A comparison of the two genera Albunea and Lepidopa (Crustacea, Anomura), with description of a new species from Singapore

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PLATE XXIX

In 1936, while on a visit to London Mr. M. W. F. Tweedie of the Raffles Museum, Singapore submitted to me for determination two specimens belonging to the family Albuneidæ. One of these belongs to the fairly common species *Albunea symnista* (Linn.) while the other is undoubtedly referable to a new species. As this latter appeared to be intermediate between the genera *Albunea* and *Lepidopa* it seemed as if the two might have to be united under the older name *Albunea*, or a third genus established. Before adopting either of these alternatives, however, I decided to re-examine as much material of both genera as possible in order to supplement the diagnoses of Miers (1878, pp. 326 and 331) and Ortmann (1896, pp. 221–222, in key).

I take this opportunity of expressing my thanks to Dr. Waldo L. Schmitt of the United States National Museum for so kindly sending me, on loan or in exchange, specimens belonging to seven species of *Lepidopa* and *Albunea*, together with a list of the localities from which various species are represented in the United States National Museum Collection[1]. My thanks are also due to Dr. A. Panning of the Zoologisches Museum, Hamburg for the loan of the holotype of *Albunea intermedia* Balss[2]. Plate XXIX is the work of Miss O. F. Tassart; the other figures have been made from camera lucida sketches.

The following is a list of the known species of *Albunea* and *Lepidopa* with the geographical distribution of each. The localities from which I have seen specimens are marked with asterisks. While the genus *Albunea* has an extremely wide geographical range the genus *Lepidopa* is restricted to the eastern and western coasts of America, (including the West Indies and the Galapagos Islands).

Albunea carabus (Linn.) (= *guerini*, Lucas)	Mediterranean, Algiers; Liberia, Nanna Kroo; Gold Coast, Munford near Appam (Balss 1916); also Mediterranean (shore) [B.M.]*.

1. U.S.M. in list on pp. 186–188. 2. H.M. in list on pp. 186–188.

Albunea elegans M.-Edw. and Bouvier ..	La Praya, Cape Verde Is.
„ *elioti Benedict* (? = *microps*) ..	Samoa.
„ *gibbesii* Stimpson ..	"Cape Fear, N.C. to Key West* and Pensacola*, Florida; Bermuda; Porto Rico and Dry Tortugas, Fla. [U.S.M.]."
	S-E Coast of United States [B.M.]*.
„ *intermedia* Balss ..	Cape Palmas, Liberia [H.M.]*.
„ *lucasia* Saussure ..	Mazatlan, W. coast of Mexico.
„ *microps* Miers ..	Sooloo Is. [B.M.]*.
„ *oxyophthalma* Leach (= *pareti* Guérin)	"Morehead City N.C. to W. coast of Florida* to Texas; Kingston Harbour, Jamaica*, Drift Bay, Water Island, Virgin Islands, [U.S.M.]."
	W. Indies, St. Christophers; Barbadoes; Cayenne; Brazil [B.M.]*.
„ *paradoxa* n.sp. ..	Singapore*.
„ *speciosa* Dana ..	Sandwich Is.
„ *symnista* (Linn.) ..	Java; Pondicherry; Madras; Aden; Ceylon; Colachal; Lord Howe Is. (wrongly referred to *microps*); ? N.W. Australia [B.M.]*.
	Also recorded from Rameswaram; Nicobars; Amboina; seas of Asia.
„ *thurstoni* Henderson	Cheval Par, Madras [2 cotypes in [B.M.]*.
Lepidopa benedicti Schmitt 1935 (= *scutellata* of Benedict) ..	"Ocean beach, north of Fort Worth Inlet to Miami and Pensacola* and Santa Rosa I.*, Florida; Louisiana; Texas (Padre Id.); ? Barbadoes—larval specimens —perhaps larva of the true *scutellata* [U.S.M.].
„ *chilensis* Lenz ..	Iquique, Chile.
„ *deamae* Benedict ..	"Salina Cruz, Mexico; Punta Arenas, Costa Rica.* [U.S.M.]."
„ *mearnsi* Benedict ..	"W. coast of Central America [U.S.M.]."

Lepidopa myops Stimpson	Cape St. Lucas [B.M.]*. "San Pedro, Long Beach*, and La Jolla, California; Mexico [U.S.M.]."
„ *richmondi* Benedict	"Pensacola, Florida; Greytown, Nicaragua; Ile a Vache, Haiti* [U.S.M.]."
„ *scutellata* (Desmarest)	Type locality unknown. ? Peru; San Lorenzo (Dana), St. Thomas Id. ? Barbadoes—*see* under *benedicti*.
„ *venusta* Stimpson ..	"Sabanilla, Colombia [U.S.M.]*." St. Thomas Id. (Stimpson).
„ *websteri* Benedict ..	"Beaufort, N.C.* [U.S.M.]." Type locality Fort Macon, N.C.
„ *wollebaecki* Silvertsen	Floreana, Galapagos Ids.

There are also several specimens of *Lepidopa*, from St. Lucia and Acon in Peru, in the British Museum Collection. They are nearly related to *L. websteri* and *L. venusta* (fig. 1*a*); they do not appear to be referable to *L. chilensis* Lenz which has a very long antero-lateral spine. Lenz's figure, (1902, pl. 23 fig. 5) is probably inexact in that the lateral suture, the *linea anomurica*, is not indicated. Perhaps they are referable to *L. wollebaecki* Silvertsen (1934, p. 9, pl. IV) yet the eye peduncles do not appear to be quite as in that species.

Genus **Lepidopa** Stimpson

In marked contrast to *Albunea*, the genus *Lepidopa* is a very homogeneous one; the species, which exhibit only minor specific differences, all agree in the following characters:—

Carapace.—(*a*) The spine at the antero-lateral angle of the carapace is situated on the dorsal shield and not on the large plate (*p*) that forms the anterior part of the lateral wall; *i.e.* the spine is dorsal, not ventral, to the lateral suture or *linea anomurica*. (fig. 1*a* and *c*).

(*b*) There is a prominent triangular rostral lobe between the eye-peduncles (with a very slight ocular sinus on either side of the lobe) and a spine on the anterior margin of the carapace external to the antennule (fig. 1*a* and *b*). The carapace is, moreover, truncate posteriorly on either side of the median arch as represented in fig. 1*a*.

Scaphocerite.—The "accessory joint" or scaphocerite of the antenna is very short (fig. 2*g*, *x*).

Third Maxillipede.—The carpus is produced at the antero-external angle and reaches almost or quite to the distal end of the propodus (fig. 2*h*).

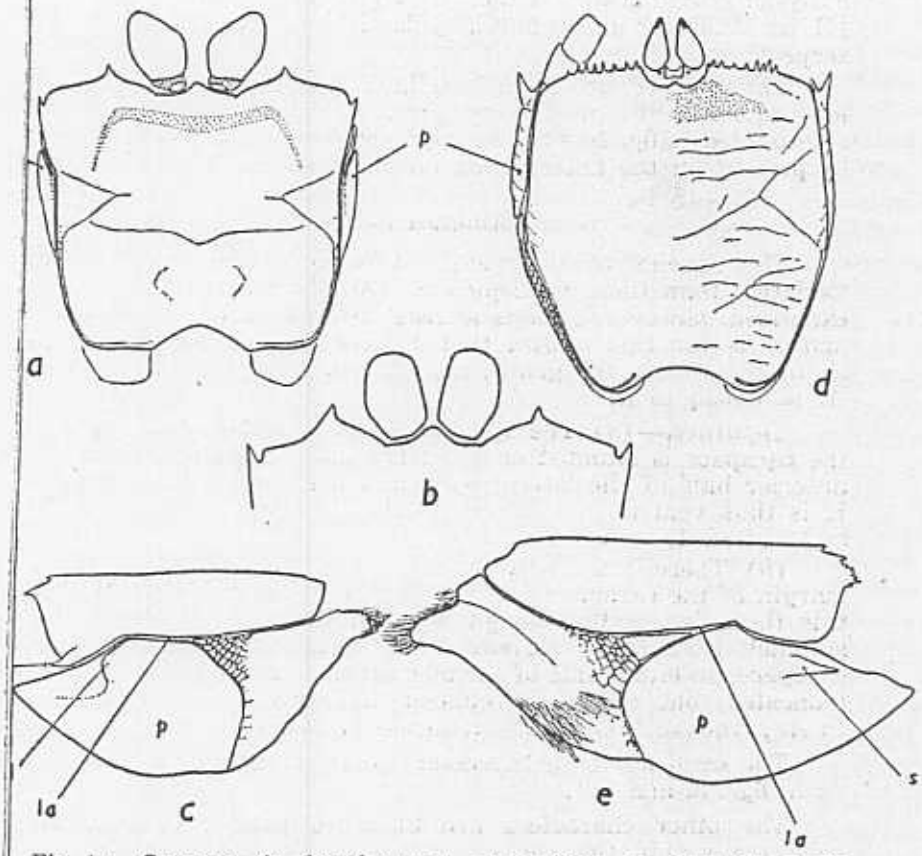


Fig. 1*a*. Carapace, in dorsal aspect, of *Lepidopa sp. from St. Lucia*, Peru [B.M.].

b. Anterior part of carapace of *Lepidopa myops* Stimpson.

c. Carapace, in lateral aspect, of *Lepidopa websteri* Benedict.

d. Carapace, in dorsal aspect, of a young *Albunea* from Muscat. [B.M.].

e. Carapace, in lateral aspect, of *Albunea symnista* (Linn). *l.a.* = *linea anomurica*; *l.* = lobe on lateral plate; *p.* large plate forming anterior half of lateral wall of carapace; *s.* = spine.

The dactyli of peraeopods II–IV are (minor specific differences apart) always of the type represented in fig. 2*i* and *j*). Each dactylus is deeply indented in the distal half of the anterior margin; proximal to this there is a prominent spur on dactylus III, an abtuse or an acute triangular lobe on dactylus II and IV respectively.

The eye peduncles are lamellate, compressed and more or less squamiform; they vary greatly in shape, however, as represented in fig. 2*a–f;* and a pigmented eye-spot (cornea) may be present on the anterior, or the external margin.

Genus **Albunea** Fabricius

The species of the genus *Albunea* exhibit much more variation than those of *Lepidopa*. All the species that I have examined, however, possess at least two characters in common and it is for this reason that I have decided (1) to retain *A. intermedia* in the genus, and (2) to refer the new species *A. paradoxa* to it.

Caparace.—(*a*) The spine near the antero-lateral angle of the carapace is situated on the large plate (*p*) that forms the anterior half of the lateral wall, and not on the dorsal shield. It is thus ventral, not dorsal, to the *linea anomurica* (fig. 1*d* and *s*, figs. 1*e* and 5*b*).

(*b*) There is a deeply concave ocular sinus in the anterior margin of the carapace posterior to the eye peduncles. Within this there is usually, though not invariably, a minute rostral spinule[1] (fig. 1*d*). Moreover, the posterior border of the carapace, on either side of the median excavation, is not broadly truncated, but narrowly rounded, as represented in fig. 1*d*. In *A. paradoxa* it is slightly truncate (Plate XXIX).

The *scaphocerite* or "accessory joint" of the antenna is long (*x* in figs. 3*i* and 5*b*).

The other characters are liable to exhibit considerable variation within the genus, *e.g.*:—(*a*) *The third maxillipede* usually has the antero-external angle of the carpus slightly produced (to reach approximately to the distal end of the proximal third of the propodus) as represented in fig. 3*k;* in *A. paradoxa* it is not produced to any appreciable extent (fig. 5*a*) while in *A. intermedia* it reaches the middle of the propodus (fig. 3*j*).

(*b*) *The dactyli of peraeopods II–IV* also vary considerably in shape as represented in fig. 4*a–d*. In the majority of the species examined they are very similar to those of *A. gibbesi* (fig. 4*b*). In *A. intermedia* the dactylus of peraeopod III is

1. There is no rostral spinule in *A. intermedia*.

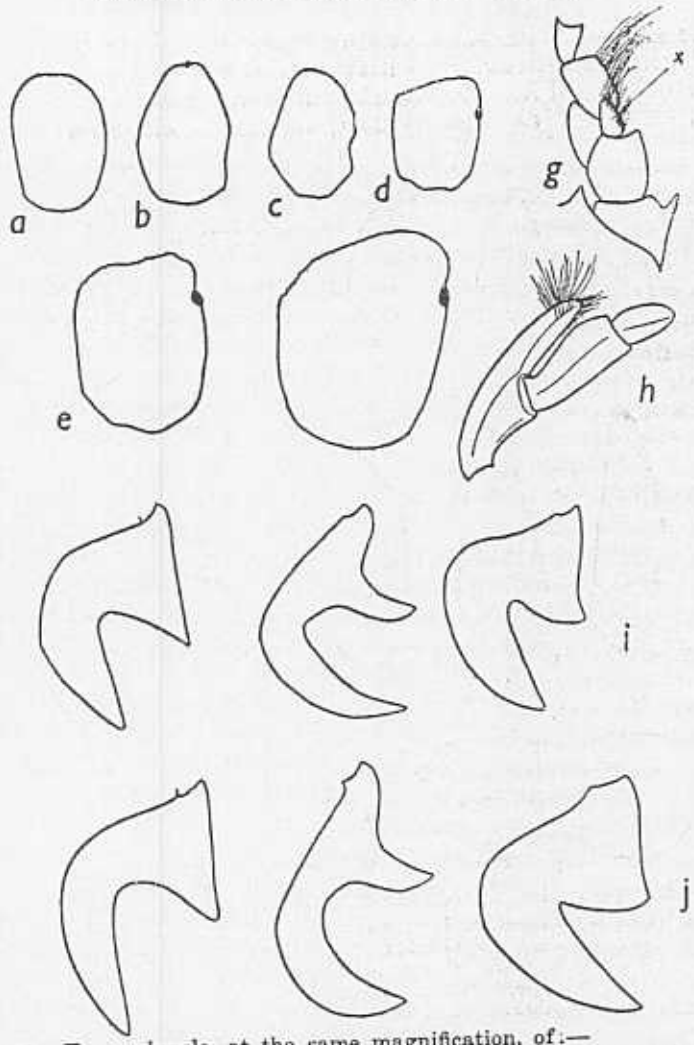


Fig. 2. Eye peduncle, at the same magnification, of:—

a. *Lepidopa myops* Stimpson (max. *c.l.* = 14·3 mm.).
b. " *venusta* Stimpson (" = 10·8 mm.).
c. " *websteri* Benedict (" = 10 mm.).
d. " *richmondi* Benedict (" = 12·2 mm.).
e. " *benedicti* Schmitt = *scutellata* Benedict (" = 19 mm.).
f. " *deamae* Benedict (" = 25 mm.).
g. Proximal half of antenna of *L. benedicti*, to show the small scaphocerite *x*.
h. Carpus, propodus and dactylus of the third maxillipede of *L. benedicti*.
i. Dactylus of peræopods II–IV (from right to left) of *L. benedicti*.
j. Same of *L. myops*.

The setæ are, for the most part omitted; in *g*. and *h*. they are much more numerous than here represented.

sickle shaped, with scarcely any trace of a blunt lobe or of a spur near the articulation with the propodus (fig. 4*a*). Those of *A. symnista* and *A. oxyophthalma* approach more to the *Lepidopa* type, especially as regards dactylus III which is spurred; but

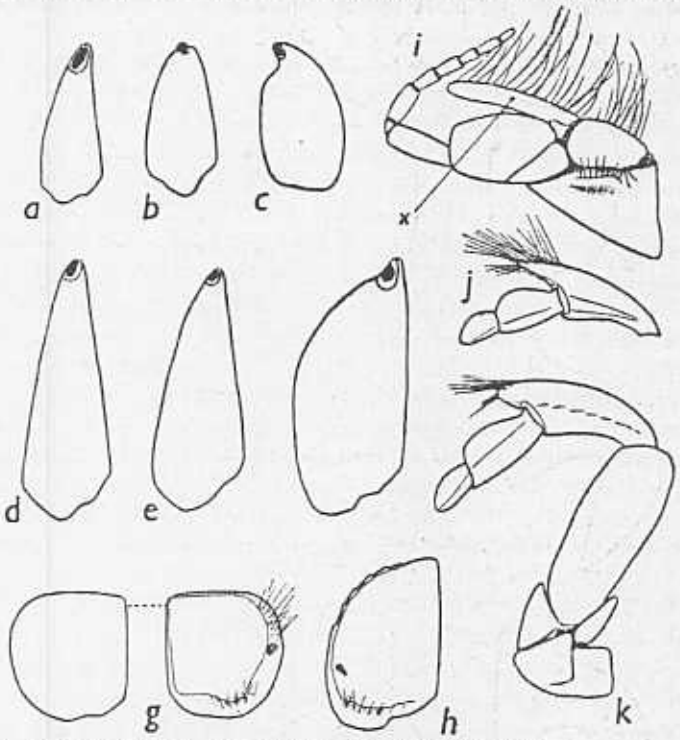


Fig. 3. Eye peduncles, at various magnifications, of:—

a.	*Albunea thurstoni* Henderson, Cotype,	(max. *c.l.*	=	8·5 mm.).
b.	" *carabus* (Linn.).	("	=	17·5 mm.).
c.	" *microps* Miers, holotype,	("	=	14 mm.).
d.	" *oxyophthalma* Leach	("	=	20·5 mm.).
e.	" *gibbesi* Stimpson	("	=	25 mm.).
f.	" *symnista* (Linn.)	("	=	23·5 mm.).
g.	" *paradoxa* n.sp.; outer and inner aspects[1]	("	=	10·2 mm.).
h.	" *intermedia* Balss; inner aspect[1]	("	=	13·2 mm.).

i. Antenna of *A. thurstoni* to show the long, narrow scaphocerite *x*.
j. Carpus, propodus and dactylus of the third maxillipede of *A. intermedia*.
k. *Third maxillipede of A. thurstoni.*
The majority of the setæ have been omitted.

1. The details of the inner aspect may not be quite exact, as the peduncle was not removed from the specimen; the outline is that of the outer aspect reversed.

dactylus IV is only a trifle more concave on the anterior margin than in *A. gibbesi* (c.f. fig. 4*c* and *d* with 4*b* and 2*i* and *j*). Those of *A. paradoxa* are much more of the *Lepidopa* type, since the anterior margin of dactylus IV is deeply concave distal to the triangular lobe (c.f. fig. 5*c* with fig. 2*i* and *j*).

(*c*) *The eye peduncles* are lamellate and compressed and vary greatly in shape as represented in fig. 3*a–h*. Sometimes they are more or less narrowly triangular, sometimes squamiform. There is usually a rather conspicuous cornea or eye spot at or near the apex (fig. 3*a*, *c*, *d–f*); in a specimen from the Mediterranean referred to *A. guerini* (= *A. carabus*) there is a small rather soft terminal papilla, which doubtless represents the eye spot. (The pigment has retracted during fixation and both eye peduncles are slightly damaged at the apex). No eye spot is visible on the dorsal surface of the squamiform peduncles of *A. intermedia* and *A. paradoxa;* there is, in each species, a small suboval spot on the ventral surface, near the external margin but I am not sure whether or not this represents a vestigial eye (fig. 3*g*, *h*).

(*d*) *The spinulation of the front.*—As a rule there are some 8–12 or 14 spinules on the frontal margin of the carapace, on either side of the ocular sinus (fig. 1*d*). In *A. intermedia* (Balss 1916, p. 38 fig. 14) the ocular sinus is unusually wide; only 5 or 6 of the lateral spinules are well developed, the remaining ones having all but disappeared. Since the carapace is, moreover, slightly convex on either side of the ocular sinus the front at first sight recalls the genus *Lepidopa*. There is, however, no trace of a rostral spinule and in *Lepidopa*, as stated above, there is always a prominent rostral lobe separating the eye peduncles. In *A. paradoxa* the spinules, with the exception of the rostral one, have disappeared (Plate XXIX).

Albunea paradoxa n.sp. (Pl. XXIX).

Material.—Singapore, 1 ♀ (holotype)[1] (maximum carapace length = 10·2 mm., frontal width of dorsal shield of carapace = 10·5 mm.).

Description.—In general outline the *carapace* recalls the genus *Lepidopa* and this is further emphasised by the absence of spinules on the front; there is, however, a distinct ocular sinus separated from the rest of the front by a pair of blunt lobules and containing a rostral spinule. Such an ocular sinus is typical of the genus *Albunea* (*see* p. 190). A small spine is present, near each antero-lateral angle of the carapace; it is situated ventral to the *linea anomurica*, on the large plate that forms the anterior part of the lateral wall. The posterior part

1. The holotype is deposited in the collection of the British Museum.

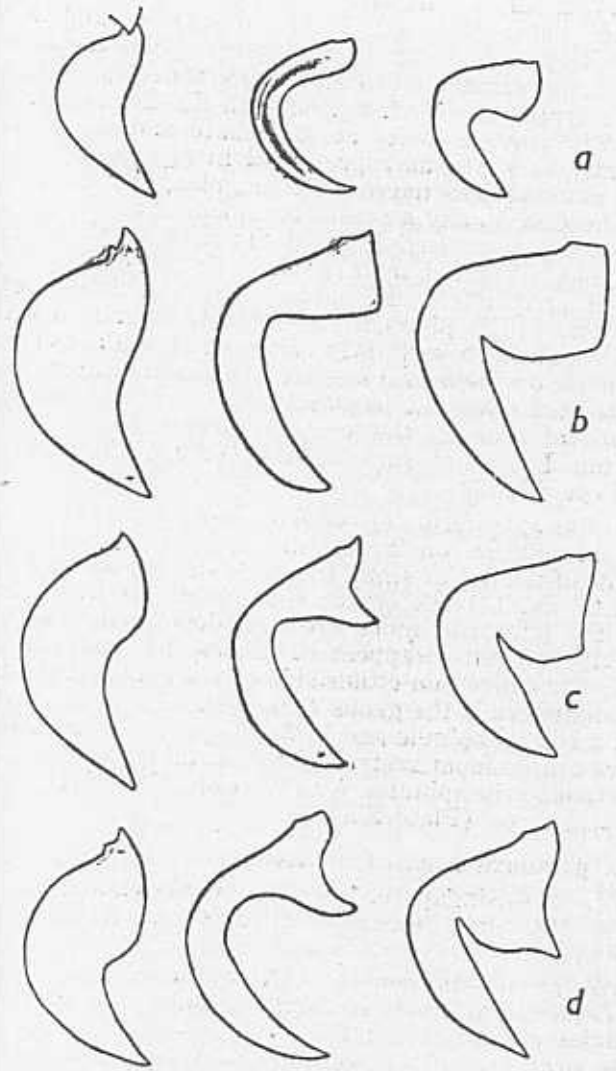
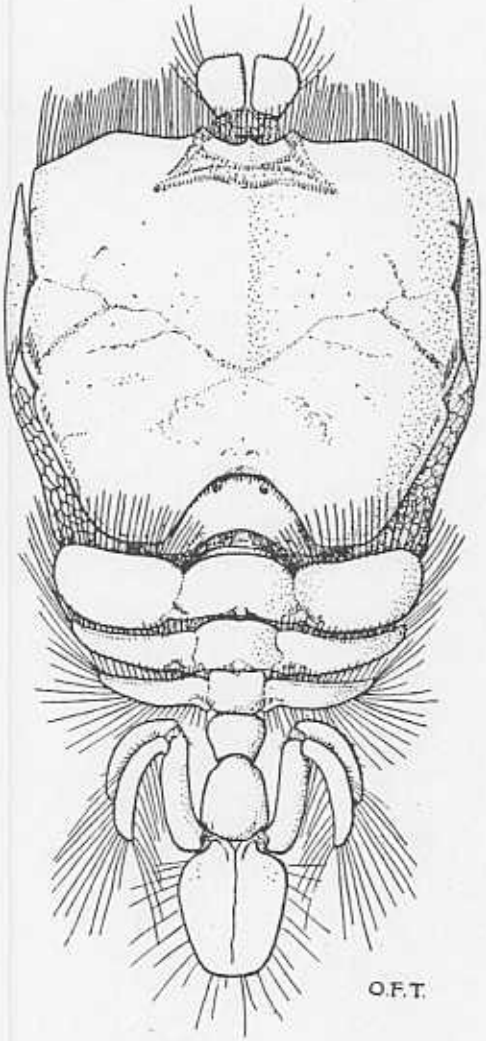


Fig. 4. Dactyli of peræopods II–IV (from right to left) of:—
a. *Albunea intermedia* Balss (max. *c.l.* = 13·2 mm.).
b. " *gibbesi* Stimpson (" = 12·5 mm.).
c. " *symnista* (Linn.) (" = 17·4 mm.).
d. " *oxyophthalma* Leach (" = 20·5 mm.).
All setæ omitted.



Albunea paradoxa sp.n.

of the lateral wall is soft and membranous, and bears numerous small plates in the upper portion. The posterior margin is deeply excavated medially and, on either side of this, it is slightly more truncated than in most species of *Albunea* (fig. 1*d*) though not nearly so much as in *Lepidopa* (fig. 1*a*, c.f. Pl. xxix).

The eye-peduncles are squamiform, about as broad as long; no eye spot is apparent on the dorsal surface, but there is a small oval spot on the ventral surface near the middle of the external margin which may represent a vestigial eye (fig. 3*g*).

The flagellum of the antennule is at least four times the maximum length of the carapace (measured to one side of the median line).

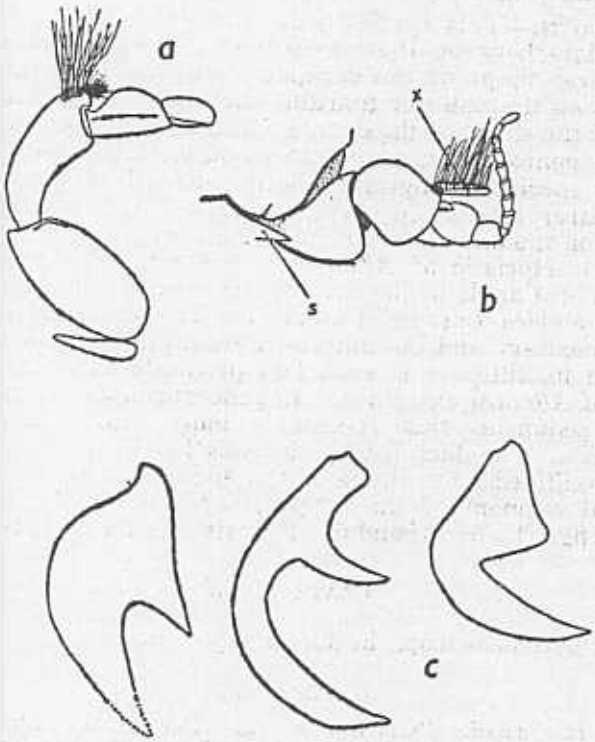


Fig. 5. *Albunea paradoxa* n.sp.

a. Third maxillipede.

b. Antenna, in lateral aspect, to show the scaphocerite *x*; *s* = spine on large lateral plate.

c. Dactyli of peræopods II–IV (from right to left). The setæ are, for the most part, omitted.

The antenna is short, with a well developed, narrow scaphocerite as represented in fig. 5*b*.

The third maxillipede, as represented in fig. 5*a* has the antero-external angle of the carpus less produced than in most other species of the genus, and concealed by a tuft of short setæ (fig. 5*a*).

The peraeopods are of the usual Albuneid type; the dactylus of peræopod III has a long slender spur, near the articulation, on the anterior margin; that of peræopod IV is deeply concave on the distal half of the anterior margin as in all species of the genus *Lepidopa* (c.f. fig. 5*c* and 2*i* and *j*).

The telson, as represented in Pl. xxix, is only a trifle longer than its maximum width.

Remarks.—This species seemed at first sight to be exactly intermediate between the two genera, *Albunea* and *Lepidopa*. The general shape of the carapace, together with the absence of spines on the anterior margin; the broad eye peduncles and, above all, the shape of the dactylus of the fourth peræopod recall the latter genus. But, as mentioned on p. 190, a re-examination of many species belonging to both genera leaves no doubt as to its nearer relationship with *Albunea*. Although spines are wanting on the anterior margin of the carapace, the deep ocular sinus characteristic of *Albunea* is present. The spine at the antero-lateral angle of the carapace is ventral, not dorsal, to the *linea anomurica* (c.f. fig. 1*c* and *e*). The scaphocerite is long, not rudimentary and the antero-external angle of the carpus of the third maxillipede is even less produced than in the other species of *Albunea* examined. In general shape of carapace and of eye peduncles this species is most nearly allied to *A. intermedia*. The dactyli of peræopods II–IV, the carpus of the third maxillipede, the shape of the abdominal segments and of the basal segment of the uropod, differ markedly in the two species (figs. 4*a*, 5*c*; 3*j* and 5*a*; Pl. xxix and Balss, 1916, fig. 14).

PLATE XXIX

Albunea paradoxa n.sp., in dorsal aspect, x. 5.

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