

REVISION OF IPHIMEDIIDAE AND SIMILAR FAMILIES (AMPHIPODA: GAMMARIDEA)

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Abstract.—The amphipod families Acanthonotozomatidae, Amathillopsidae, Astryidae, Epimeriidae (=Paramphithoidae), Iphimediidae, Ochlesidae and Stilipedidae are rediagnosed and three new families, Acanthonotozomellidae, Dikwidae, and Odiidae are described. New keys distinguish these families; other similar families, Lafystiidae and Laphystiopsidae are diagnosed and included in the keys.

In the process of rediagnosing the Ochlesidae Stebbing, 1910 (see Coleman & Barnard 1991a), as a family distinct from Iphimediidae, we determined that other alterations to the taxonomy of the Iphimediidae and Epimeriidae were necessary. Our contribution here offers a different division than used in the past based on characters not previously used or inconsistently used to define these groups. For example, we found relatively good consistency of characters on incisors, rakers, gnathopods and coxae in proposing this new division of the taxa.

Discussion

By using characters other than reduction of maxillipedal palp, we are able to tighten the diagnosis of Ochlesidae, but this requires, at the same time, the removal of the genera *Odius* and *Postodius* from the Iphimediidae to form the contents of a new family Odiidae, the removal of the peculiar *Dikwa* from its paramphithoid-iphimediid associations to form a unique family Dikwidae, and the reinstatement of the Amathillopsidae (an old family synonymized with Epimeriidae some years ago). The genera *Parepimeria* Chevreux (1911) and *Parepimeriella* Schellenberg (1931) are removed to the Pleustidae. By removing the above contents from the two families, the diagnosis of Epimeriidae becomes strengthened and these amphipods can be distinguished

more discretely from Iphimediidae, without resorting to the difficult judgment about the conical or quadrate shapes of the mouthpart group. Within the Iphimediidae two principal groups remain: those genera similar to *Iphimedia* and those genera similar to *Acanthonotozoma*. These two groups are distinguished and the Acanthonotozomatidae are revived. The new family Acanthonotozomellidae are split away from Acanthonotozomatidae.

Methods

All diagnoses presented herein follow the format of comparison to the model amphipod known as the “basic gammaridean” published by Barnard (1969:50, figs. 1, 2). The formula for setae on the mandibular palp was invented by Stock (1974). Two keys with different starting points are presented. To account for possible differing interpretations of certain characters some taxa are entered twice in the keys. For example, Dikwidae are entered twice to treat the alternatives of coxa 1 acuminate and tapering, or subtruncate and not tapering.

Key I to the Families of the Iphimediidae and Similar Taxa

- | | |
|---|----|
| 1. Mandibular rakers present | 2 |
| – Mandibular rakers absent | 10 |
| 2. Coxa 1 truncate, not pointed or tapering | 3 |

- Coxa 1 tapering or pointed 7
- 3. Gnathopod 1 propodochelate, head deformed Dikwidae
- Gnathopod 1 not propodochelate 4
- 4. Molar triturative ... Amathillopsidae
- Molar not triturative, or absent .. 5
- 5. Neither molar present nor incisor broadened .. Acanthonotozomellidae
- Either molar present or incisor broadened 6
- 6. Small setose molar present, incisors narrow Astryidae
- Molar absent, incisors very broad certain Stilipedidae
- 7. Gnathopod 2 much broader than gnathopod 1, carpus lobate .. Odiidae
- Gnathopod 2 almost as slender as gnathopod 1, carpus not lobate .. 8
- 8. Gnathopod 1 propodochelate, head deformed and reduced Dikwidae
- Gnathopod 1 simple, head formed normally 9
- 9. Molar absent Acanthonotozomellidae
- Molar present Epimeriidae
- 10. Coxa 1 truncate below 11
- Coxa 1 tapering below 14
- 11. Gnathopods 1-2 propodochelate Iphimediidae
- Gnathopods 1-2 not propodochelate 12
- 12. Body and incisors of mandible very broad and flat Stilipedidae
- Body and incisors of mandible ordinary 13
- 13. Gnathopod 2 subchelate, molar absent, coxa 4 not reduced, pointed Lafystiidae
- Gnathopod 2 simple, molar present, all coxae 1-4 reduced, truncate Laphystiopsidae
- 14. Gnathopod 2 propodochelate ... Iphimediidae
- Gnathopod 2 not propodochelate 15
- 15. Carpus of gnathopod 2 produced, molar present Ochlesidae

- Carpus of gnathopod 2 not produced, molar absent Acanthonotozomatidae

Key 2 to the Families of the Iphimediidae and Similar Taxa

- 1. Gnathopod 1 propodochelate 2
- Gnathopod 1 subchelate or simple 4
- 2. Gnathopod 2 enlarged, subchelate, carpus lobate, (molar triturative, rakers present) Odiidae
- Gnathopod 2 feeble, propodochelate or simple, carpus not lobate 3
- 3. Rakers present, gnathopod 2 simple Dikwidae
- Rakers absent, gnathopod 2 propodochelate Iphimediidae
- 4. Carpus of gnathopod 2 produced Ochlesidae
- Carpus of gnathopod 2 not produced 5
- 5. Coxa 1 tapering or pointed 6
- Coxa 1 not tapering or pointed .. 8
- 6. Molar produced, triturative or setose Epimeriidae
- Molar reduced or absent, not triturative or setose 7
- 7. Rakers absent Acanthonotozomatidae
- Rakers present Acanthonotozomellidae
- 8. Incisors extremely broad and flat Stilipedidae
- Incisors of ordinary width and not extremely flat 9
- 9. Rakers present 10
- Rakers absent 11
- 10. Molar only setose, gnathopods feeble, propodus smaller than carpus, rectangular or ovate Astryidae
- Molar triturative, gnathopods enlarged, propodus larger than carpus, almost almond-shaped Amathillopsidae
- Molar absent, gnathopods feeble, propodus dominated by carpus, subrectangular Acanthonotozomellidae

- 11. Gnathopod 2 subchelate, molar absent, coxa 4 not reduced, tapering Lafystiidae
- Gnathopod 2 simple, molar present, all coxae 1-4 reduced, truncate Laphystiopsidae

Special Couplets Distinguishing
Ochlesidae and Odiidae

- A. Pereonites 1-6 flat and keel-like dorsally, flagella of both antennae 1-2 reduced, merus and carpus of gnathopod 2 produced, palp of maxilla 1 reduced, inner plate of maxilla 1 reduced B
- B. Gnathopod 1 simple, gnathopod 2 simple, coxae 1 and 4 shorter than coxae 2-3 Ochlesidae
- Gnathopod 1 propodochelate, gnathopod 2 subchelate, coxae 1 and 4 ordinary Odiidae

Amathillopsidae

Amathillopsidae Pirlot, 1934:201.

Diagnosis.—Body compressed. Rostrum of medium size or very small (not “well developed”). Antennae elongate, flagella with 5+ articles; accessory flagellum 1-2 articulate. Mouthpart part field quadrately developed (box-like). Epistome and labrum broad, short, entire. Incisor of mandible ordinary, toothed; raker row strong; molar large and triturative, palp always present, 3-articulate. Lower lip with large fleshy inner lobes, without distinct inner notches. Inner plate of maxilla 1 ordinary, apically and somewhat medially setose; outer plate oblique, normally spinose; palp large, 2-articulate. Inner plate of maxilla 2 without facial setae. Palp of maxilliped 4-articulate, article 2 not produced medially. Coxae 2-3 more or less acuminate, ventral margins fitting normal ventral parabolic curve of anterior coxae; coxa 1 but not 4 shortened, coxa 1 scarcely to not acuminate, mostly truncate, coxa 4 not strictly acuminate, with weak or no posteroventral lobe, coxa 5 at

least slightly shorter than 4. Gnathopods of moderate size and with short articles 5-6, not flagellar, gnathopod 2 usually slightly longer than gnathopod 1; gnathopods 1-2 propodosubchelate, carpi lobed, propodi enlarged and almost almond-shaped. Article 2 of pereopods 5-7 occasionally with posterior cusps or teeth. Epimeron 3 lacking 2 large cusps. Urosomites free. Uropods 1-3 biramous. Rami of uropod 3 flattened, lanceolate, 1-articulate. Telson entire or weakly incised, generally not longer than peduncle of uropod 3.

Relationship.—Differing from the Epimeriidae in the weaker rostrum, slightly shortened and unpointed coxa 1, lobate carpi and enlarged almond-shaped propodi of gnathopods, and presence of large inner lobes on the lower lip.

List of genera.—*Amathillopsis* Heller, 1875 (= *Acanthopleustes* Holmes, 1908).

Epimeriidae

Epimerinae [sic] Boeck, 1871:183.

Paramphithoidae Stebbing, 1906:320.

Diagnosis.—Body compressed, with dorsal teeth sometimes confined to metasome, or urosome, and sometimes weak (*Epimeriella*). Rostrum well developed. Antennae elongate, flagella with 5+ articles; accessory flagellum 0-1 articulate. Mouthpart part field quadrately developed (box-like). Epistome and labrum broad, short, incised or entire. Incisor of mandible ordinary, toothed; raker row strong; molar large and triturative or reduced, conical and pubescent (*Epimeriella* and *Epimeria victoria* Hurley, 1957); palp always present, 3-articulate. Lower lip without inner lobes, without distinct inner notches. Inner plate of maxilla 1 ordinary, medially setose (except *Uschakoviella*); outer plate oblique, normally spinose; palp large, 2-articulate. Inner plate of maxilla 2 without facial setae. Palp of maxilliped 3-4-articulate, article 2 not produced medially. Coxae 1-4 acuminate, ventral margins fitting normal ventral parabolic curve of anterior coxae; coxae 1 and

4 not shortened, coxa 4 with large postero-ventral lobe, coxa 5 at least slightly shorter than 4. Gnathopods feeble and with elongate articles 5–6 but not flagellar, gnathopod 2 usually slightly longer than gnathopod 1; gnathopods 1–2 propodosubchelate, or simple, merus and carpus not produced. Article 2 of pereopods 5–7 often with posterior cusps or teeth. Epimeron 3 lacking 2 large cusps (though occasional species with very small epimeral bicuspidation), occasionally body or coxae with surficial cusps or rarely articulate spines (*Uschakoviella*). Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, usually 1-articulate. Telson entire or weakly incised, generally not longer than peduncle of uropod 3.

Relationship.—Differing from the Acanthonotozomatidae in the box-like field of mouthparts and the well developed mandibular molar and the non-flagellar gnathopod 1.

Differing from the Odiidae in the well developed flagella of antenna 1, well developed medial setae on the first maxillae, absence of distinct medial notches on the main lobes of the lower lip, strongly acuminate coxae 1–3, and well developed (versus reduced) D–E setae on the mandibular palp (an accessory character not otherwise used in diagnoses).

The maxillipedal palp of Ochlesidae is 0–2 articulate, coxa 4 is shortened, the merus and carpus of gnathopod 2 is otherwise produced, and the pereon has an anterior keel, except *Meraldia* which has a series of dorsal plaques.

Differing from the Acanthonotozomellidae in the presence of a molar.

The Iphimediidae have chelate gnathopods and have a severely reduced molar.

The Dikwidae have a chelate gnathopod 1, flagellar gnathopod 2, and reduced head.

The Pardaliscidae have poorly developed inner plates on the maxillipeds and one of the mandibles is heavily flattened; usually pardaliscids have an elongate accessory fla-

gellum. Most Pardaliscidae have evenly extending coxae 1–7, there being little difference in the ventral extension of these plates.

The Stilipedidae have an expanded, non-acuminate coxa 1, and foliaceous mandibles. The Astryidae have a lower lip with widely separated outer lobes and the gnathopods have a characteristic pattern, the carpus being weakly lobate but much wider than the thinner, simple propodus. The Stilipedidae have an exaggerated version of this kind of gnathopod but the carpus is not so strongly lobate as it is strongly enlarged.

Stegocephalidae lack a mandibular palp.

Dexaminidae have fusion of certain urosomites and normal maxillipeds.

Pleustidae have characteristic lower lips.

Gammaridans with acuminate coxae have a large accessory flagellum and normal maxillipeds.

Within Pontoporeiidae *Priscillina* also bears acuminate coxae but differs otherwise from Epimeriidae in the multiarticulate accessory flagellum and short inner ramus of uropod 3 (gammaroid facies).

Rhachotropis is distinguished from Epimeriidae (except *Epimeria yaquinae*) in the large gnathopods with expanded propodus and short deeply lobate carpus; the telson is elongate. *Oradarea* in the Eusiridae has an occasional species with incipiently acuminate coxae. *Cleippides quadricuspis* has points on some anterior coxae, but no coxa tapers to a single point downward.

Amathillopsidae appear similar to eusirid-calliopiid groups, but differ in the short telson. The ratio of size between the plates and the palps of the maxilliped in Amathillopsidae are not typical for Epimeriidae (a character not otherwise used in the diagnoses). The shape of the gnathopods differs strongly from all Epimeriidae.

Removals.—*Parepimeria* Chevreux (1911) and *Parepimeriella* Schellenberg (1931) are removed to the Pleustidae because of the condition of lower lips and maxillipeds.

Eclysis and *Epimeriella* were removed to

the Astryidae by Andres (1985). Walker (1907) originally differentiated *Epimeriella* from *Epimeria* on the lack of significant dorsal body cuspidation, lack of a point on coxa 5, the elongate pereopods 5–6, smallness of rostrum, and the imperfect molar. His two figures of coxa 1 on his plate 9 are slightly different views but show some tapering. Gnathopod 1 is less typical of Astryidae than of Epimeriidae. Andres (1985) partially described some non-type specimens of the type species, *Epimeriella macronyx*, but no full analysis and figures of a single specimen, nor comparison with types appears to be present in the literature. Gnathopods have not been reillustrated. Andres addresses dactylar lengths of pereopod 5 but not overall lengths relative to pereopod 7. Coxae 1–2 of the type species are not illustrated but coxae 1–2 of *Epimeriella truncata* show coxa 1 definitely blunt distally but not as greatly and disproportionately widened as in species of *Astrya* and *Stilipes*. The gnathopodal carpi are much less dominant than in species of *Astrya* and *Stilipes*, and scarcely differ from the classic *Epimeria cornigera* shown by Sars (1895:pl. 128).

Epimeriella victoria (Hurley 1957; and see Moore 1985) has a narrow pointed coxa 1, unlike other supposed members of the genus (but coxa 1 of the type-species of *Epimeriella* is still not well documented). The close congruency of mandibular molar of *E. victoria* to the other species of *Epimeriella* suggests there might be a close relationship; one may establish a transformation series between the least cuspidate species of *Epimeriella* and *E. victoria* to account for the very cuspidate conditions in the latter. For the moment we have removed *E. victoria* to *Epimeria*. It fits into Epimeriidae as well as it does into Astryidae; it differs from Astryidae in its tapering coxa 1 and from Epimeriidae in the reduced molar and slightly more opened outer lobes of the lower lip. It fits Epimeriidae better because of the cuspidation character of its body and coxae and

the weakness of carpal expansion on the gnathopods. The latter character is a problem of context and needs much better documentation in the literature than heretofore available.

List of genera.—*Paramphithoe* Bruzelius, 1859 (= *Acanthosoma* Ross, 1835, homonym, Hemiptera) (=type genus); *Actinacanthus* Stebbing, 1888; *Epimeria* Costa, 1851, 1851–1853 (= *Pseudepimeria* Chevreux, 1912a, 1912b, = *Subepimeria* Bellan-Santini, 1972); *Epimeriella* Walker, 1906, 1907; *Metepimeria* Schellenberg, 1931; *Uschakoviella* Gurjanova, 1955.

Acanthonotozomellidae, new family

Type genus.—*Acanthonotozomella* Schellenberg, 1926.

Diagnosis.—Body compressed, with dorsal teeth (except *Acanthonotozomopsis*). Rostrum well developed (except *Acanthonotozomopsis*). Antennae elongate or short, flagella with 5+ articles, rarely with 2 (*Amatiquakius*); accessory flagellum absent. Mouthpart part field conical. Epistome and labrum narrow, long, incised. Incisor of mandible ordinary, toothed; raker row strong; molar reduced or absent; palp always present, 3-articulate. Lower lip without inner lobes, without distinct inner notches. Inner plate of maxilla 1 ordinary, medially setose or setation reduced; outer plate oblique, normally spinose; palp large, 2-articulate. Inner plate of maxilla 2 without facial or medial setae. Palp of maxilliped 4-articulate, article 2 often produced medially. Coxae 2–4 more or less acuminate, ventral margins fitting normal ventral parabolic curve of anterior coxae or in type genus coxa 2 shortened; coxae 1 and 4 not shortened, coxa 1 widened in 2 genera but not significantly wider than coxa 2 (versus Stilipedidae), subtruncate or rounded (except *Acanthonotozomoides* with concave margin and anteroventral tooth), coxa 4 with large posteroventral lobe (except *Acanthonotozomopsis* and small in *Amatiquakius*).

Coxa 5 shorter than posteroventral lobe of 4. Gnathopods feeble, subequal; gnathopods 1–2 simple or weakly parachelate, merus and carpus not produced, carpi slender. Article 2 of pereopods 5–7 often with posterior cusps or teeth. Epimeron 3 often with 2 large cusps posteroventrally. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, 1-articulate. Telson entire or weakly incised, generally not longer than peduncle of uropod 3.

Relationship. — See the Epimeriidae, Odiidae, Ochlesidae, for distinctions from those families and see Epimeriidae for mention of families outside of the iphimedioid group of families included herein, which differ in the same way as from Acanthonotozomellidae.

Differing from the Acanthonotozomatidae in the presence of rakers on the mandible.

Differing from the Iphimediidae in the presence of rakers, the simple gnathopods 1–2, and in the absence of medial setae on the inner plate of maxilla 2.

Differing from the Dikwidae in the absence of a molar, the normal head, simple gnathopod 1, and the non-flagellar gnathopod 2.

Acanthonotozomella and *Acanthonotozomopsis* share with Stilipedidae a slightly expanded coxa 1, and in most species coxae 1–3 are not sharply pointed but rather truncate or rounded. The Stilipedidae are distinguished by the immensely broadened mandibles.

The mandibular incisors in Acanthonotozomellidae move plesiomorphically in the “horizontal transverse plane of the body and in a plane perpendicular to the long axis of the mandible” (Watling & Thurston 1989), whereas in the Iphimediidae there occurs gradual change of the cutting plane towards the “vertical frontal plane of the body and in the medial-lateral plane through the long axis of the mandible.” This transition of the cutting plane, however, cannot be used to

separate Acanthonotozomellidae from Iphimediidae, because *Pseudiphimediella* bears the plesiomorphic mandibular conditions.

Maxilliphimedia bears the fully plesiomorphic mandibular conditions and *Anchiphimedia* intermediates between the plesiomorphic state and the apomorphic frontal mandibular cutting plane (compare with Watling & Thurston 1989). These two genera differ from Stilipedidae in the chelate gnathopods with otherwise completely different form than in Stilipedidae and in the paired dorsal cusps typical of most iphimediids.

Acanthonotozomellidae are similar to Stilipedidae and Astryidae in that coxa 1 is expanded and apically truncate or rounded in most species of Acanthonotozomellidae. For the most part coxa 1 of Acanthonotozomellidae is not broader than coxa 2 as in Astryidae and Stilipedidae. Astryidae have a molar and Stilipedidae have broadened mandibular bodies and incisors. The gnathopods of Acanthonotozomellidae are subtly distinct from those of Astryidae and Stilipedidae where the carpus significantly dominates the propodus in its breadth.

Composition. — *Acanthonotozomella* Schellenberg, 1926 (= *Paracanthonotozoma* Bellan-Santini, 1972); *Acanthonotozomoides* Schellenberg, 1931; *Acanthonotozomopsis* Watling & Holman, 1980; *Amatiquakius* Coleman & Barnard, 1991b.

Acanthonotozomatidae Stebbing

Acanthonotozomatidae Stebbing, 1906:210.

Diagnosis. — Body compressed, with or without dorsal teeth. Rostrum well developed. Antennae elongate, flagella with 5+ articles; uniarticulate accessory flagellum present. Mouthpart field conical. Epistome and labrum narrow, long, incised. Incisor of mandible narrow, toothed; raker row absent; molar reduced or absent; palp always present, 3-articulate. Lower lip apically pointed, without inner lobes, without dis-

tinct inner notches. Inner plate of maxilla 1 ordinary, medially setose; outer plate oblique, normally spinose; palp large (somewhat shortened in *A. cristatum*), 2-articulate. Inner plate of maxilla 2 without facial setae. Palp of maxilliped 4-articulate, article 2 not produced medially. Coxae 1–4 acuminate, ventral margins fitting even curve or straight line of anterior coxae; coxae 1 and 4 not shortened, coxa 4 with large posteroventral lobe, coxa 5 slightly shorter than 4. Gnathopod 1 feeble, slender, articles 5–6 weakly elongate, gnathopods 1–2 propodosubchelate, merus and carpus not produced. Article 2 of pereopods 5–7 often with posterior cusps or teeth. Epimeron 3 with 2 large cusps posteromarginally (except *Acanthonotozoma cristatum*), occasionally body or coxae with surficial cusps. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, 1-articulate. Telson weakly incised, generally not longer than peduncle of uropod 3.

Relationship.—The Epimeriidae differ in the well developed mandibular molar. See Epimeriidae for mention of differences from families outside of the families included herein.

See the Odiidae, Ochlesidae, *Acanthonotozomellidae*, *Iphimediidae*, and the *Dikwiidae* for distinctions from those families.

List of genera.—*Acanthonotozoma* Boeck, 1876 (= *Acanthonotus* Ross, 1835 [=homonym, Pisces], = *Panoploeopsis* Kunkel, 1910).

Ochlesidae Stebbing

Ochlesidae Stebbing, 1910:581.

Diagnosis.—Body compressed, at least pereonites 1–6 projecting dorsalwards as thin flat keel or formed in to flat plaques (*Meraldia*). Rostrum well developed. Antennae poorly developed, short, flagella with 4 or fewer articles; accessory flagellum absent. Mouthpart field conically developed. Epistome and labrum narrow, long, entire. In-

cisor of mandible ordinary, toothed, or needle-shaped or blunt or scarcely toothed; raker row absent; molar small and weakly triturative or reduced and simple; palp always present, 3-articulate, D–E setae reduced. Lower lip without inner lobes, outer lobes very thin, with inner notches only at apices. Inner plate of maxilla 1 minute, often medially setose, setae usually very small; outer plate coniform, spinal margin very oblique, spines few and mostly fused; palp tiny, 1-articulate. Inner plate of maxilla 2 with only terminal setae. Plates of maxilliped very thin, palp 0–2-articulate. Coxae 1–3 more or less acuminate, at least one coxa tapering, ventral margins not fitting normal ventral parabolic curve of anterior coxae; coxae 1 and 4 shortened, coxa 3 usually with posterodorsal buttress, coxa 4 with peculiar shape (see figures in Coleman and Barnard 1991a), with posteroventral lobe, coxa 5 about as long as 4. Gnathopods feeble and with elongate articles 5–6 (article 3 of gnathopod 1 mostly elongate, versus Odiidae), gnathopod 1 weakly flagellar, gnathopod 2 usually slightly broader and shorter than gnathopod 1; gnathopods 1–2 simple, merus and carpus of gnathopod 2 produced. Article 2 of pereopods 5–7 lacking posterior cusps or teeth. Epimeron 3 rarely with 2 large cusps. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 subequal to or longer than peduncle, flattened, lanceolate, usually 1-articulate. Telson entire, generally not longer than peduncle of uropod 3.

Relationship.—Differing from the Epimeriidae in the thin dorsal keel or plaques on the pereon, short antennal flagella, short coxae 1 and 4, in the simple gnathopod 1 and produced merus and carpus of gnathopod 2, reduction of D–E setae on the mandibular palp, reduction of medial maxillary setae and loss of at least 2 articles on the maxillipedal palp. See Epimeriidae for mention of differences from families outside of the families included herein.

Differing from the Odiidae in the reduction of coxae 1 and 4, absence of rakers, in

the produced carpus of gnathopod 2 and the simple gnathopod 1.

Differing from the Acanthonotozomatidae in the presence of a molar, and from that family and Acanthonotozomellidae in the reduction of the maxillipedal palp, reduction of D-E setae on the mandibular palp, reduced coxae 1 and 4, and the produced carpus of gnathopod 2.

Differing from the Iphimediidae in the produced carpus of gnathopod 2, simple gnathopods 1-2, short coxae 1 and 4, keel-like dorsal margin of pereonites 5-6, and the presence of a mandibular molar.

Differing from the Dikwidae in the more or less well developed head, short coxa 4, simple gnathopod 1, produced carpus of gnathopod 2, conical outer plate of maxilla 1, reduced palp of maxilliped, and the reduced D-E setae of the mandibular palp.

Like the Ochlesidae, the Lafystiidae have a 2-articulate palp on the maxilliped; otherwise they differ from Ochlesidae in the long coxa 4, normal lower lip, broad, unkeeled body, parachelate gnathopod 2, lack of meral and carpal lobe on gnathopod 2 and well developed laciniae mobiles on both mandibles.

List of genera.—*Ochlesis* Stebbing, 1910 (=type genus); *Curidia* Thomas, 1983; *Meraldia* Barnard & Karaman, 1987; *Ochlesodius* Ledoyer, 1982.

Dikwidae, new family

Type genus.—*Dikwa* Griffiths, 1974:266.

Diagnosis.—Body compressed, with thin middorsal keel on pereonites 1-5, dorsal carina on pereonites 6-7 and pleonites 1-3 (based on new observation of material from South African Museum). Head poorly formed, rostrum absent (our interpretation despite Griffiths 1977). Antennae elongate, flagella with 5+ articles; accessory flagellum absent. Mouthpart part field? quadrately developed (box-like). Epistome and labrum broad, short, incised. Incisor of mandible ordinary, toothed; raker row strong; molar

large and tritulative; palp 3-articulate (D-E setae well developed, versus Odiidae). Lower lip without inner lobes, without inner notches. Inner plate of maxilla 1 slender, only apically setose; outer plate truncate, with 13 spines; palp large, 2-articulate. Inner plate of maxilla 2 [unknown]. Palp of maxilliped 4-articulate, article 2 not produced medially. Coxae 3-4 more or less acuminate, coxa 2 shortened and blunt below, ventral margins not fitting normal ventral parabolic curve of anterior coxae; coxae 1 and 4 not shortened, coxa 1 truncate-concave below, with marginal points and anteroventral lobule, coxa 4 with small posteroventral lobe, coxa 5 shorter than posteroventral lobe of 4. Gnathopods feeble and with elongate articles 5-6 on gnathopod 2, and article 6 on gnathopod 1, gnathopod 2 flagellar and much longer than gnathopod 1; gnathopod 1 propodochelate, gnathopod 2 simple, merus and carpus not produced. Article 2 of pereopods 5-7 with posterior cusps or teeth. Epimeron 3 lacking 2 large cusps posteroventrally. Urosomites free. Uropods 1-3 biramous. Rami of uropod 3 longer than peduncle, though peduncle elongate, flattened, lanceolate, 1-articulate. Telson weakly incised, not longer than peduncle of uropod 3.

Relationship.—Differing from Epimeriidae in the severely reduced head, chelate gnathopod 1, simple gnathopod 2, and elongate articles of the gnathopods.

Differing from Odiidae in the acuminate coxae 3-4, simple gnathopod 2, conical outer plate of maxilla 1, broad (ordinary) lower lip, and broad prebuccal parts.

Differing from Ochlesidae in the reduced head, chelate gnathopod 1, well developed and extraordinary maxilla 1, 4-articulate maxillipedal palp, well developed antennal flagella, and unshortened coxae 1 and 4.

Differing from the Acanthonotozomatidae and Acanthonotozomellidae in having a mandibular molar, chelate gnathopod 1, flagellar gnathopod 2 and reduced head.

Differing from Iphimediidae in the sim-

ple gnathopod 2, presence of mandibular rakers, triturative molar, normal lower lip, and severely reduced head.

See Epimeriidae for mention of differences from families outside of the families included herein.

List of genera.—Dikwa Griffiths, 1974.

Iphimediidae

Iphimedinae Boeck, 1871:178.

Diagnosis.—Body compressed, with dorsal teeth (except minutely in *Iphimedia gibba* and absent in *Pariphiphimedia normani*). Rostrum well developed. Antennae elongate, flagella with 5+ articles; accessory flagellum 0–1 articulate. Mouthpart part field conically developed. Epistome and labrum highly variable, broad or narrow, short or long, incised or entire. Incisor of mandible variable, broad and toothed in transition to needle shaped or blunt, untoothed, callused or hollowed out; raker row absent; molar absent or reduced (*Stegopanoploea* with conical molar); palp always present, 3-articulate. Lower lip without inner lobes, with or without distinct inner notches. Inner plate of maxilla 1 ordinary or minute, usually medially setose; outer plate oblique, normally spinose or reduced (*Nodotergum*); palp large or small, 1–2-articulate. Inner plate of maxilla 2 rarely with facial setae. Palp of maxilliped 3–4-articulate, article 2 produced medially in several genera. Coxae 2–4 more or less acuminate, ventral margins fitting normal ventral parabolic curve of anterior coxae; coxae 1 and 4 not shortened, coxa 1 variable, broad or narrow, acuminate or not, coxa 4 with large posteroventral lobe, coxa 5 shorter than 4. Gnathopods feeble and with elongate articles 5–6, gnathopod 1 often flagellar, gnathopod 2 usually slightly longer or stouter than gnathopod 1; gnathopods 1–2 propodochelate, or gnathopod 1 simple in *Nodotergum*, merus and carpus not produced. Article 2 of pereopods 5–7 often with posterior cusps or teeth. Epimeron 3 usually with 2 large cusps. Uro-

somites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, 1-articulate. Telson entire or weakly incised, generally not longer than peduncle of uropod 3.

Remarks.—Gnathopod 1 of *Nodotergum* is simple, and because rakers and notches on lower lip are absent, *Nodotergum* might be assigned to Acanthonotozomatidae, but the chelate gnathopod 2 and 3-articulate maxillipedal palp suggest closer affinities to Iphimediidae than to Acanthonotozomatidae. The outer plate of maxilla 1 in *Nodotergum* is reduced and poorly spinose. *Maxilliphiphimedia* and *Paranchiphiphimedia* differ from typical Iphimediidae in the untapered coxa 1 and broad, flattened mandible.

Relationship.—Differing from the Epimeriidae in the absence of raker spines and the presence of at least one pair of chelate gnathopods.

Differing from the Odiidae in the chelate gnathopod 2, reduction or absence of mandibular molar, and absence of rakers.

The maxillipedal palp of Ochlesidae is 0–2 articulate, the antennal flagella are reduced, coxae 1 and 4 are shortened, the propodi of the gnathopods are simple, and gnathopod 2 otherwise has lobate merus and carpus.

Differing from the Acanthonotozomatidae in the presence of at least one pair of chelate gnathopods.

Differing from the Acanthonotozomellidae in the presence of at least one pair of chelate gnathopods and the absence of rakers.

Differing from the Dikwidae in the chelate gnathopod 2, unreduced head and the reduced or absent mandibular molar and rakers.

Differing from Stilipedidae in the chelate gnathopod 2.

See Epimeriidae for mention of differences from families outside of the families included herein.

Removals.—*Bathypanoploea* and its synonyms are removed to the Stilipedidae.

List of genera.—*Iphimedia* Rathke, 1843 (type genus) = *Microcheles* Kroyer, 1846, = *Panoploea* Thomson, 1880, = *Iphimediopsis* Della Valle, 1893, = *Cypsiphimedia* K. H. Barnard, 1955; *Anchiphimedia* K. H. Barnard, 1930; *Anisoiphimedia* Karaman, 1980; *Coboldus* Krapp-Schickel, 1974; *Echiniphimedia* K. H. Barnard, 1930; *Gnathiphimedia* K. H. Barnard, 1930; *Iphimediella* Chevreux, 1911, 1912b; *Labriphimedia* K. H. Barnard, 1931, 1932 (= *Maoriphimedia* Hurley, 1954); *Maxilliphimedia* K. H. Barnard, 1930; *Nodotergum* Bellan-Santini, 1972; *Paranchiphimedia* Ruffo, 1949; *Parapanoploea* Nicholls, 1938; *Pariphimedia* Chevreux, 1906; *Pseudiphimediella* Schellenberg, 1931; *Stegopanoploea* Karaman, 1980.

Odiidae, new family

Type genus.—*Odius* Liljeborg, 1865:11.

Diagnosis.—Body compressed, all pereonites dorsally flush, in most species projecting dorsalwards as thin flat keel (see "Remarks" below), teeth present only on pleon. Rostrum well developed. Antennae poorly developed, short, flagella with 6–8 short articles; accessory flagellum absent. Mouthpart part field conically developed. Epistome and labrum narrow, elongate, minutely incised. Incisor of mandible narrow, scarcely toothed; raker row strong; molar small and triturative; palp present, 3-articulate (D–E setae reduced, versus Dikwidae). Lower lip without inner lobes, outer lobes thin, with inner notches or excavations. Inner plate of maxilla 1 small, apically with 1–3 setules; outer plate oblique ("conical"), normally spinose; palp 1-articulate. Inner plate of maxilla 2 without facial or medial setae. Palp of maxilliped 4-articulate, article 2 not produced medially. Coxae 1–3 weakly tapering but coxae 2–4 remaining quadrate below, ventral margins fitting normal ventral parabolic curve of anterior coxae; coxae 1 and 4 not shortened, coxa 3 lacking posterodorsal buttress, coxa 4 with large pos-

teroventral lobe, coxa 5 shorter than 4. Gnathopod 1 feeble and with elongate articles 5–6, weakly flagellar, gnathopod 2 much larger and broader than gnathopod 1; gnathopod 1 propodochelate or with spine forming chela; 2 propodosubchelate, merus and carpus produced. Article 2 of pereopods 5–7 with or without posterior cusps or teeth. Epimeron 3 with 2 large cusps posteroventrally. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, usually 1-articulate. Telson weakly incised, not longer than peduncle of uropod 3.

Remarks.—We have examined the types of *O. antarcticus* which have a thin but weak dorsal keel from pereonite 5 to pleonite 2.

Relationship.—Differing from Epimeriidae in the diverse gnathopods, with chelate gnathopod 1 and produced merus and carpus on gnathopod 2, conically arranged mouthparts and generally reduced subsidiary features on mouthparts, the presence of distinct notches or medial excavations on the lobes of the lower lip, and a flush dorsal keel on the pereon.

Odius has many of the same body formations as found in Ochlesidae. For example, its basic members, albeit weakly in *O. antarcticus*, have the compressed body formed into a dorsal keel and have a dorsal tooth on pleonite 3 characteristic of primitive ochlesids (compare *O. carinatus* and *O. eridunda*). The head is tall dorsoventrally and short anteroposteriorly and incipiently appears to be telescoped into pereonite 1. The antennae are short and the flagella poorly articulate. The labrum is slender, elongate and triangular. The mandibular molar is strongly processed, and the number of D and E setae on the third palp article is reduced (a character not otherwise used in diagnoses except for Odiidae and Ochlesidae). *Odius*, is, however, not an ochlesid because articles 4–6 of gnathopod 2 are short and broad, and the propodus is broadly subchelate; article 3 of gnathopod 1 is not elongate and the propodus is cheliform; coxa 4

is fully developed and lobate as in Iphimediidae; the maxillipedal palp has more than 2 articles; coxa 1 is not significantly reduced in size. Differing from the Ochlesiidae also in the truncate coxae 2–3 and presence of cusps on article 2 of pereopods 5–7.

Differing from the Acanthonotozomatiidae, Acanthonotozomellidae, and Iphimediidae (except *Stegopanoploea*) in the presence of a molar, the produced merus and carpus of gnathopod 2, and the absence of dorsal teeth on the pereon; instead, the pereon has a flush dorsal keel or margin.

The Dikwidae are characterized by reduced head, well developed D–E setae on the mandibular palp, and flagellar gnathopod 2.

See Epimeriidae for mention of differences from families outside of the families included herein.

List of genera.—*Odius* Liljeborg, 1865 (= *Otus* Bate, 1862, homonym, Lepidoptera) (=type genus); *Postodius* Hirayama, 1983.

Astryidae

Astryidae Pirlot, 1934:175.

Diagnosis.—Body compressed, with or without dorsal teeth (sometimes confined to metasome). Rostrum of medium size or very small. Antennae weakly elongate, flagella with 5+ articles; accessory flagellum absent. Mouthpart part field quadrately developed (box-like). Epistome and labrum broad, short, weakly incised. Incisor of mandible ordinary, toothed; raker row strong; molar reduced, conical and pubescent; palp always present, 3-articulate. Lower lip without inner lobes (except tiny inner basal lobes), outer lobes widely spaced, without distinct inner notches. Inner plate of maxilla 1 ordinary, somewhat medially setose; outer plate oblique, spines reduced to 7 (? or 8) in *Eclysis*; palp large, 2-articulate. Inner plate of maxilla 2 without facial setae. Palp of maxilliped 4-articulate, article 2 not pro-

duced medially. Coxae 2–4 scarcely acuminate, ventral margins fitting normal ventral parabolic curve of anterior coxae; coxae 1 and 4 not shortened, coxa 1 expanded, wider than coxa 2, truncate or rounded below, coxa 4 with posteroventral lobe, coxa 5 shorter than 4. Gnathopods feeble, simple, merus not lobate, with slightly elongate, weakly lobate or non-lobate carpus, propodus shorter and narrower than carpus, nipple-like, gnathopod 2 usually slightly longer than gnathopod 1. Article 2 of pereopods 5–7 lacking posterior cusps or teeth. Epimeron 3 lacking 2 large cusps. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, usually 1-articulate. Telson cleft.

Relationship.—Differing from Stilipedidae in the narrowness of the incisors, the presence of a setose molar and the reduction of spines on the outer plate of maxilla 1.

Remarks.—We keep *Eclysis* distinct from *Astrya* based on the expanded palp of maxilla 1 and the need to describe many unknown characters. *Epimeriella* is transferred to Epimeriidae because of the ordinary outer plate of maxilla 1 and poorly dominant carpus of the gnathopods. *Epimeriella victoria* Hurley (1957) is transferred to *Epimeria* because of tapering coxa 1.

List of genera.—*Astrya* Boeck, 1871 (= *Chagosia* Walker, 1909, = *Parastrya* Pirlot, 1934); *Eclysis* K. H. Barnard, 1932.

Stilipedidae

Stilipedidae Holmes, 1908:535.

Diagnosis.—Body compressed, dorsal teeth present or confined to urosome. Rostrum very small. Antennae moderately elongate, flagella with 5+ articles; accessory flagellum 0–1 articulate. Mouthpart part field quadrately developed (box-like). Epistome and labrum broad, short, incised or lobate. Incisor of mandible extremely wide, smooth or toothed; raker row present or

absent; molar absent; palp always present, 3-articulate. Lower lip with or without weak inner lobes, outer lobes widely separated, without distinct inner notches. Inner plate of maxilla 1 ordinary, apically and somewhat medially setose; outer plate oblique, normally spinose in 2 genera, very wide and superspinose in many species; palp large, 2-articulate, greatly widened apically. Inner plate of maxilla 2 without facial setae. Palp of maxilliped 4-articulate, article 2 not produced medially. Coxae 2–4 more or less acuminate, ventral margins flush; coxae 1 and 4 not shortened, coxa 1 widely expanded, wider than narrowed coxa 2, ventral margin rounded or quadrate, coxa 4 weakly acuminate, with posteroventral lobe, coxa 5 shorter than 4. Gnathopods feeble, simple or very poorly subchelate, merus not lobate, with slightly elongate, weakly lobate carpus, propodus irregularly ovate, shorter and narrower than dominant carpus, gnathopod 2 usually slightly longer than gnathopod 1. Article 2 of pereopods 5–7 without posterior cusps or teeth. Epimeron 3 lacking 2 large cusps. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 longer than peduncle, flattened, lanceolate, 1-articulate. Telson weakly incised.

Remarks.—*Astryoides* and *Bathypanoploea* retain the plesiomorphic characters of rakers and normal outer plate of maxilla 1.

Relationship.—See Astryidae and Acanthonotozomellidae Relationships. Differing from the Iphimediidae and Acanthonotozomatidae in the broadened and non-acuminate coxa 1. Differing from Epimeriidae in the lack of molar, broad, flat mandible, and dominant carpus of the gnathopods.

List of genera.—*Stilipes* Holmes, 1908 (type genus); *Bathypanoploea* Schellenberg, 1939 (= *Iphimediopsis* Schellenberg, 1931, homonym, = *Epimeriopsis* K. H. Barnard, 1931, void ab initio, misidentified type species, = *Pseudiphimediopsis* Ruffo, 1949); *Alexandrella* Chevreux, 1911, 1912b (= *Parandaniexis* Nicholls, 1938, =homonym,

= *Pseudandaniexis* Nicholls, 1938); *Astryoides* Birstein & Vinogradova, 1960.

Lafystiidae

Lafystiidae Sars, 1895:382.

Diagnosis.—Body broadened, without dorsal teeth. Rostrum large, flattened. Antennae scarcely elongate, flagella with 5+ articles; accessory flagellum absent. Mouthpart part field conically developed (box-like). Epistome and labrum of ordinary width and length, entire. Incisor of mandible ordinary, toothed; raker row absent; molar absent; palp present, 3-articulate. Lower lip without inner lobes, without distinct inner notches. Inner plate of maxilla 1 small, apically setose; outer plate oblique, normally spinose; palp tiny, 1-articulate. Inner plate of maxilla 2 without facial setae. Palp of maxilliped reduced to 2 articles. Only coxae 4–6 acuminate, coxa 4 longer than coxae 1–3, latter ordinary and quadrate, their ventral margins flush; coxa 4 with weak posteroventral lobe, with strong anteroventral lobe, coxae 5–6 with strong, sharp posteroventral lobe, scarcely shorter than or subequal to 4. Gnathopod 1 feeble and with scarcely elongate articles 5–6, gnathopod 2 slightly larger than gnathopod 1; gnathopod 1 simple, gnathopod 2 weakly propodochelate, merus and carpus not produced. Article 2 of pereopods 5–7 without posterior cusps or teeth. Epimeron 3 lacking 2 large cusps. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 elongate but peduncle also slightly elongate, rami flattened, lanceolate, 1-articulate. Telson entire, not longer than peduncle of uropod 3.

Relationship.—Differing from the Laphystiopsidae in the normal outer plate of maxilla 1, the reduction of the maxillipedal palp, the sub(para)chelate gnathopod 2, and the lack of molar.

List of genera.—*Lafystius* Kroyer, 1842 (type genus) (= *Darwinia* Bate, 1857, = *Der-*

mophilus Beneden & Bessels, 1870, = *Ichthyozocus* Hesse, 1873).

Laphystiopsidae

Laphystiopsidae Stebbing, 1899:211.

Diagnosis based only on *Laphystiopsis*; see Remarks for *Prolaphystius*.

Diagnosis.—Body slightly broadened, with weak or strong dorsal teeth on few pleonites. Rostrum large and flat or absent. Antennae elongate, first longer than second, flagella with 5+ articles; accessory flagellum absent. Mouthpart part field quadrately developed (box-like). Epistome and labrum broad, short, minutely incised. Incisor of mandible ordinary, toothed; rakers absent; molar present, well developed but smooth or tritulative (*Prolaphystius*); palp present, 3-articulate. Lower lip with or without small fleshy inner lobes, without distinct inner notches. Inner plate of maxilla 1 small, with one apical seta; outer plate oblique, spines reduced to 5; palp large, 1–2-articulate. Inner plate of maxilla 2 without facial setae. Palp of maxilliped 4-articulate, article 2 not produced medially. No member of coxae 1–4 acuminate downward, all short, broader than long, ventral margins of coxae 1–4 flush; coxa 4 without posteroventral lobe; coxa 5 longer or shorter than 4. Gnathopods 1–2 feeble, simple, carpi not lobate, propodi narrow and rectangular. Article 2 of pereopods 5–7 lacking posterior cusps or teeth. Epimeron 3 lacking 2 large cusps. Urosomites free. Uropods 1–3 biramous. Rami of uropod 3 elongate, peduncle ordinary, rami flattened, lanceolate, 1-articulate. Telson entire, not longer or greatly longer than peduncle of uropod 3.

Remarks.—*Prolaphystius* combines characters of Lafystiidae and Laphystiopsidae. Its lafystiid characters are larger coxae with some degree of acumination, a posterior lobe on coxa 4, and shortened coxa 5; its laphystiopsid characters are presence of (tritulative) molar, simple feeble gnathopod 2,

and reduction of spines on outer plate of maxilla 1; its unique apomorphic characters are elongate telson, and loss of rostrum. K. H. Barnard (1930:342) thought that Lafystiidae and Laphystiopsidae should be synonymized. We believe *Prolaphystius* should be reevaluated and place it here only provisionally.

Relationship.—Differing from Lafystiidae in the presence of a molar, reduction of spines on outer plate of maxilla 1, simple gnathopod 2, and 4-articulate palp of the maxillipeds.

List of genera.—*Laphystiopsis* Sars, 1895 (type genus); ?*Prolaphystius* K. H. Barnard, 1930; *Prolaphystiopsis* Schellenberg, 1931. (Note: We have determined that Sars (1895) overlooked the biarticulate condition of the palp on maxilla 1 in *Laphystiopsis*; this negates the only published distinction of *Prolaphystiopsis* Schellenberg; specimens of the latter will be examined to seek any other possible generic difference).

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