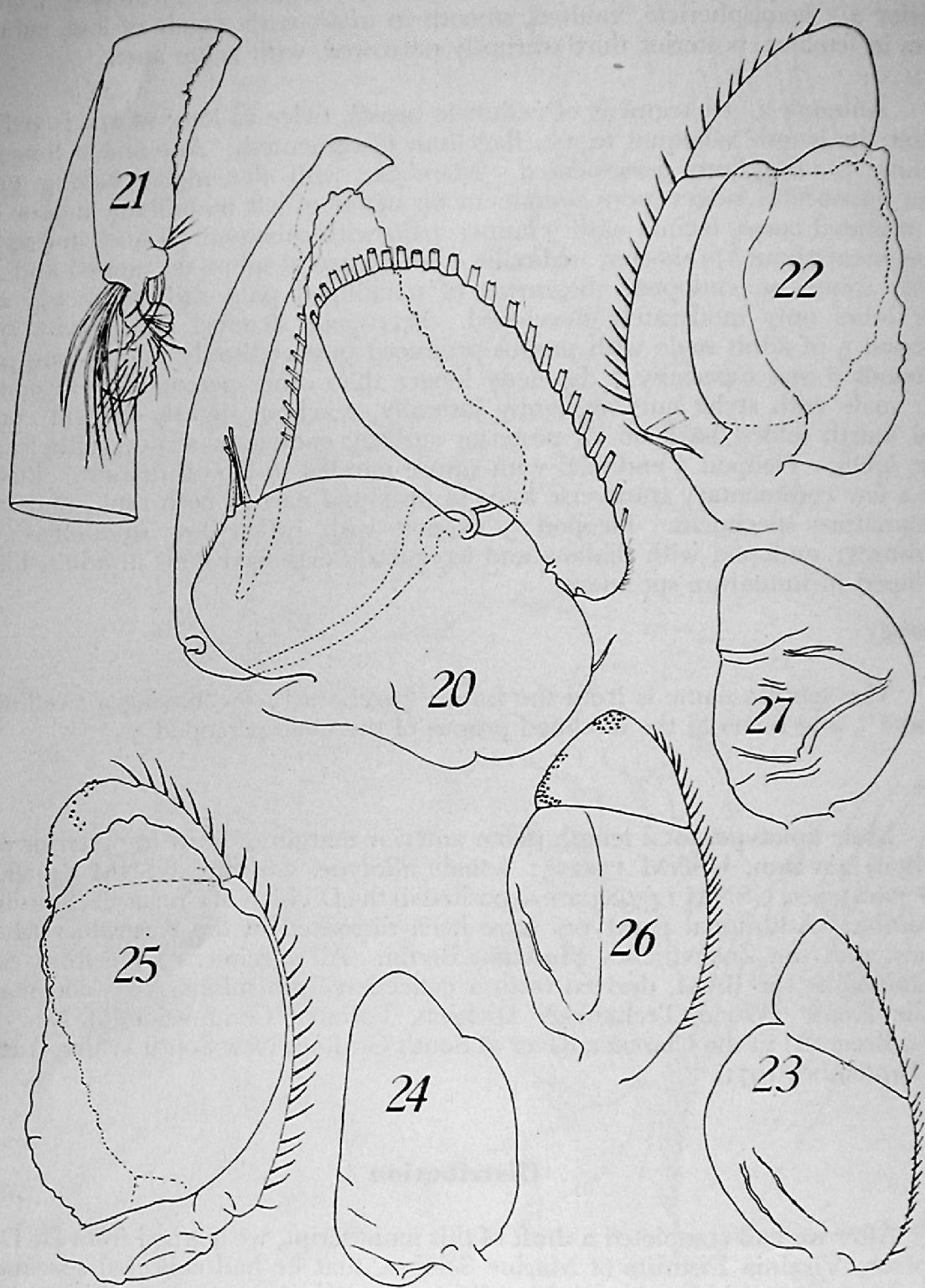
#### *Types*

Male holotype, total length (from anterior margin of head to posterior margin of telson) 4.0 mm, USNM 142255; female allotype, 3.6 mm, USNM 143982, and 100+ paratypes, USNM 143983 are deposited in the Division of Crustacea, Smithsonian Institution. Additional paratypes have been deposited in the Australian Museum, Sydney, and the Zoologisches Museum, Berlin. All specimens were from cultures maintained at the BAM, derived from a collection from submerged wood made by Rosalie Keirle (Wood Technology Division, Forestry Commission of New South Wales, Beecroft) in the Clarence River at South Grafton, New South Wales, Australia, 14th September 1971.

### **Distribution**

After we had completed a draft of this manuscript, we learned from Dr Donald F. Boesch, Virginia Institute of Marine Science, that he had collected specimens of our new sphaeromatid from several localities along the eastern coast of Australia and had independently judged it to represent a new genus and species. Dr Boesch generously deposited specimens in the Smithsonian Institution and has permitted us to cite his collection data.

Dr Boesch's data show that *Cymodetta* inhabits fresh or brackish water (0-20‰ north to the Burran River, Howard, Queensland, and south at least to the East Gippsland lakes in Victoria). It occurs on various types of bottoms: among littoral weeds, on mud, sand, stones, and rocky bottoms. It is quite tolerant of fresh water



Figures 20-27. *Cymodetta gambosa*. Fig. 20, pleopod 2, anterior, 4 mm ♂; fig. 21, detail of apex of stylet of same, posterior; fig. 22, right pleopod 4, 3 mm ♂; fig. 23, right pleopod 4, exopod, 4 mm ♂; fig. 24, endopod of same; fig. 25, left pleopod 5, 3 mm ♂; fig. 26, left pleopod 5, exopod, 4 mm ♂; fig. 27, endopod of same.

and is common in Lake Barracoota, a freshwater lake in Victoria that was isolated recently from Mallacoota Inlet by sedimentation (Timms, 1973) as well as in "blind estuaries" temporarily isolated from the sea for several months. *C. gambosa* is the "unidentified sphaeromid isopod" listed by Timms, who points out that two other species of marine origin also survive today in Lake Barracoota, an anthurid isopod and a spionid polychete, both undescribed.

### Mating Behaviour

Specimens were cultured individually in petri dishes 6 cm in diameter in water with a salinity of 20‰ at 22°C. The food provided consisted of sections of pine sapwood, 20 x 10 x 1 mm, which had been stored in sea water for one year, and sufficient unicellular algae (*Dunaliella* sp.) to make the water slightly cloudy. Twice a week, during a period of 4 weeks, pairs were placed together and observed with a stereoscopic microscope and photographed.

When a pair of isopods comes into contact, the male grasps the female with his pereopods. The female responds by rolling together, either firmly or loosely depending on her readiness to copulate. The male turns the female around several times and often taps her by suddenly bending his head and uropods. If the female is not ready and remains firmly rolled up, the male usually releases her very soon. If the female is receptive and only loosely rolled together, the male turns her until his ventral side faces her lateral side. Usually the male uses pereopods 1-4 to cling to the lateral side of the pereon of the female and the longer pereopods 6-7 to grasp the dorsal side of the pleotelson. The male then prods the ventrolateral side of the female several times with his pereopod 5 nearest to her. During copulation the male pereopod 5 pushes against the ventral surface of the female; the propal process is appressed and the dactyl is splayed from it. The male pleopods 1 and 2 are bent forward in the shape of a funnel, while the posterior pleopods continue their rhythmic beat. Presumably the sperm is released at this time. The male may shift to the opposite side of the female, in which case the opposite pereopod 5 is used as described. Mating may last for more than 1 hour.

Males will attempt to copulate with females regardless of the moulting condition of the latter. On one occasion a male attempted to copulate with another male.

It is not clear whether the male's prodding with pereopod 5 before copulation serves as a stimulus to the female or aids the male in finding the most effective position for pereopod 5 during copulation. It is clear that pereopod 5 aids in preventing the female from rolling up, and the propal process is an adaptation for this function.

The dimorphism of the pleotelson is unusual; in most Sphaeromatidae ornamentation is greater in the male, but the reverse is true in *C. gambosa*. Possibly the dorsal bosses of the female facilitate the male's clinging to her during copulation.

Sexual dimorphism is often well developed, sometimes markedly so, in the Sphaeromatidae, but the modified pereopod 5 of *C. gambosa* and its function in mating described herein has no parallel among the Sphaeromatidae of which we are aware. Published accounts of mating behaviour in the Sphaeromatidae are rare, but information is available for *Cassinopsis maculata* (Studer, 1884) and for *Ancinus*.

Among 15 preserved specimens of *C. maculata* from the Kerguelen Islands, Monod (1930) found 3 pairs in copula. The much larger male held the smaller female with her dorsum fitting into his somewhat concave ventral surface. The male pereopod 4 with its long, slender, twisted basis, holds the female in place; pereopods 1-3 have setae or spines missing in the female, and Monod suggests that they may also play a role during mating. In *Ancinus* the smaller female is also carried below the larger male, but in this case she is held in position by the modified male pereopod 2 which is subchelate rather than ambulatory as in the female (Glynn and Glynn, in press).

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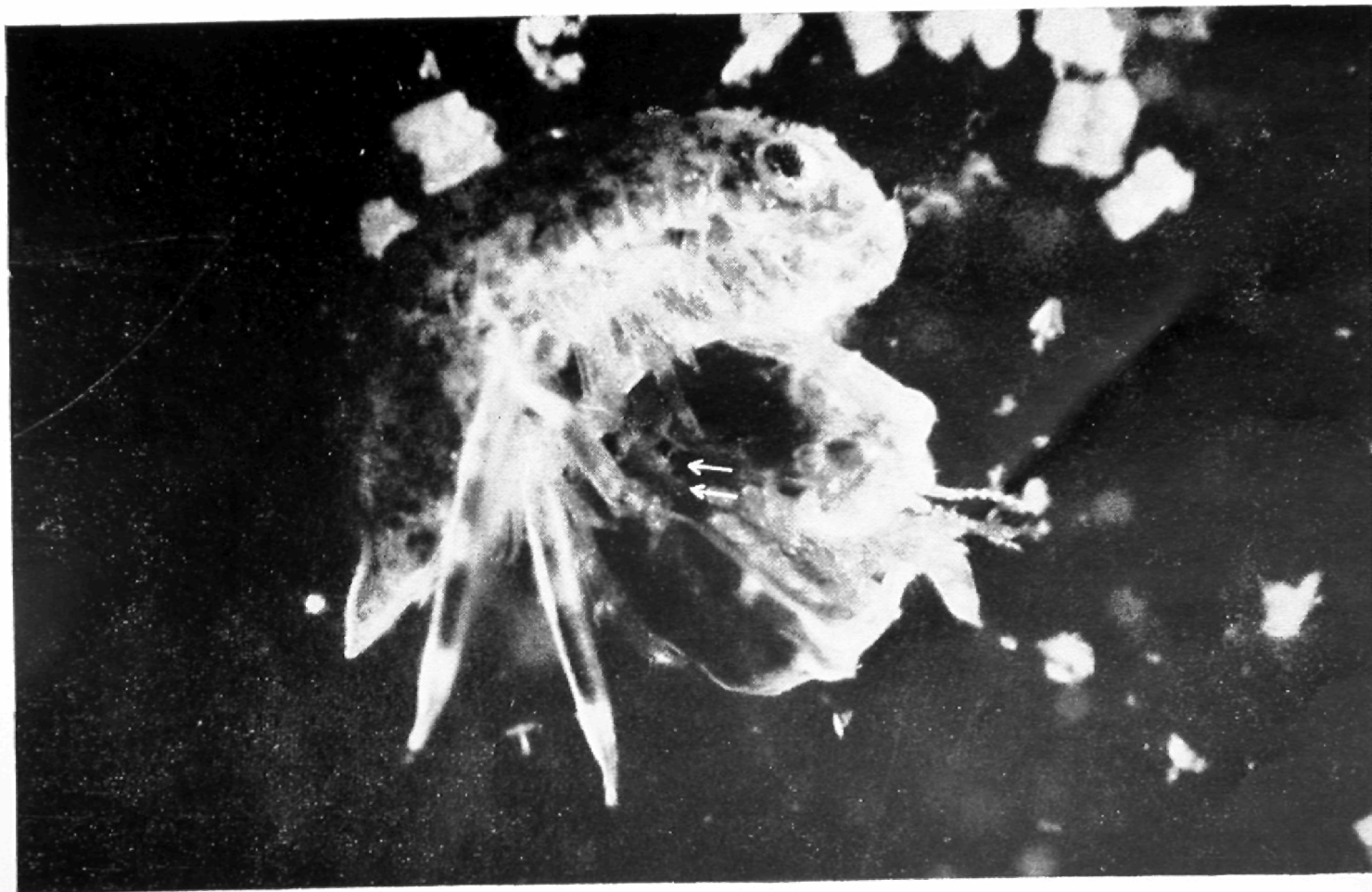


Plate 8. *Cymodetta gambosa*. ♂ (above) and ♀ in copula. Arrows point to propal process and dactyl of ♂ pereopod 5.