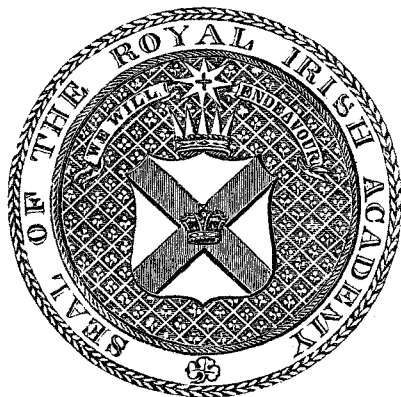


THE  
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PART II.—SCIENCE.



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observed in the profound stillness of an Arctic winter, when the command to fire a six-pounder cannon was several times heard at a distance of 5645 feet, about one-eighth of a second after the report.\*

\* Lieutenant Foster records this very remarkable observation in the following passage, taken from the appendix to Captain Parry's Journal of his second Arctic Voyage, p. 239:—"The experiments," to determine the velocity of sound, "on the 9th of February, 1822, were attended with a singular circumstance, which was—the officer's word of command, 'fire,' was several times distinctly heard, both by Captain Parry and myself, about one beat of the chronometer *after* the report of the gun; from which it would appear, that the velocity of sound depended, in some measure, upon its intensity. The word 'fire,' was never heard during any of the other experiments. Upon this occasion, the night was calm and clear; the thermometer 25° below zero; the barometer 28·84 inches; which was lower than it had ever been observed before at Winter Island. Upon comparing the interval between the flash and report of a musket with the gun, upon other occasions, there appears to be no assignable difference."

VI.—*On the Britanmic Species of Crangon and Galathea ; with some Remarks on the Homologies of these Groups.* By J. R. KINAHAN, M.D., M.R.I.A., F.L.S., Professor of Zoology, Government School of Science applied to Mining and the Arts.

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Read 25th June, 1860.

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PART I.—CRANGON.

CONSIDERATIONS ON THE SPECIES USUALLY INCLUDED UNDER THE GENUS  
CRANGON.

AS at present constituted, the genus Crangon comprises the following species, which are here arranged in the order of their presumed affinities, the extra Britanmic species being italicized :—

*Crangon vulgaris*. Fabricius (not Owen or Dana).

*Crangon Franciscorum* (1) (Stimpson\*). Boston Journal Natural History, VI., 496, pl. xxii. 6.

*Crangon rubropunctatus* (Risso). Crustaces de Nice, p. 83, Hist. Naturelle de l'Europe Meridionale, t. v. 86.

*Crangon propinquus* (2) (Stimpson). Prodromus, 94.

*Crangon nigricauda* (3) (Stimpson). Bost. Jour. Nat. Hist., VI., 496, pl. xxii., fig. 5.

\* I am indebted to the kindness of the author for the descriptions of this and the other species bearing his name. As the works in which these occur are probably not easily accessible, I have, in the note at page 47, given the characters of the species.

with minute blackish dots and star-shaped patches of reddish-brown, pale reddish-brown in stripes, pale blue, deepening into bright azure-blue on the abdomen, before the spawn is extruded, patches of opaque white,—all combine, along with the varied tracery of its sculpturing, to render this one of the most lovely of its family.

Length, from 0·7 inch to 1·25 inch.

Habitat, sandy gravel, and, though rarely, sludgy sand, in from five to twenty-five fathoms.

Habits active, swimming freely in the aquarium.

Localities, Belfast, off the Gobbins ; Dublin, in deeper waters, very common in suitable grounds ; Galway, Isles of Arran, rare (Prof. Melville).

In ova in March ; ova salmon-red.

This species, first established by Professor Bell, is very common about Dublin, especially on the oyster and scallop (*Pecten opercularis*) beds.

If due regard be paid to the characters of the rostrum and abdomen, it cannot be confounded with any other British species, and from the foreign species it may also be easily distinguished.

From *Æg. carinicauda* (vide p. 48, *supra*), by the denticulations on the carinæ of the carapace, &c.

From *Ægeon cataphractus*\* it differs in the lesser amount of emargination

\* *Ægeon cataphractus* (Olivi), *Ægeon loricatus* (Risso). Milne Edwards has looked on this species as identical with the male of *Pontophilus spinosus* (Leach), why, I know not. Examination of a male specimen thus marked in the British Museum (presented by Marquis Spinola, from the Mediterranean), and of female specimens in the same collection marked as from the Mediterranean, and of female specimens in the Jardin des Plantes, furnish the following characters, which also agree with Risso's descriptions and imperfect figure.—*Vide* N. H. de l'Eur., mer. 5, p. 58, pl. 1, fig. 3.

Rostrum deeply emarginate; carapace armed with *numerous* strongly-toothed carinæ terminating in teeth, which in the females project over the orbits. The abdominal segments in male—first, with several distinct, but not continuous lines of teeth; second, a single median tooth; third and fourth carinated and sculptured; fifth bicarinated (the carinæ divergent) and sculptured; sixth bicarinated; telson, as in *Crangon*, sulcate. Females—first, bicarinate and coarsely sculptured; second, third, and fourth, carinated and highly sculptured; fifth and sixth, bicarinated and sculptured; telson deeply sulcate. The carinæ in the female are all more strongly marked than in the male, being mostly denticulate on their margins. The sexes may belong to different species, but their differences are only in degree, and the female specimens are much larger than the male.

of rostrum (cfr. pl. I., fig. v. and vi.), and of denticulation of the segments, and smaller size.

Its distribution round Ireland can be by no means imagined to be accurately made out. (For general distribution of species, see end of Galatheidæ.)

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## PART II.—THE BRITANNIC GALATHEIDÆ.

### CONSIDERATIONS ON GENUS.

THE following list shows the species now included under this genus, according to Stimpson:—

- Galathea strigosa* (Fabricius).
- Galathea Andrewsii* (Kinahan).
- Galathea nexa* (Embleton).
- Galathea dispersa* (Spence Bate).
- Galathea squamifera* (Leach).
- Galathea tridentata* (Esmark).
- Galathea intermedia* (Liljebourg).
- Galathea serricornis* (Löven).
- Galathea latirostris* (Dana).
- Galathea spinosirostris* (Dana).
- Galathea Vitiensis* (Dana).
- Galathea longirostris* (Dana).
- Galathea elegans* (A. White).
- Galathea monodon* (Milne Edwardes).
- Galathea integrirostris* (Dana).
- Galathea Australiensis* (Stimpson).
- Galathea labidolepta* (Stimpson).
- Galathea orientalis* (Stimpson).
- Galathea acanthomera* (Stimpson).
- Galathea pubescens* (Stimpson).
- Galathea grandirostris* (Stimpson).

Of these, five species are Britannic, all of which have occurred to me in the Eastern Irish Seas.

The exact position of the group has been a subject of dispute, M. Edwards placing it among the macrourous Decapoda; Bell, and most subsequent authors, among the Anomoura. With these last my own investigations would lead me to concur, since the imperfect cheliform development of the fifth pair of chelipeds (appendages of the fourteenth somite), conjoined with the depression of the body from above, is peculiar to and characteristic of Anomoura; for, with the exception of a curious crustacean described by Professor Bell as allied to the Pinnotheridæ (and I suspect, had we more specimens, even this will be found to be only an additional proof of the law), these are always found to be accompanied by the peculiar arrangement of the sixth pair of pleopods, which is characteristic of the group.

Observations on the Galatheidæ alive, in the dredge and in the aquarium, confirms this—anomourous are they in all their actions. I have kept all the British species, except *nexa*, in the aquarium, and find that in confinement the abdomen is carried closely folded up under the body; and although in swimming the animals progress by darts backwards in the same mode as *Homarus*, yet their ordinary manner of progression is by ambulation, like other anomoura. The submembranous nature of the telson, and the great length of the external maxillipeds, are also arguments in favour of their anomorous tendencies.

#### HOMOLOGIES OF THE GROUP.

Ocular, auditory antennal, and olfactory antennal, or first, second, and third somites, only developed inferiorly, and completely concealed above by mandibular (fourth) somite, which alone forms carapace; beneath a suture separates from this a portion which probably belongs to the sixth somite (6?).

The carapace is entirely made up superiorly of the fourth somite, and in all the British species has its surface covered with a series of transverse raised ridges, which are divided into two sets: a principal, the anterior borders laterally developed into teeth, the posterior smooth on their edges; and a secondary, which is generally edentulous. It is flattened from above horizontally, and produced anteriorly as a toothed rostrum, in the same plane as the

carapace. Inferiorly, two triangular plates on each side probably represent respectively the second antennal and sixth somites.

The eighth and ninth somites have their appendages (the first and second maxillipeds) developed to a great extent as legs; their chief office appears to be to act as hands for the conveyance of the food to the maxillæ, and for the guidance of the respiratory currents to the branchiæ. The second maxillipeds are highly subpediform.

The first chelipeds (tenth pair of limbs) are didactyle, the dactylos well developed, hollowed like a spoon, and the opposing angle of the propodos, produced, long and strong.

The second to fourth chelipeds are well developed, nearly of equal size, acuminate and simple.

The fifth chelipeds (fourteenth pair) consist of the normal seven articulations, but are developed as a pair of imperfect chelæ; the basis, ischium, meros, and carpus, slender; the propodos slender, its distal angle developed as a tooth, against which the dactylos is folded: this last is short, and not nailed, the whole limb being carried folded up in the interspace between the carapace and the fourth cheliped (*vide infra*).

The eyes are moderate, and for the greater part of the length of their peduncles concealed beneath the rostrum. In British species these bear a short, haired scale on their summit.

The olfactory antennæ are moderate; their peduncle is four-jointed, the basal joint soldered to a narrow triangular plate, which fits in between the mandibular segment and the branchial plate, which last, as already noted, probably belongs to the sixth somite.

The auditory antennæ are small, inserted on the membranous space beneath the ocular peduncles, their somite appearing to be represented by a small toothed triangular piece, which forms the external edge of the orbit; their peduncle is made up of four articulations, unless we look on the plate just spoken of as the basal joint; the uppermost two of these are elongated and slender, the basal short and robust.

The filament is extremely short, multiarticulate, and bears at its origin a curved multiarticulate appendage.

The fourth pair (mandibles, Fig. X. 4) is six-jointed; the coxæ soldered

to the somite ; the ischium dilated into a cutting edge, behind which the succeeding articulations are folded down.

The fifth pair (first maxillæ, Fig. X. 5) is three-jointed ; the coxæ soldered as before ; the ischium armed with teeth on its inner edge, and bearing a secondary appendage. That this plate is respiratory is shown by its position and structure, as distinct chains of respiratory tubes may be seen traversing its structure, and terminating at the base of the articulated hairs with which its borders are fringed. In structure it is but slightly simpler than the respiratory lobes found attached to the abdominal somites in many of the subterranean crustacea (ex. gr. *Trypæa porcellana*).

The seventh pair (third maxillæ, Fig. X. 7) is two-jointed ; the coxæ membranous, except a linear longitudinal ridge, which is calcified, dilated externally into a respiratory plate ( $z$ ), from the upper margin of which the accessory appendage ( $x$ ) springs. The basis completes the limb ; its inner edge is straight, sparingly denticulate, and ciliated with thick-set long hairs, and also bearing a raised ridge set with hairs ; its outer margin is curved. By some this limb is looked on as three-jointed, the coxa being represented by a small squared membranous plate, internal to the calcified column, and the ischium bearing what is here called the respiratory plate and its appendage ; but I cannot agree to this view ; and as to the objection, that in the other limbs the ischium always bears the most important cutting edge, an examination of the external maxilliped shows that the basis also may bear a set of teeth, even when the ischium is present.

The eighth pair (internal maxillipeds) (Fig. X. 8) is seven-jointed, the basis squared, the ischium ( $i$ ) toothed on its inner edge, which shows a double ridge, and is fringed with hairs ; the accessory appendage ( $x$ ) is two-jointed, arising from the coxæ, but also articulated to the basis.

The external maxillipeds (ninth pair of limbs) are seven-jointed, and bear a secondary appendage, which arises from the outer superior angle of the coxæ, and is articulated by a lateral process to the basis. The appendage is four-jointed ; the basal joint short and imperfect, the second long, the third short and slender, and the fourth a curved, flattened, multiarticulate, hairy filament. A lateral process of the coxæ bears a set of branchial palps and plates articulated to it. *Query*—Is the office of the appendage gustatory ? The basis and



ischium are connate, their line of junction marked by a suture, their inner edge dilated, and generally finely serrated; they are also often hirsute and toothed. The meros, carpus, and propodos, are slender, generally denticulated and hairy. The dactylos is blunt at its extremity, and hairy. The comparative lengths of the ischium and meros afford valuable specific distinctions.

The abdomen generally equals the carapace in length, and is as broad as the posterior margin of that organ; it is flattened from above downwards, and each of its somites sculptured transversely; the sixteenth to twentieth somites bearing well-developed coxa; in the fifteenth the coxa is absent in the females.

The telson (twenty-first) is triangular, submembranaceous, with a varying number of chitinous plates, thickened with carbonate of lime scattered throughout; it is also unappendiculate.

The abdominal appendages vary in the sexes.

I. In the males (Plate X., 15, 16, 17-20, left-hand side of plate).

First abdominal pair (fifteenth pair; anterior pleopod Spence Bate) coxa sparingly developed and connate with somite, which is expanded outside it; basis and ischium flattened, the latter membranaceous; somite developed inferiorly.

Second abdominal pair (sixteenth pair). Coxæ soldered to somite, well developed, basis small; ischium and meros flattened, the latter membranaceous.

Third to fifth (seventeenth to nineteenth). Coxa well developed, connate; basis dilated into a truncated scale; ischium and meros very short, cylindrical, arising from a notch in side of basis, and barely attaining its apex.

II. In the females (Plate X., figs. 16, 17-19, right-hand side of plate).

First abdominal somite unappendiculate.

Second abdominal somite (sixteenth). Coxæ soldered; basis, ischium, and meros elongated, flattened, ciliated along edges; the apex of meros rounded.

Third to fifth (17th to 19th) as last, except that the meros (incorrectly marked *c* in plate) is acuminate.

Sixth abdominal somite (twentieth pair). Coxæ connate; basis flattened, broad, articulated to coxa, and by a small lateral process to telson; furnished on its inner side with a flattened squamiform appendage (but *vide infra*, Gal. squamifera, p. 92).

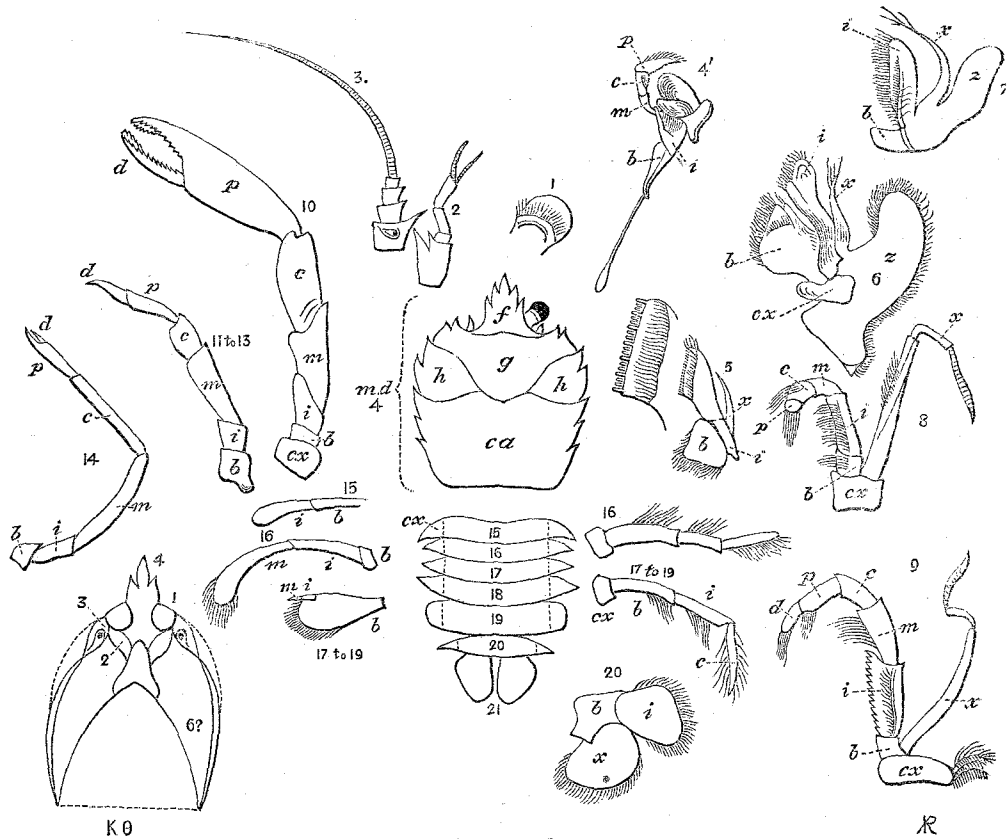


PLATE X.

## DIAGRAMMATIC SKETCH, ILLUSTRATING HOMOLOGIES OF GALATHEA.

Kθ, lower view of carapace, etc.; 1, ocular somite; 2, auditory antennal; 3, olfactory do.; 4, mandibular do., frontal portion; 6?, probably second maxillary.

1, eye and scale.

2, auditory antennæ.

3, olfactory antennæ.

4', mandible; *b*, basis; *i*, ischium; *m*, meros; *c*, carpus; *p*, propodos.

5, first maxilla, with enlarged view of cutting edge; *b*, basis; *i*, ischium; *x*, appendage.

6, second maxilla; *cx*, coxa; *b*, basis; *i*, ischium; *x*, appendage; *z*, respiratory plate.

7, third maxilla; *b*, basis; *i*, ischium; *x*, appendage; *z*, respiratory plate.

8, internal maxilliped; *cx*, coxa; *b*, basis; *i*, ischium; *m*, meros; *c*, carpus; *p*, propodos; *x*, appendage.

9, external maxilliped, references as last.

10, first cheliped, do. do.

11-13, second to fourth do.

14, fifth pair of chelipeds.

15, first pleopod, male.

16, second do. do.

17-19, third and fourth do.; the corresponding numerals on the right-hand side of the plate show the same limbs in the female. In 17-19, *c* has been inserted for *m*.

20, posterior pleopod; *b*, basis; *i*, ischium; *x*, accessory plate.

*md 4*, carapace upper view; regions, *f*, frontal; *g*, gastric; *hh* hepatic; *ca*, cardiac.

The figure below this shows the 15th to twenty first somites, with attached coxa (*cx*).

The group is represented in the Britannic area by five species, which have occurred in both Irish and British seas. For their distribution see end of Paper.

CHARACTERS OF GENUS.

GALATHEA.

Anomoura ; anterior chelipeds strong, equal, didactyle ; fifth pair chelipeds weak, didactyle, carried folded up ; second, third, and fourth pairs acuminate.

External maxillipeds elongate, subpediform. Carapace depressed, beaked.

Abdomen depressed ; no spines on somites ; six anterior abdominal somites appendiculate in male ; appendages of first somite wanting in female.

Telson unappendiculate, submembranaceous.

Antennæ unappendiculate ; external long ; internal inserted beneath eye-stalks ; peduncle elongate.

Eyes large, with a hairy scale (?).

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Chelipedum : par primum cheliforme : paria 2dum, 3tum, 4tumque simplicia : par quintum debile, cheliforme. Maxillipedes externi subpediformes. Carapax depressus, rostratus.

Abdomen depressus, superne inermis ; somitum, anteriora paria primum ad sextum in maribus appendiculata ; in foeminis paria secundum ad sextum solum.

Somite, ultimus submembranaceus, sine appendice.

Antennæ exappendiculatae : par primum (internum) infra oculos insitum, par secundum (externum) satis longum. Oculi magni. Species G. squamifera, Andrewsii, dispersa, nexa, strigosa.

1. *Galathea squamifera* (Fabricius).

G. Rostro brevi, tuberculis squamosis, ciliatis superne velato, mediane sulcato ; dente cylindrico terminante, marginibus fortiter denticulatis ; chelipedum pare primo lato, denticulatis tuberculis conferto ; articulis, secundo, tertio,

quartoque, externe fortiter denticulatis ; maxillipedibus externis, cum ischio (articulo tertio) quam meros (articulo quarto) breviori.

2. *Galathea Andrewsii* (Kinahan).

G. Rostro brevi, squamosis tuberculis pilosis parce velato ; chelipedûm pare primo (pedum par primum) elongato, rotundato, angusto, parce squamosè-tuberculato, tuberculis sæpissime denticulatis ; chelipedûm paribus, 2do, tertioque externe dentatis, interne squamulatis ; maxillipedibus externis, cum ischio (articulo tertio), quam meros (articulo quarto) breviori.

3. *Galathea dispersa* (Spence Bate).

G. Rostro brevi, superne subplano, squamato, alteris ut *G. squamifera*; chelipedûm pare primo elongato, sub compresso, squamato, propodos parce dentato, carpo, et meros parce fortiter interne dentato ; maxillepedibus externis cum meros quam ischio breviori.

4. *Galathea nexa* (Embleton).

G. Rostro brevi, superne lævi, subpiloso, mediane sulcato ; dente cylindrico terminante, dimidio posteriori longitudinis suæ serrato ; alteris, ut *Gal. squamifera*; chelipedûm pare primo globoso, satis lato, elongato, articulo sexto (propodos) externe dentato, supra parce tuberculato, villosa, articulis quinto, quartoque fortiter superne dentato ; maxillepedibus externis cum meros (articulo quarto) quam ischio (articulo tertio) multo breviori.

5. *Galathea strigosa* (Linnæus sp.).

G. Rostro brevi, tuberculis squamosis pilosis superne consperso, mediane sulcato, deflexo ; dente cylindrico terminante, marginibus fortiter dentatis ; chelipedûm pare primo lato, fortiter omnino dentato ; maxillepedibus externis cum ischio (articulo tertio), meros (articulo quarto), longitudinem æquante.

DESCRIPTION OF SPECIES.

SCALY GALATHEA.

*Vulgo* Spanish Lobster.

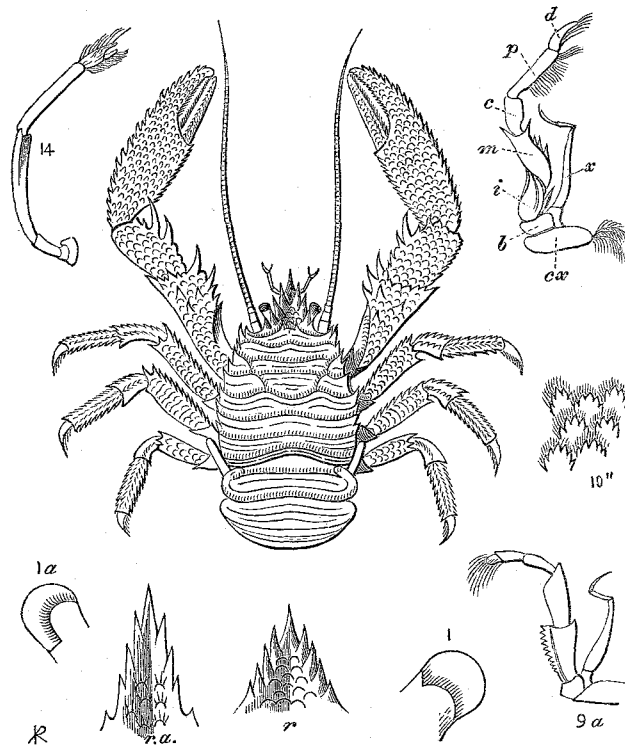


PLATE XI.

GALATHEA SQUAMIFERA—SIZE OF LIFE.

*r*, rostrum

*ra*, rostrum, *Galathea Andrewsii*.

*1*, eye and scale.

*1a*, do. do., *Galathea Andrewsii*.

*10''*, sculptured frontal region, *Galathea squamifera*.

*9a*, external maxillipeds, *Galathea Andrewsii*.

*14*, fifth cheliped, *Galathea squamifera*.

The unnumbered figure represents the external maxilliped of *Galathea squamifera*.

*Vide* also Plate X., figs. 15 to 19.

GALATHEA SQUAMIFERA. Leach, Mal. Pod. Brit., t. xxviii., A, excluding Fig. 2.

*Cancer astacus squamifer*. Montagu.

*Gal. squamifera*. Leach, Edinburgh Encyclopedia, vii., p. 393; Dictionnaire des Sciences Naturelles, xviii., p. 51; M. Edwardes, Histoire Naturelles des Crustacés, ii., p. 275; Conch. Cornish Fauna, p. 77; Thompson, Natural History of Ireland, vol. iv., p. 385; Bell, British Crustacea, p. 197; White, Popular History British Crustacea, p. 87; Kinahan, Proceedings Natural History, Dublin, vol. ii., pp. 68, &c.; Report British Association, 1859; Proceedings Dublin University and Zoological Association, vol. i., p. 270; Zoologist, 3rd Series, 5775.

(?) *Gal. Glabra*. Risso, Crust. de Nice, 72; H. N. de l'Eur. Mer., v. 47.

*Rostrum*: short, covered with squamiform tubercles above, tubercles ciliated along margins; deeply depressed in median line, terminating in a cylindrical pointed tooth; four pointed teeth on lateral margins on each side, the posterior one much smaller than the others; first pair chelipeds broad, flattened, covered with squamiform dentated tubercles; dactylos moderate, not twisted; sides of propodos curved, outer margin toothed, two succeeding joints strongly toothed on outer edge; ischium (third joint) of external maxillipeds shorter than meros (fourth joint).

The general form of this species is elongate, the breadth being to the length as 3 : 8. The carapace is one-fourth longer than broad, and much narrower in front than behind. The abdomen much narrower than the carapace.

The carapace is rounded, perfectly free from teeth above, except two small spiniform ones behind the orbits; the surface marked out by transverse ciliated raised lines in two series bounding the regions, a principal dilated laterally into teeth in front, but untoothed behind; and a secondary, which is generally smooth. The gastric region has two or more small teeth on the median portion of its anterior boundary. The frontal region and rostrum (Fig. *r*) are covered with squamiform tubercles.

The rostrum deeply concave above, terminating in a strong cylindrical sharp tooth, its surface covered with squamiform tubercles, which are rounded in outline, and ciliated at their margins with thick-set short hairs; these are present, and easily distinguishable, even in specimens barely a quarter of an inch

long. I have, however, met two small specimens out of some hundreds examined, which, while agreeing more closely with this species than any other, differ in having the beak perfectly smooth. There are other characters in the squamation of the hands in which they also differ. If a variety of squamifera, it is certainly a rare one, as all the other specimens I have met agree with each other in the characters given above. The margins of the beak are produced into eight teeth, four on each side, which are cylindrical and sharp, the posterior pair the smallest. The rostrum surpasses the eyes by about the length of the peduncle of the latter.

The internal antennæ, with the third joint short, dilated externally, and strongly toothed anteriorly.

External antennæ equal to the body from rostrum to telson; basal articulations short; the filament very long.

The first chelipeds exceed the cephalo-thorax and abdomen by one-fifth of their own length, are moderately broad, generally somewhat flattened. Varieties occur in which they are somewhat globose. The propodos finely serrate on outer margin, and obsoletely so on inner, especially in young specimens; its upper and under surfaces densely covered with squamiform tubercles, which are dentelated at the free edges, and ciliated. The dactylos and opposing process of propodos are nearly parallel: varieties occur in which they are curved, leaving a broad interval between them, the tips alone touching. The meros is squamulate, and armed with strong teeth along its inner edge. The carpus is strongly toothed internally, a few spiniform teeth being scattered through the squamiform tubercles on its upper surface. These limbs are remarkably easy of replacement, the animal casting them at once if seized by them. I possess a specimen in which both the chelipeds had been cast, and are now replaced by a very short pair, still soft, and only half the length of the external foot-jaws. I have constantly seen the animal in good health and condition, though wanting these organs. The second and third pairs of chelipeds are more or less serrate along their upper edge, and squamulate. The fourth pair bears a row of stiff hairs along its upper margin; its under margin is serrated. The fifth pair of chelipeds is as long as the carapace, smooth, terminating in a small blunt hand; it is generally carried folded up. The only use I have seen the animal make of these limbs is in combing out and arranging the fringes of the branchiæ.

The external maxillipeds, when extended, surpass the rostrum by their sixth and seventh articulations; their coxæ are somewhat quadrilateral, and connate with their own somite and the succeeding; their basis short, somewhat triangular; their ischium double the length of the basis, four-sided, its inner side hollowed longitudinally, two-edged, the innermost armed with rows of fine teeth. The meros is remarkably twisted, dilated at its base, much longer than the ischium, bears four cylindrical teeth on its outer edge, terminates in a pointed tooth, and is fringed with long hairs. The carpus is much shorter than the meros, twisted *en revers*, and rounded. The propodos is much longer than the carpus, cylindrical; the dactylos extremely short and blunt. The last three joints are clothed with hairs. A four-jointed appendage arises from the coxa.

The eyes are short; the scale rounded (*vide* Figure).

The abdomen is much narrower than the cephalo-thorax, smooth; the edges of the somites ciliated.

In the male it bears six pairs of appendages, and in the female five, the appendages of the first segment being absent, and the somite itself deficient below.

In the male the first pair is made up of two free joints, and the connate coxa. The terminal joint, broadly dilated, twisted, and hairy. The second articulation has three free joints and the connate coxa, the terminal joint (meros) as in the last. The three succeeding limbs are four-jointed; the coxa soldered as before; the basis (*vide* Fig.) dilated into a broad plate; the apex rounded and hairy, its inner side deeply and truncately notched. From this notch arise the ischium and carpus, which are cylindrical and short, conjointly barely attaining the dilated apex of the basis; the outer side of the basis is ciliated.

In the female the first pair are wanting; the second to fifth four-jointed, flattened, slender, and haired.

The sixth pair in both sexes is made up of ischium, basis, and connate coxa, the ischium dilated; a broad appendage is articulated to the coxa and basis.

Length of the largest specimens I have met, two inches and a half or three inches, including outstretched chelæ four and a half inches. The subjoined measurements are taken from an individual captured at Sandycove, and represents a medium adult specimen:—



	Inches.
Length from tip of chelæ to extremity of curved abdomen, . . . . .	2·875
Length from rostrum to extremity of telson, . . . . .	3·4
Length of carapace, . . . . .	1·0
Length of abdomen, . . . . .	1·0
Length of chelæ, . . . . .	2·875
Length of propodos of chelæ, . . . . .	1·25
Breadth of carapace, . . . . .	0·75
Breadth of chela, . . . . .	0·375

Colour, greenish-brown, with greyish-brown streaks and blotches, occasionally, especially in young specimens, tinged with red. When heated in drying, and on immersion in spirits, it turns red.

It appears to be a generally diffused species around Ireland, and by no means rare, though local—that is to say, only inhabiting peculiar kinds of localities, viz., weedy stones, beneath which it lurks. The nature of this habitat—the rocks being too weighty to be lifted by an ordinary dredge—perhaps accounts for its apparent rarity. All the localities I have found it in were situate at the margin of the laminarian zone, and only approachable at low spring and neap tides. I have never dredged it, even when carrying out a careful series of explorations at Sandycove; nor has it occurred to me in Dublin in the pots, being in fact unknown to the fishermen there. William Thompson and Professor Bell both record it—the former in the dredge, the latter in the dredge, and also in lobster-pots. I have taken it abundantly, of all sizes, from the length of one-fourth inch upwards, clinging to the under sides of the stones, at Sandycove at all seasons, and also on the coast of Clare. There is no appreciable difference, except in size (excluding the variety already spoken of), in the specimens.

In habits the animal is active. I have never seen it feign death. When at liberty, as also in the aquarium, it carries the abdomen close appressed to the under surface of the cephalo-thorax. Swimming is performed by quick, short flaps of the abdomen: it walks at the bottom of the water nearly directly backwards over the stones; it progresses forwards, backwards, and sideways.

Localities, Belfast, on authority of specimens collected by William Thompson and also in Mr. Edward Waller's collection: Dublin, abundant near Howth, Sandycove, and Dalkey: Youghal, authority of late Dr. Ball; Valentia Island; Lahinch, abundant; Galway, according to Professor Melville.

In ova all the year;—at least I have taken it so in every month from January to November. Ova, when immature, coral-red; when approaching maturity, muddy-red.

Habitat, under large stones in clear pools, and also in sludge in the laminarian zone, where they occur in hundreds.

The species was first distinguished by Montagu: it is difficult to establish in a tank; but when once established, requires little care.

The species is easily distinguished, when alive, from all the other British species by its colour, and the characters of the chelipeds and rostrum. It may be also distinguished from all save *G. Andrewsii* by the ischium of the external maxillipeds being shorter than the meros; whilst from *G. Andrewsii*, even excluding colour, the squamulation of the chelæ separates it.

Leach has given a characteristic plate and description of the species in the *Malacostraca Britannica*, excluding Fig. II. and his description of young specimens taken in the dredge, both of which refer to *Galathea Andrewsii*.

## SLENDER-ARMED GALATHEA.

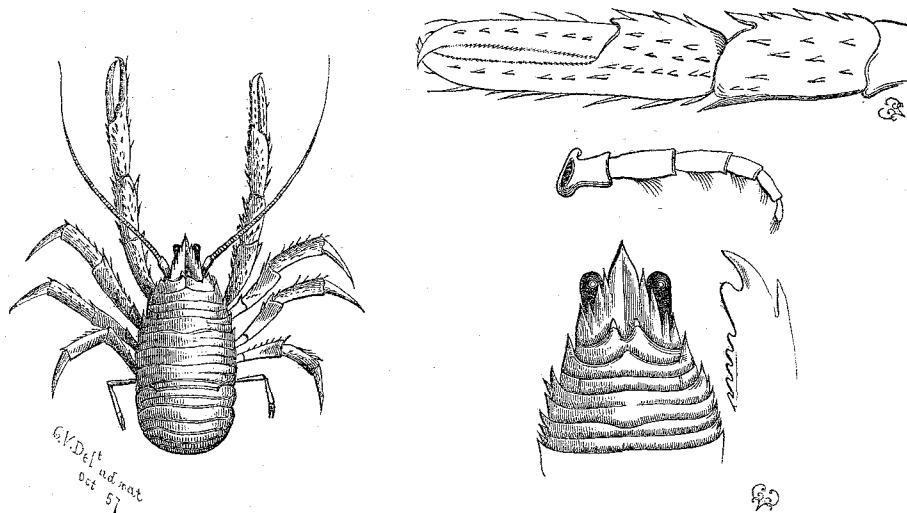


PLATE XII.

## GALATHEA ANDREWSII.

*Vide* also Plate XI, figs. 7a, 1a, and 9a.

## Galathea Andrewsii (Kinahan).

*Galathea Andrewsii*. Kin., Proceedings Nat. Hist. Society, Dublin, vol. ii., p. 58, pl. xvi, fig. 8, and fig., p. 71; *ib.*, p. 47, as nexa, &c.; Zoologist, 3rd series, p. 5775, &c.; Report British Assoc., 1857, p. 104, &c.; Stimpson, Prod., p. 76; Spence Bate, Proceedings Linn. Soc., vol. iii., p. 104.

*Galathea squamifera* (Junr.). Leach (in part), Mal. Pod. Brit., p. xxvii., fig. 2.

*Rostrum* moderate, sparingly covered with elongated, squamiform tubercles above, depressed in the centre, terminating in a flat, pointed tooth, armed with four flattened teeth on each side, the last two of which are separated from the others. First pair of chelipeds elongate, narrowed, covered with a few squamiform tubercles, terminating in a few scattered hairs, or ciliated. Sides of propodus sparingly dentate. Two succeeding pairs of chelipeds strongly dentate on outer margin and upper surface. Ischium of external maxillipeds shorter than meros.

The general form of this species is elongate, the breadth being to the length as 3 : 7; the carapace longer than broad, narrowed in front for two-thirds of its length, then suddenly broader, and then slightly contracted behind. The abdomen is nearly as broad as the carapace.

The carapace is rounded above, smooth, except the usual row of small teeth posterior to frontal region. The rostrum is deeply depressed in the median line, moderately long, terminating in a flattened tooth, and produced laterally into four flattened teeth on each side, the posterior two of which are smaller than the others, from which they are separated by an interspace, close together, and situate at the inner canthus of the orbit. The upper surface of the rostrum and the frontal region are covered with a few comparatively broad, rounded, squamiform tubercles, which are margined with long ciliæ. The transverse lines are shortly ciliated, and toothed laterally. The rostrum surpasses the eyes by half its own length. *Vide* Plate XI., fig. *ra*.

The internal antennæ bear cylindrical teeth on their peduncle, and, when extended, surpass the eyes.

The external (olfactory) antennæ are nearly as long as the first chelipeds, their peduncle sparingly toothed.

The first pair of chelipeds are as long as the conjoined carapace and abdomen; the propodos is rounded above, narrow, its sides parallel, their outermost border margined with teeth, their innermost sparingly toothed, slightly hairy. The dactylos and opposing process of the propodos are linear, twisted, and parallel; their upper surface covered with rows of minute, irregular, dented, squamiform tubercles, which are margined with a few long ciliæ; the under surface is polished, covered with ciliated squamiform tubercles. The carpus bears a row of moderately strong teeth internally; its surface and outer margin are squamulate. The superior border and inner side of the meros is toothed, its surface squamulate. The second and third chelipeds are toothed, their upper borders squamulate above and below, their terminal articulations furnished with strong stiff hairs below. The fifth pair is smooth and slender.

The external maxillipeds are short, the ischium much shorter than the meros, the accessory appendage long. Plate XI., fig. *9a*.

The eyes are short, the eye-scale wide and haired. Plate XI. fig. *1a*.

The abdomen is the same breadth as the posterior margin of the carapace, smooth, the transverse lines ciliated.

Length of largest specimens one inch, or 1.2 inch, with outstretched chelæ; it seldom, however, attains these dimensions.

	Inches.	Inches.
Length from tip of chelæ to curvature of abdomen,	0.875	0.90
Length from rostrum to extremity of telson, . . .	0.75	0.75
Length of carapace, . . . . .	0.375	0.375
Length of abdomen, . . . . .	0.375	0.375
Length of first pair of chelipeds, . . . . .	0.75	0.7
Length of propodos of first chelipeds, . . . . .		0.325
Length of dactylos of do., . . . . .		0.175
Breadth of carapace, . . . . .		0.225
Breadth of propodos of first chelipeds, . . . . .	0.093	0.075
Length of external antennæ, . . . . .		0.6
Length of second pair of chelipeds, . . . . .		0.45

With these measurements, which represent average Dalkey specimens, I find specimens obtained at Plymouth and Belfast by myself; from the west Irish coast, furnished me by Professor Greene and Dr. Wright, and from the north of Scotland, correspond, as well as specimens from Madeira, communicated by Professor Bell, and from Algeria by M. Lucas.

Colour, shades of pale red, banded and blotched with light red and white.

Habitat, clean bottom everywhere about Dublin, in from five to twenty-five fathoms; also in lobster and whelk-pots from rocky ground. I have never met it either in the littoral or exposed laminarian zone. Dr. Perceval Wright assures me he met it thus off the south-west coast.

Habits extremely active; lives well in the aquarium, where I have had it for months; it is fond of climbing to the top of the sea-weeds in the tank, and basking there in the sun.

From the numbers met in the pots, it must be a very roving species. It is far in a way the commonest Galathea met in dredging during my researches on the Dublin coasts: it occurred everywhere, and abundantly, except in black shingly sand, though most abundantly on the oyster-grounds.

Localities, Belfast, 1858 ; specimens, unidentified, occur also in the Ordnance Survey collection from the north of Ireland, and in the Museum of the Belfast Natural History Society, from Strangford Lough and Belfast Bay.

Dublin, everywhere. From the south of Ireland specimens unnamed occur in J. Vaughan Thompson's collection ; and Dr. Wright and Professor Reay Greene have furnished me with specimens from the south-west coast. Its extra-Britannic range, Algeria and Madeira, conjoined with its Orkney habitat, would lead me to expect it all round our coasts.

In ova during the months December to June: ova pale red.

Since the establishment of this species as distinct in 1857, I have examined some hundreds of specimens, many of them in ova, and from various localities, not merely Irish, English, and Scotch, but also Continental, and find that the dimensions and characters of this species are constant. It has by earlier authors been confounded with *Galathea squamifera*, with which the only characters it has in common are the form (but not squamulation) of beak and proportions of foot-jaws ; these latter, however, are remarkably twisted in *Galathea squamifera*. Leach, as already noted, has figured and described it in the Mal. Pod. Brit. as the young of that species ; and I believe William Thompson, in the supplemental volume of the Natural History of Ireland, p. 385, has fallen into the same mistake into which also Professor Bell has fallen, through quoting Leach's statement, given above.

It is distinguished from the allied species as follows :—

From *Galathea squamifera*, by colour, form, and character of sculpture of first pair of chelipeds, form and degree of squamulation of rostrum, and size.

From *Galathea dispersa*, *nexa*, and *strigosa*, by the characters of the rostrum, first chelipeds, proportions of meros and ischium of external maxillipeds, and size.

As already stated, it is a very common, and apparently commonly diffused species.

The species is named after William Andrews, M. R. I. A., President of the Natural History Society of Dublin.

## SPENCE BATE'S GALATHEA.

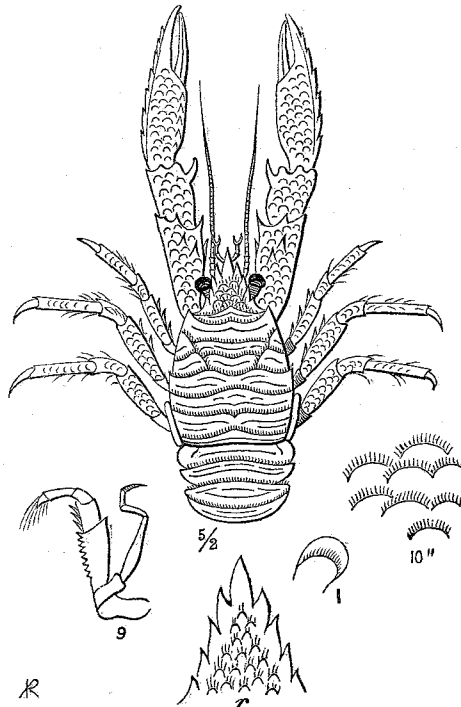


PLATE XIII.

## GALATHEA DISPERSA.

*Galathea dispersa* (Spence Bate).

*Galathea dispersa*. Spence Bate, Proceedings Linnæan Society, London, vol. iii. p. 3; Kinahan, Proceedings British Association, Report on Dublin Bay Dredging, 1860; Proc. Nat. Hist. Soc., Dublin, vol. iii. p. 49.

*Rostrum moderate, nearly plane above, squamate, terminating as a flattened tooth, and bearing four flattened teeth on each side. First pair of chelipeds elongate, somewhat flattened; dactylos narrowed; sides of propodos nearly parallel, minutely toothed on outer margin, squamate; two succeeding articulations sparingly strongly toothed on inner margin; internal antennæ barely surpassing tip of rostrum; ischium of external foot-jaws nearly double length of meros of same limb.*

The general form of body of this species is elongate, the breadth being to the length as 3 : 8, the carapace being longer than broad, narrowed in front. The abdomen is nearly one-third narrower than the broadest part of the carapace, and much narrower anteriorly than posteriorly. The carapace is rounded above ; it bears a row of small teeth behind the frontal region. The transverse lines are hirsute, and terminate laterally in teeth.

The rostrum is nearly plane above, flattened, terminating as a moderately broad tooth, and surpassing the eyes by two-thirds of their length. Its margins are produced into four small flattened teeth on each side, which are equidistant from each other, and the last situate at the inner margin of the ocular notch. The upper surface of the rostrum and the frontal region are squamate ; the scales rounded, ciliated, and thick-set.

Internal antennæ longer than the eyes when outstretched, the basis strongly toothed.

External antennæ are nearly as long as the body, their third articulation very sparingly toothed.

First pair of chelipeds elongate, as long as cephalo-thorax and abdomen, a row of small cylindrical teeth along each margin of the propodos, carpus, and meros, which are toothed on inner margin and superiorly, the upper surface covered with squamiform tubercles, which are rounded in outline, close-set, and densely bordered with long hairs, which give the limb a slightly villose appearance. In young specimens, these scales are present as teeth. The under surface is polished, thickly set with squamiform tubercles, which are serrated, rounded, and ciliated. The dactylos and opposing process of the propodos are hollowed, coarsely and evenly denticulate. The carpus is furnished with a strong tooth at its superior margin, and a second smaller about half way down. The meros bears two teeth on its superior margin, and a smaller one at the inner edge. Its outer border terminates in a cylindrical tooth. The second pair of chelipeds is toothed on its inner border. The fifth pair of chelipeds are slender, as long as the carapace without the rostrum, and terminating in a blunt hand.

The external maxillipeds barely attain extremity of rostrum when extended; the ischium is much longer than the meros.

The eye-scale is rounded, broad, and ciliated.



The abdomen is narrower than the carapace, smooth, the margins of the somites haired.

Length of largest specimens I have seen, one inch from rostrum to telson, or, including outstretched chelæ, 1·75 inch. The subjoined measurements are taken from a Belfast specimen:—

	Inches.
Length from tip of chelæ to extremity of curved abdomen, . . . . .	1·5
Length from rostrum to extremity of telson, . . . . .	1·0
Length of carapace, . . . . .	0·5
Length of abdomen, . . . . .	0·5
Length of chelæ, . . . . .	1·0
Length of propodos of chelæ, . . . . .	0·5
Breadth of carapace, . . . . .	0·375
Breadth of chelæ, . . . . .	0·125
Length of external antennæ, . . . . .	0·5
Length of second pair of chelipeds, . . . . .	0·625

Colour, various shades of dull salmon-red, with a few scattered greenish-brown blotches.

Habitat—To me it has only occurred in deeper water, on a sandy, shingly bottom. In Belfast it has also been taken only in deep water. It is much rarer than *nexa*.

Habits—The animal lived well in the tank, and was active.

Localities, Dublin, south of the Mugglins, in ten to fifteen fathom water. Cnook, in a similar locality. In Mr. Waller's collection, obtained off the 'Turbot Bank and elsewhere, Belfast, occur several specimens of this species. I have not seen it in the pots.

This species was first established by Charles Spence Bate, from specimens taken at Plymouth. It is distinguishable from *G. squamifera* by the proportions of the external foot-jaws and colour, &c.;

From *Galathea strigosa*, by the absence of teeth on the surfaces of the chelipeds, squamulation of the rostrum, and globosity of chelæ;

From *Galathea nexa*, by the form and squamulation of rostrum, comparative

smoothness and lesser amount of villosity of hands, and proportions of abdominal somites.

From *Galathea Andrewsii* it is at once separated by the comparative breadth of first chelipeds, squamulation of rostrum, and propodos of first chelipeds, and comparative lengths of articulations of foot-jaws.

## EMBLETON'S GALATHEA.

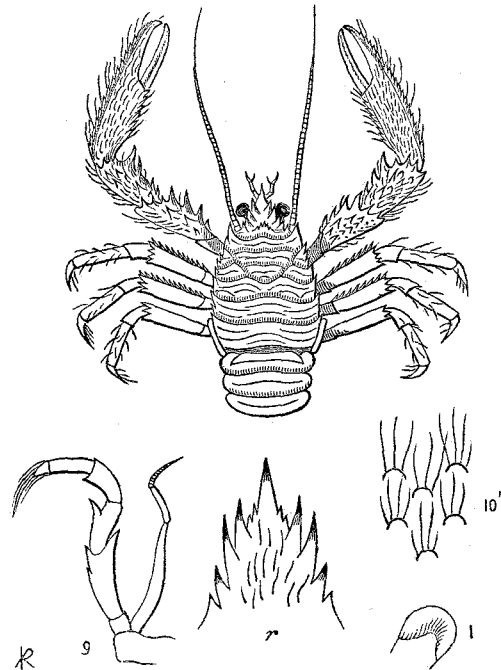


PLATE XIV.

## GALATHEA NEXA.

*Galathea nexa* (Embleton).

*Galathea nexa*. Embleton, Proceedings Berwickshire Club; Thompson, Annals of Natural History, p. 255; Natural History of Ireland, vol. iv., p. 385; Bell, Brit. Stalk-eyed Crust., 204; White, Pop. Hist. Brit. Crust., p. 88; Kinahan, Proceed. Nat. Hist. Soc., Dublin, vol. ii., excluding p. 47, which refers to *G. Andrewsii*; Zoologist, 3rd series, p. 5775, &c.; Spence Bate, Proceed. Linn. Soc., vol. iii., p. 3.

*Rostrum moderate, quite smooth above, covered with scattered hairs, depressed in the median line, terminating in a cylindrical tooth, which is serrated on its edge for its posterior half; borders of rostrum armed with two principal rounded teeth, and two secondary and smaller; first pair of chelipeds somewhat globose, moderately broad, elongate, twisted; sides of propodos parallel, toothed on outer margin, surface sparingly tuberculated, hairy; two succeeding joints strongly toothed on upper surface; internal antennæ surpassing rostrum; ischium of external foot-jaw nearly double length of meros.*

The general form of this species is somewhat elongate, though less so than *dispersa*, breadth at its broadest part being to the length as 2 : 7.5; the carapace being not quite one-third longer than broad, and nearly of equal breadth throughout. The carapace is rounded above and smooth, the transverse lines ciliated at their borders, and produced into pointed teeth laterally; it bears a row of teeth behind the frontal region. The rostrum is concave, terminating in a cylindrical pointed tooth, which is dilated and serrated at its base: the serrations are not visible to the unassisted eye. Its margins are produced on each side into four slightly flattened, curved teeth, the posterior two of which are the smallest, and separated from the others by a short interspace. It surpasses the eyes by nearly their own length. The upper surface of the rostrum and the frontal region are smooth, furnished only with a few scattered long hairs.

The internal antennæ, when extended, surpass the eyes.

The external antennæ are much shorter than the body, their third articulation sparingly toothed.

The first pair of chelipeds as long as entire body, moderately broad, the propodos hairy, a row of strong, sharp-pointed teeth along its outer margin, and a row of smaller ones internally, its surface covered with scattered minute squamiform tubercles, each set with long hairs, giving a hairy appearance to the entire limb. The under surface is set with squamiform tubercles, bordered with long hairs: the produced angle of the propodos bears a raised ridge beneath its denticulated cutting edge.

The dactylos is triangular, minutely denticulated at the outer border, and bears a raised ridge above its cutting edge. Both it and the opposing process

of the propodos are hollowed like a spoon at the tips, twisted and hairy. The carpus is hairy, with rows of curved, pointed teeth on its superior surface and outer margin: the inner margin bears two or three strong teeth. The meros is also toothed and hairy. The fourth and fifth pair of chelipeds are more or less beset with sharp-pointed teeth; the fifth pair slender and smooth.

The external maxillipeds are moderately long, their ischium much longer than the meros.

The eye-scale is rounded and narrow.

The abdomen is much narrower than the posterior border of carapace; narrowed in the middle, and smooth.

Length, about two inches from rostrum to telson; or, including chelæ, three inches. The greater number of specimens which have come under my notice do not exceed an inch and a half.

The following measurements are from specimens obtained at Loughshinny from the lobster-pots:—

	Loughshinny.
Length from tip of chelæ to curve of abdomen, . . . . .	1·875
Length from rostrum to extremity of telson, . . . . .	1·3
Length of carapace, . . . . .	0·687
Length of abdomen, . . . . .	0·625
Length of first chelipeds, . . . . .	1·25
Length of propodos of first chelipeds, . . . . .	0·625
Breadth of carapace, . . . . .	0·50
Breadth of propodos of first chelipeds, . . . . .	0·187
Length of external antennæ, . . . . .	0·875
Length of second pair of chelipeds, . . . . .	0·90

Colour, shades of red, varying from salmon-red to brick-red.

Habitat, stony gravel, in from ten to twenty fathom water. In the spring it also at Dublin occurs in the crab and whelk-pots, which are set in the same depths in weedy, rocky grounds.

Habits—In the aquarium I find the species active. My experience of the species thus has been very limited, as the specimens soon died.

Localities: On the East coast I have obtained this species near Dublin, at

Loughshinny, south of the Mugglins, and off Dalkey Island. Several specimens occur among the collection made by Edward Waller, Esq., at Belfast.

The late William Thompson notes the species at Belfast; but he was unacquainted with *Galathea dispersa*, which, as is already shown, also occurs there.

In ova in February and March; ova scarlet.

This species was first established by Embleton, as stated above.

In appearance this species approaches to *Gal. dispersa*, *Gal. Andrewsii*, and *Gal. strigosa*; and, I doubt not, has been confounded with the latter by early writers. It may be the true Cancer strigosus of Linnæus, which Leach looked on as distinct from that called *Gal. strigosa* here. It is a very distinct species, and is distinguished as follows:—

From *Gal. dispersa*, by the form and smoothness of the rostrum, greater degree of tothing, and hairiness of first chelipeds, and proportions of abdominal somites;

From *Gal. strigosa*, by absence of teeth on upper surface of propodos of first chelipeds, and general comparative smoothness of ditto; absence of teeth on carapace behind eye externally, smoothness of beak and frontal region, and general proportions of body;

From *Gal. Andrewsii*, by form, sculpturing, and hairiness of chelipeds, proportions of ischium, and meros of external maxillipeds, smoothness of rostrum, and superior size;

From *Gal. squamifera*, by the smoothness of rostrum, proportions of ischium and meros of maxillipeds, form and greater amount of tothing of first chelipeds, and colour.

When better known, I have no doubt it will be noted all round Ireland.

## SPINY GALATHEA.

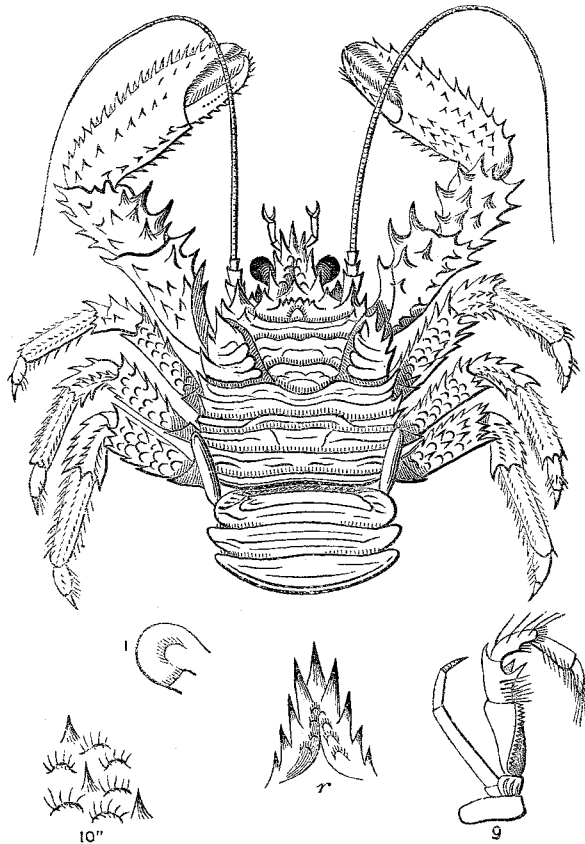
*Vulgo* Spanish Lobster.

PLATE XV.

## GALATHEA STRIGOSA.

GALATHEA STRIGOSA (Fabricius), (altered from Linn.)

- Cancer strigosus*. Linnaeus, *Systema Naturæ*, 1053; *Herbst*. II., p. 50, t. xxvi.  
*Astacus strigosus*. Pennant, *British Zoology*, IV., p. 24, t. xv.  
*Galathea strigosa*. Fabr., *Suppl.* 414; Latreille, *Genera Crustacés et Insectes*, I., p. 49; Leach, *Edin. Encycl.*, VII., p. 398; Edw., *N. H. Crust.*, II., p. 273; Bell, *Brit. Crust.*, p. 200; White, *Pop. Hist. Brit. Crust.*; Kin., *loc. cit.*; Spence Bate; Couch; and most British Authors.  
*Galathea spinifera*. Leach, *Mal. Pod. Brit.* xxviii.

*Rostrum short, deflected, clothed above with a few scattered hairy squamiform tubercles; depressed in median line, terminating in a cylindrical pointed tooth, its sides armed with three pointed teeth, and one minute tooth over inner border of orbit; first pair of chelipeds broad, all the articulations very spinous on their borders and superior surfaces; dactylos short; propodos clothed with squamiform tubercles, scattered among the toothed tubercles; meros of external maxillipeds longer than ischium.*

The general form of this species is somewhat stunted, the breadth being to the length as 2 : 4.

The carapace is but slightly longer than broad, and of nearly equal breadth from behind the eyes backwards; the abdomen of nearly same breadth as the carapace.

The carapace is depressed above, and armed along its sides and lateral regions with spiny teeth. A row of moderately strong teeth marks out the frontal region posteriorly. The rostrum is curved downwards, slightly sulcate in the median line; it terminates in a short cylindrical pointed tooth; the lateral margins are produced into three strong teeth on each side, and a smaller one behind over orbit. It surpasses the eye by the entire length of the peduncle. The rostrum and frontal region are sparingly clothed with squamiform tubercles, which are oblong and toothed, ciliated with thickset short hairs, and with a number of long hairs scattered among the tubercles, which, in old specimens, give a hirsute appearance to the region.

The external antennæ scarcely surpass the entire length of the body. The internal antennæ surpass the rostrum by their terminal two joints.

The first pair of chelipeds are generally as long as the body, closely covered with strong cylindrical, curved, sharp teeth, arranged in rows: these occur on both margins, and on all the articulations.

The propodos is flattened, moderately broad, and, in addition to the spines, bears above and below a number of dentated, ciliated, squamiform tubercles, which above, in addition, bear scattered long hairs, giving a hirsute appearance to the limb. The dactylos is triangular in form, coarsely dentated on its outer edge, and covered with tufts of long hairs.

The second, third, and fourth pairs of chelipeds are coarsely toothed

along their superior margins, squamulated, and haired. The fifth pair is smooth.

The external maxillipeds exceed the rostrum by their propodos and dactylos. The ischium is longer than the carpus, which latter is but moderately twisted. Owing to its size, the characters of these appendages can be readily studied in this species; their details are therefore given at some length.

The fourth pair of limbs (mandibles), (Plate X. 4'), is six-jointed, the coxæ soldered to the somite, the basis and ischium connate, the latter dilated at its distal extremity into a strong process, which is hollowed longitudinally, two-ridged, and its cutting edge rounded. Springing from the outer side of this is the continuation of the limb, which is three-jointed; the meros and carpus somewhat cylindrical and stout; the propodos lanceolate, its upper margin ciliate: these are carried folded down within an interspace behind the dilated lobe of the ischium. From the proximal extremity of the basis, which is bifid, arises the styliform accessory process, and from the junction of the basis and ischium a small rounded membranous scale.

The fifth pair (first maxillæ) (Plate X. 5) is made up of two distinct articulations. The basal (basis) quadrilateral, flattened, membranous; its external distal angle truncate, and furnished with a calcified rounded process below for articulation with ischium; its internal border fringed with long hairs. The second articulation (ischium) is elongated, triangular, its inner distal edge, which represents the base of the triangle, armed with sharp, short, chitinous teeth, which are arranged in three rows. Behind these, on its superior surface, is a raised ridge, which is densely ciliated. From its outer edge, near its origin, arises a curved membranous appendage (*x*). The coxa, which is very small, is connate with the somite; a raised minute ridge crosses the ischium opposite the origin of the appendage, which may by some be looked on as an articulation; but to me it does not appear to be such.

The sixth pair (second maxillæ) (Plate X. 6) is the most complicated of the mouth appendages. The coxa (*cx*) is of a quadrilateral shape, but very imperfectly calcified; from its margin arises a broadly-lobed respiratory plate (*z*), which nearly completely encircles it; this is unequally three-lobed; an internal lobe, small, extending into the mouth, and from the upper margin of which the other articulations of the limb take their origin; a basal, triangular,



fringed on its margins, likewise extending into the mouth, and a superior, which is somewhat semi-ovoid in shape, fringed with articulated hairs, traversed by vessels, and lying on the upper part of the branchial cavity, which it completely covers. The basis is membranous for its upper two-thirds, broadly triangular; its distal margin ciliated, two-lobed; its base calcified, narrow, and enveloped in the respiratory plate. The ischium is likewise dilated, bifid, semicalcified, arising above the basis in a notch in the superior lobe of the respiratory plate, and bears on its external margin, near its base, a curved accessory appendage, which is dilated at its base, pointed, and fringed with hairs at its apex. By some this may be looked on as the meros; but a comparison with the other limbs is sufficient to point out its true homologies.

The third maxillæ (seventh pair) (Plate X. 7) three-jointed, the coxæ narrow, furnished with a simple respiratory plate (*z*), from which the accessory appendage (*x*) springs; its basis is quadrilateral, membranous, attached for its entire length to the border of the coxa; the ischium elongated, flat, its inner margin armed with rows (generally three) of fine chitinous teeth, internal to which is a raised, chitinous ridge.

The internal maxillipeds (eighth pair) (Plate X. 8) with six free joints, the coxæ soldered as before; the basis is squared and short; the ischium toothed on its inner edge, which bears a double ridge, and is fringed with hairs. The accessory appendage (*x*) is made up of two joints, the basal longer than the entire limb, somewhat cylindrical, dilated externally, its apical segment cylindrical at the base, flattened, and ciliated at the apex. The meros is long, curved, with a double fringe of stiff hairs along its inner margin. The three succeeding joints are short and cylindrical; the propodos and dactylos terminating in bunches of stiff hairs; the dactylos is omitted in the figure.

The external maxillipeds (ninth pair) (Pl. X. 9, and Pl. XV. 9) are seven-jointed. The coxa short, somewhat triangular, its external inferior angle dilated into a long process, which bears a set of branchiæ. The secondary appendage is four-jointed, arises from the outer superior angle of the coxa, and is articulated by a lateral process to the basis. Its basal joint is short and imperfect; the second long, curved, somewhat trigonal; the third short, slender; the terminal joint curved, flattened, multiarticulate, and hairy. The basis and ischium are connate, the line of junction marked by a suture, the inner edge dilated, hollowed,

two-edged, finely denticulated on the innermost ridge, the outer ridge sparingly denticulate, hairy. External to this, the ischium bears a hairy ridge. The meros is barely as long as the ischium, and bears two or three strong cylindrical teeth on its inner border, and a single tooth externally at its superior margin. The carpus is curved, short, and strongly haired internally: the propodos is elongate, and haired externally and internally. The dactylos is short, rounded, and haired at its apex.

The eyes are short, their scale rounded.

The abdomen is as broad as the posterior border of carapace, and smooth, its margins ciliated. The other appendages as in *Galathea squamifera*.

The largest specimens I have seen measured four inches from the tip of the rostrum to the end of the telson, and eight inches, including the outstretched chelæ. It only sometimes, however, attains these dimensions, seldom exceeding six inches in length. I give the dimensions of two specimens captured at Dalkey in 1861.

	Inches.	Inches.
Length from tip of chelæ to extremity of curved abdomen, . . . . .	6·25	4·75
Length from rostrum to end of telson, . . . . .	4	4
Length from tip of chelæ to end of telson, . . . . .	8	5·75
Length of Carapace, . . . . .	2	1·875
Length of abdomen, . . . . .	2	2
Length of chelæ, . . . . .	5·375	3
Length of propodos of chelæ, . . . . .		1·375
Breadth of carapace, . . . . .	2	1·5
Breadth of propodos of chelæ, . . . . .		0·5
Length of external antennæ, . . . . .	4	3·25
Length of second chelipeds, . . . . .	3·25	2·75

In colour this is by far the handsomest of all our British species: when living, it is dressed in bright salmon-red, picked out and banded with blue and white: the colours fade much in drying. I have not met any varieties.

This species appears generally diffused, but not common.

Habitat, among rocks, in ten to twenty fathoms. I have never met it either

in the littoral zone nor in the dredge. It is not uncommon in the spring months in lobster and whelk-pots set in rocky ground in ten to twenty fathom water. All the specimens thus obtained are adult, the majority females, and in ova. I have never met young specimens, as it is impossible to work the dredge in the ground these animals frequent.

Habits.—Thrives in the aquarium, but is not so active as either *Galathea squamifera*, *dispersa*, or *Andrewsii*. It is rather a troublesome pet, as sometimes it takes fits of destructiveness, and kills everything else (even Actiniæ) which it can master, in one night destroying six or seven animals, without attempting to eat any of them.

Localities, East coast, Belfast; I have, near Dublin, procured it under the circumstances detailed above, from Bray, Dalkey, Howth, and Loughshinny, where it appears to be not scarce, though it can scarcely be called common.

The species is most frequently met with in March; but specimens have been brought to me in December, January, February, and April. Cork, J. V. Thompson; west coast, Galway, where, according to Professor G. Melville, it is rare.

Ova, coral-red.

This species is easily distinguished from all the other British species by the spinosity of the limbs and the form of the chelæ, which are much broader than those of *Andrewsii*, with which alone it could be confounded, as neither *nexa* nor *dispersa* have spines on the dactylos: the characters of the rostrum are also of value in distinguishing it from both these species; and the colour, when living, at once separates it from *squamifera*.

RANGE OF SPECIES OF CRANGON, CHERAPHILUS, ÆGEON,  
AND GALATHEA.

This table is compiled from various sources. Of many species, especially of Galathea, the range could be much extended. I have quoted no notices of species of whose identity there is not good evidence, as the distinction of several of the species are as yet but imperfectly known.

PART I.

Crangon vulgaris, . . . .	Great Britain; from extreme North to South all round coasts.
"    "	Ireland: from extreme North to South all round coasts.
"    "	Europe: North seas; Mediterranean.
"    "	America: North-east coast; Florida.
Cr. Steiracrangon Allmanni, .	Ireland: North and East coast.
"    "	Scotland: Lamlash, Rev. A. M. Norman.
Cheraphilus trispinosus, . .	England: South coast.
"    "	Ireland: East coast, Dublin.
Cheraphilus bispinosus, . .	England: South coast, Hastings.
"    "	Ireland: East coast, Dublin; West coast, Isles of Arran.
Cheraphilus Pattersonii, . .	Ireland: North, Belfast.
"    "	Scotland: Shetland, Rev. A. M. Norman, q.v.
Cheraphilus spinosus, . . . .	Great Britain: North, Shetland; East coast; West coast; South coast.
"    "	Ireland: North coast, Belfast; East, Dublin; South, Cork (?); West, Galway.
Ægeon fasciatus, . . . . .	Great Britain: South coast.
"    "	Ireland: North, Belfast; East, Dublin; West, Galway.
"    "	Europe: Mediterranean.
Ægeon sculptus, . . . . .	Great Britain: East coast, Moray; South; West.
"    "	Ireland: North, Belfast; East, Dublin; West, Galway.

## PART II.

Galathea squamifera,	. . .	Great Britain : Firth of Forth ; Firth of Clyde ; South coast generally.
"	"	Ireland : North, East, South, West.
"	"	Europe, &c. : France ; Mediterranean ; Nice.
Galathea Andrewsii,	. . .	Great Britain : Scotland : South coast.
"	"	Ireland : general round coast.
"	"	Extra-Britannic : Madeira ; Algiers.
Galathea dispersa,	. . .	Great Britain : South coast.
"	"	Ireland : North, Belfast ; East, Dublin.
Galathea nexa,	. . .	Great Britain : Scotland, East coast ; South coast.
"	"	Ireland : North, Belfast ; East, Dublin ; South, Cork.
Galathea strigosa,	. . .	Great Britain : Moray Frith ; South coast.
"	"	Ireland : North, East, South, West.
"	"	Extra-Britannic : Mediterranean.