



Journal of the Royal Society of New Zealand

ISSN: 0303-6758 (Print) 1175-8899 (Online) Journal homepage: https://www.tandfonline.com/loi/tnzr20

Harpacticoid copepods from biogenic substrata in offshore waters of New Zealand. 1: New species of Paradactylopodia, Stenhelia (St.) and Laophonte

Geoffrey R. F. Hicks

To cite this article: Geoffrey R. F. Hicks (1988) Harpacticoid copepods from biogenic substrata in offshore waters of New Zealand. 1: New species of Paradactylopodia, Stenhelia (St.) and Laophonte, Journal of the Royal Society of New Zealand, 18:4, 437-452, DOI: 10.1080/03036758.1988.10426467

To link to this article: https://doi.org/10.1080/03036758.1988.10426467



Published online: 18 Jan 2012.

\sim

Submit your article to this journal 🖸





View related articles 🗹



Citing articles: 1 View citing articles 🗹

Harpacticoid copepods from biogenic substrata in offshore waters of New Zealand. 1: New species of *Paradactylopodia*, *Stenhelia* (St.) and *Laophonte*

Geoffrey R. F. Hicks*

Three new species of harpacticoid copepods are described from a waterlogged teredinid-bored log, off Kawhia on the north-west coast of New Zealand. *Paradactylopodia trioculata* sp. nov. is distinguished from others in the genus by the three curious lens-like structures on the frontal part of the cephalothorax. *Stenhelia* (*St.*) *xylophila* sp. nov. is unique within the subgenus in lacking the inner seta on the P4 endp. 2. *Laophonte lignosa* sp. nov. is a new member of an incipient species group characterized by a 0:0:1 setal formula for P2-P4 endp. 1.

Keywords: taxonomy, Copepoda, submerged wood, offshore waters

INTRODUCTION

The unique habitat of submerged wood, bored and eroded by the biological activities of isopod crustaceans (Limnoriidae), shipworms (Teredinidae) and microorganisms, has recently been the subject of considerable research interest in New Zealand waters, and parallels in some respects that undertaken in the North Atlantic (e.g. Turner, 1977; Wolff, 1979). Decomposing wood, in the form either of small fragments or sections of large tree trunks, offers a firm yet ephemeral substratum for invertebrates in offshore waters that ordinarily are incapable of extended survival on surrounding terrigenous deposits. Recent collections around the New Zealand continental shelf and slope have revealed that, not only do large numbers of invertebrates occupy these microtopographically complex habitat islands, but also highly diverse assemblages would seem to have evolved with specific adaptations to exploit this resource. Moreover, the importance to invertebrate systematics of this hitherto rather neglected habitat has been brought sharply into focus with the discovery of high order taxa that have in some cases forced a reappraisal of the taxonomy and phylogeny of their respective groups. For instance, a new Class of Echinodermata, the Concentricycloidea, recovered from waterlogged wood at over 1,000 metres off both coasts of New Zealand, appears to have superficial similarities with echinoderms extinct now since the Middle Devonian (Baker et al. 1986). New families and lower taxa of Mollusca have been described; and other biogenic substrata frequently taken in trawls along with wood, such as bone, algal holdfasts and crab carapaces, have also revealed exciting new material (Dell, 1987; Gibbs, 1987; Marshall, 1983, 1985a,b, 1987).

At the meiofaunal level, harpacticoid copepods have been recovered in the course of these investigations and some have already been reported on (Hicks, 1986a; 1986b; 1988). Of particular importance has been the revision of the subfamily Donsiellinae Lang, previously recorded as an intimate companion of wood-boring isopods of the genus *Limnoria* in shallow waters (Hicks, 1988). New genera and species isolated from samples of both shallow and deep sea wood, have contributed to an understanding of the evolutionary history of the subfamily. In the course of sorting through harpacticoid samples from substrata of both botanical and zoological origin, other new and interesting material has come to light. It is the purpose of the present and succeeding papers in this series, to describe specific components of this fauna. Herewith new species in *Paradactylopodia, Stenhelia* (*St.*) and *Laophonte* are described and illustrated from a station at 51 m depth off the northwest coast of New Zealand.

^{*} National Museum of New Zealand, P.O. Box 467, Wellington.

METHODS

Fragments or sections of wood were recovered in most instances by bottom trawl, and were immediately frozen on board ship. These substrata were returned to the laboratory, thawed, broken into smaller fractions in a bucket of alcohol, vigorously stirred and the liquid contents finally filtered through a 63μ m sieve. The residue was checked for the presence of boring or other associated invertebrates before being discarded. In no case was there any concreted sediment associated with the wood, although deposits were frequently present inside tunnels excavated by borers.

Nomenclature and terminology in general conforms to Lang (1948, 1965). Abbreviations in the text are as follows: R, rostrum; A1, antennule; A2, antenna; Md, mandible; Mxl, maxillule; Mx, maxilla; Mxp, maxilliped; P1-P6, pereiopods 1-6, Abd, abdomen; CR, caudal rami, ramus; exp., exopod; endp., endopod; basp., baseoendopod; the individual segments of P1-P4 may be cited as, for example, P1 exp. 3, which means the third segment (counting from the basis) of the exopod of pereiopod 1. Total length measurements ($\bar{x} \pm S.D.$) are from the anterior edge of the rostrum to the posterior border of the caudal rami. Unless otherwise stated, scale bars on illustrations are 0.03 mm. In accordance with the reasoning outlined by Lang (1965:9-10), all specimens of the same species are designated as syntypes. This approach, while perhaps unpopular with purists, balances the recommendations of the ICZN (Rec. 73a) against certain practicalities associated with the preparation and study of individuals of very small size, within populations that frequently show significant morphological variability. In order to satisfy the demands of modern harpacticoid taxonomy the holotype would need to be dissected so that details described accord not only with this individual, but also with other specimens of the nominal species. The longevity of dissected specimens set within chemical mountants is always unknown; add to this the need to study a number of dissected specimens to define the limits of variability, then the treatment of all specimens from the same series as of equal rank can be seen as sensible and desirable. Representative individuals from the type series of each species have therefore been selected for description and illustration. All illustrations are from camera lucida projections. Dissected specimens have been mounted on slides in polyvinyl lactophenol.

SYSTEMATICS

Fam. Thalestridae Sars, Lang

Subfam. Dactylopodiinae Lang

Paradactylopodia trioculata sp. nov. (Figs 1-4)

Material Examined Syntypes: 10 females, 3 males, 1 copepodite recovered from waterlogged teredinid bored log, off Kawhia, N.W. Coast New Zealand (38°02.5'S; 174°37.0'E-38°06.0'S; 174°36.9'E), 51 m, f.r.v. *James Cook* (Stn J9/70/84), 3 June 1984. All specimens deposited in National Museum of New Zealand (NMNZ Cr. 4584).

Description

Female (Figs 1-3). Total length 0.46 mm \pm 0.03 mm (n = 6). Body subpyriform (Fig. 1a); rostrum broad, subtriangular (Fig. 1b); cephalothorax deep, frontally with three subintegumental lens-like structures set in triangle with anteriormost at base of rostrum (Figs 1a-c). Posterior margin of cephalothorax and first two metasomites scalloped with microtubules, bearing sensilla and preceding wide, plain hyaline frills (Fig. 1d). Anterior abdominal somites unornamented apart from small sensillae; anal somite ventrolaterally spinulose (Fig. 1e); operculum finely ciliate. Genital field (Fig. 1f) medially oblong. Caudal rami (Fig. 1e) wider than long, with inner dorsal seta basally biarticulate; principal terminal setae tapering rapidly from insertion.

Antennule (Fig. 2a) compact, six-segmented, all setae naked, aesthetasc on segment four.

Antenna (Fig. 2b) allobasis complete, elongate. Exopod setation formula of 2:1:13.



Fig. 1—Paradactylopodia trioculata sp. nov., female. a. whole animal, dorsal view; b. rostrum with anteriormost 'lens'; c. frontal cephalothorax, left lateral view; d. hyaline frill of posterior cephalothorax and first two thoracic somites, left lateral view; e. anal somite and caudal rami, ventral view; f. genital field.



Fig. 2-Paradactylopodia trioculata sp. nov., female. a. antennule, setae omitted; b. antenna; c. mandible; d. mandible cutting edge; e. maxillule; f. maxilla; g. maxilliped.

Mandible (Figs 2c, d) praecoxa robust with tridentate pars incisiva; lacinia mobilis complex, with stout spinulose seta ventrally; coxa-basis divided, with three setae. Endopod one-, exopod two-segmented.

Maxillule (Fig. 2e) praecoxal arthrite large, partially divided with seven stout terminal spines. Coxal epipodite rudimentary with one long seta. Endopod represented by four setae.

Maxilla (Fig. 2f) syncoxa with three endites; a strong curved spine on outer distal edge. Basis claw elongate.

Maxilliped (Fig. 2g) prehensile. First endopodal segment with strong spiniform seta on palm.

P1 (Fig. 3a) coxa broad, copiously spinulose externally. Inner spiniform seta of basis with tip in form of crochet-hook. Rami three-segmented. Distal segment of exopod with five appendages. Inner lateral seta of first endopod segment proximally placed, long, plumose; claws on distal segment produced.

P2(Fig. 3b), P3(Fig. 3c), P4(Fig. 3d) with three-segmented rami. Outer processes of intercoxal sclerites on P2 and P3, spinulose, those of P4, naked. Hyaline frills of exopod segments incised subulate. Seta and spine formulae:

	Exp.	Endp.
P2	1:1:223	1:2:221
P3	1:1:323	1:2:321
P4	1:1:323	1:2:221



Fig. 3-Paradactylopodia trioculata sp. nov., female. a. P1; b. P2; c. P3; d. P4; e. P5.

P5 (Fig. 3e) baseoendopod extending over half length of exopod; hyaline field of inner edge with chitinous striae proximally; inner two marginal setae palmate distally; space between apical setae, nariform. Exopod twice as long as wide.

Male (Fig. 4). Total length 0.39 mm, more slender than female. Posteroventral margins of abdominal somites two to five with sensilla and clusters of spinules (Fig. 4a).

Antennule haplocer, six-indistinctly seven-segmented.

P1 basis (Fig. 4f) inner seta a strong, blunt digitiform spine with medial constriction.

P2 endopod (Figs 4b, c) two-segmented; distal segment expansive, with six setae, terminating in short unguiform process (Fig. 4c). Zone of coalescence with putative third segment evident.



Fig. 4-Paradactylopodia trioculata sp. nov., male. a. abdomen, ventral view; b. P2 endopod, ventral view; c. distal portion P2 endopod, dorsal view; d. left P5; e. right P5 exopod; f. P1 basis.

P5 (Fig. 4d, e) baseoendopods confluent, each with three stout distally palmate setae. Exopod heart-shaped with seven setae.

P6 (Fig. 4a) forming a common plate with three long thin setae on each side.

Variability The only variability evident is in the male. On one side the P4 endp. 3 has three inner lateral setae, while the other limb has the normal two. In the P5, the innermost proximal marginal seta of the right exopod (Fig. 4e) is a quarter the length of the left (Fig. 4d); the former may be considered normal for the species.

Etymology The specific name alludes to the three eye-like structures frontally on the cephalothorax.

Remarks With this addition, the genus *Paradactylopodia* now contains nine species (see Kunz, 1983). The curious "lens"-like structures on the frontal part of the cephalothorax bear relationship with only one other thalestrid, *P. oculata* (Gurney), although Gurney (1927) does make the point that *Dactylopodia spinipes* (Brady) also shares such a feature. Brady's (1910) description and illustrations are of no help in deciding if the structures are at all analogous.

P. trioculata differs from P. oculata in the distinctly six-segmented A1 and the 323 setal formula on the P4 exp. 3 and also in characters of the male P2 endp. and P5. Moreover, apart from the very obvious third albeit smaller "lens" at the base of the rostrum, P. trioculata differs from Gurney's specimens in possessing chitinous etchings down the inner margin of the P5 basp., a feature in common with some species of *Dactylopodia*. Another condition apparent in P. trioculata is the rudimentary epipodite of the maxillule, bearing a single well developed seta on the coxa, the significance of which is equivocal. A survey of the literature has established that no members of the subfamilies Thalestrinae, Pseudotachidiinae or Donsiellinae (see Hicks, 1988 for validation of latter), have retained the Mxl epipodite seta. On the other hand all species in the Rhynchothalestrinae have this seta, but its occurrence in members of the Dactylopodiinae is episodic. Eudactylopus, Dactylopodia and Paradactylopodia do not, according to Lang (1948) possess one, but more recently discovered species have been shown to do so (e.g. D. vulgaris inornata, D. crassipes, P. trioculata). Similarly Dactylopodopsis does, and Diarthrodes is said to, but again recent exceptions show the epipodite seta to be frequently lacking (e.g. Diarthrodes dissimilis, D. unisetosus). Lang (1948) regarded the ancestral thalestrid as having a Mxl epipodite, and considered it a plesiomorphic condition. It would seem, however, to be an evolutionarily plastic feature, easily and frequently lost during the phylogeny of the group.

The cephalothoracic "lenses" are structures very different from the photosensitive median eye-spots typical of the Copepoda. Within the Harpacticoida, they are recorded only in selected members of the Thalestridae, Laophontidae and Miracidae (Gurney, 1927; Krishnaswamy, 1956; Wells, 1970). They attain their greatest development in the planktonic genera Miracia Dana and Oculosetella Dahl, and parallel those in poecilostomes such as Corycaeus, Sapphirina and Copilia where they are suspected to function as light amplifiers (Gophen and Harris, 1981). The clear corneal lenses of P. trioculata have high refractive properties and are inclusion-free, despite the artifacts illustrated in Fig. 1b, which are associated with slide mounting. Although this latter procedure slightly disrupted the integrity of the lenses, it did not lead to wholesale rupturing of the lens cornea, which would undoubtedly happen if these were merely sacs containing deposits of oil. The rarity of this condition in other harpacticoids is curious, and one wonders why such an apparently specialized structure has evolved to this high level in so few species. Another similar yet pigmented "patch" between the A1 and A2 or at the base of the rostrum in some ectinosomatids (see Lang, 1965, plate Ie; Coull, 1975; Wells et al., 1982), or on the anterolateral aspect of the cephalosome in some cletodids (Becker et al., 1979), which Lang (1965) has speculated might be associated with subintegumental glands, is equally restricted in its taxonomic distribution. The suggestion that those on P. trioculata are indeed cuticular lenses is compelling, but must await detailed histological observations.

Yeatman (1962) claims to have found *P. oculata* on drifting *Sargassum* in the mid-north Atlantic. Since he makes no mention of any cephalothoracic "lenses" and as his illustrations bear little resemblance to the Suez material, I suspect Yeatman had something other than *oculata* in front of him. Indeed, while his account of the P1 and P5 fairly place his specimen in the Dactylopodiinae, the only claim to it being a *Paradactylopodia* is the fivesegmented A1. The much reduced inner marginal seta on P1 endp. 1 and the lack of an inner seta on P4 exp. 1 have no parallel elsewhere within the subfamily. Because of the very incomplete description of this single female specimen, and because of its great variance from established species, there is no alternative but to regard *Paradactylopodia oculata* sensu Yeatman (1962) as *incertae sedis*.

Fam. Diosaccidae Sars

Stenhelia (Stenhelia) xylophila sp. nov. (Figs 5, 6)

Material Examined Syntypes: 2 females (one badly damaged, only R, A1, A2, Mxl and Pl endp. recovered), from same teredinid bored log and locality as previous species. Slide mounted specimens deposited in National Museum of New Zealand (NMNZ Cr. 4585).

Description

Female (Figs 5, 6). Total length 0.57 mm, body pyriform. Rostrum (Fig. 5g) prominent,



Fig. 5-Stenhelia (St.) xylophila sp. nov., female. a. abdomen, ventral view; b. antennule; c. antenna; d. mandible; e, f. maxillule, disarticulated; g. rostrum; h. maxilliped; i. maxilla; j. P2; k. P1; l. P1 endopod; m. P1 endp. 1.

laterodistally emarginate and truncate. Abdominal somites (Fig. 5a) with stout dorsolateral and medioventral spinules; operculum large, bare, laterodistal corners produced, acute,

posterial edge indented, subtriangular. Caudal rami (Fig. 5a) slightly divergent, about as long as anal somite.

Antennule (Fig. 5b) eight-segmented; plumose setae on first and last segments, the rest naked. Proximal setae on each of segments five and six, swollen basally.

Antenna (Fig. 5c) allobasis and endopod slender. Exopod elongate, narrow with setal formula of 1:1:13.

Mandible (Fig. 5d) praecoxa very strong with complex cutting edge. Coxa-basis ornamented and with three distal setae. Endopod longer than exopod, with a subterminal seta swollen basally and with row of fine hairs.

Maxillule (Figs 5e, f) arthrite of praecoxa (Fig. 5e) with eight terminal appendages. Endopod wider but of same length as exopod (Fig. 5f).

Maxilla (Fig. 5i) syncoxa ornamented, with three endites. Basis with two terminal claws. Endopod one-segmented.

Maxilliped (Fig. 5h) weakly prehensile, whole structure reduced.

P1 (Figs 5 k-m) coxa ornamented. Basis with large inner spiniform seta reaching to end of first endopod segment. All endopod segments subequal in length, together reaching beyond end of exopod, with a setal formula of 1:1:3.

P2 (Fig. 5j), P3 (Fig. 6a), P4 (Fig. 6b) with three-segmented rami. Inner edge of bases with dentiform projections. All setae comparatively short, those on P2-P4 endp. 1 robust, in the latter, elongate, lanciform. Seta and spine formulae:

	Exp.	Endp.
P2	1:1:223	1:2:121
P3	1:1:323	1:1:221
P4	1:1:323	1:0:221

P5 (Fig. 64) baseoendopod wide, innermost but one seta basally swollen. Exopod spatulate with six setae.



Fig. 6-Stenhelia (St.) xylophila sp. nov., female. a. P3; b. P4; c. P5.

Male Unknown.

Variability No significant differences are apparent between the available appendages on both slides.

Etymology The specific name refers to the animals' habitation in offshore wood (Gr. *xylon* = wood).

Remarks This new species of the nominate subgenus keys to *Stenhelia (St.) aemula* (T. Scott) in Thistle and Coull (1979). It differs greatly from that species, however, in the following respects: spacing, relative lengths and build of the P5 setae, possesses only two inner setae on P3 endp. 3, presence of an inner seta on P1 exp. 2, and the relative lengths of the endp. segments of the same limb, CR only slightly longer than wide i.e. shorter than the 2:1 dimensions of *S. aemula*. Furthermore, in lacking the inner seta on P4 endp. 2, *S. xylophila* is unique within the subgenus.

Fam. Laophontidae T. Scott

Subfam. Laophontinae Lang

Laophonte lignosa sp. nov. (Figs 7-10)

Material Examined Syntypes: 8 females, 2 males, 2 copepodites from same teredinid bored log and locality as previous two species. All specimens deposited in National Museum of New Zealand (NMNZ Cr. 4586).

Description

Female (Figs 7-10). Total length 0.58 mm \pm 0.02mm) (n = 5). Body slender (Fig. 7a), tapering only slightly posteriorly. Cephalothorax longer than three succeeding somites combined, surface lined with faint striae, posterolateral corners produced, truncate (Fig. 7b). Rostrum (Fig. 7c) scaleiform, tip rounded. Thoracic and abdominal somites (Figs 7a, b; 8a, b) elaborately ornamented with diminutive spinules and pustules. Genital suture well developed, entire dorsally. Genital field (Fig. 8b) simple. Operculum finely denticulate. Caudal rami (Figs 8a, b) parallel, about one third longer than wide, tapering slightly posteriorly; longest terminal setae almost as long as abdomen.

Antennule (Fig. 7d) six-segmented, aesthetasc on segment four; fifth segment small; all segments except last, densely ornamented.

Antenna (Fig. 7e) coxa subquadrate; allobasis about as long as endopod. Exopod stout with four strong spiniform setae.

Mandible (Fig. 7f) praecoxa with bidentate pars incisiva; lacinia mobilis small, serrate. Palp normal for genus.

Maxillule (Fig. 7h) with seven terminal spines on arthrite. Coxa and basis discrete with spinules. Endopod rudimentary, one-segmented.

Maxilla (Fig. 7i) syncoxa ornate with three endites, proximalmost represented by a seta. Endopod vestigial.

Maxilliped (Fig. 7g) robust, prehensile.

P1 (Fig. 8c) coxa and basis profusely ornamented. Exopod three-segmented, extending about half way down first endopod segment; two innermost setae on distal segment, geniculate. Second endopod segment about twice as long as wide.

P2 (Fig. 9a), P3 (Fig. 9b), P4 (Fig. 9c) coxae similarly adorned. Basis setae strong and spiniform on P2, longer, thinner and naked on P3 and P4. Exopods three-segmented, endopods two-segmented. Seta and spine formulae:

	Exp.	Endp.
P 2	0:1:123	0:220
P 3	0:1:223	0:321
P4	0:1:223	1:121

P5 (Fig. 10g) baseoendopod expansive, excavate-subtriangular, inner expansion produced; transverse spinule rows on surface; five marginal setae, two innermost weakly spiniform. Exopod longer than wide with oblique posterior border bearing six setae; surface spinulated in irregular rows.



Fig. 7 – Laophonte lignosa sp. nov., female. a. whole animal, dorsal view; b. whole animal, lateral view; c. rostrum; d. antennule; e. antenna; f. mandible; g. maxilliped; h. maxillule; i. maxilla.



Fig. 8-Laophonte lignosa sp. nov., female. a. abdomen, dorsal view; b. abdomen, ventral view; c. Pl.

Male (Fig. 10). Total length 0.51 mm, more slender than female. Prosome ornamented similar to female, abdominal somites as in Figs 10a, b; spinules on posteroventral borders stronger than female.

Antennule (Fig. 10e) chirocerate, six-segmented.

P1 endopod first segment with diminutive spinules down outer margin.

Marginodistal spines on exp. 1 and 2 of P2-P4 more elongate and robust, while those on exp. 3 are slightly shorter than female. P2 endopod as in female; P3 endopod (Fig. 10c) three-segmented, second segment with externally curved, blunt, chitinized nail not reaching end of third segment. P4 endopod (Fig. 10d) stouter than female, without inner marginal seta on first segment.

P5 (Fig. 10f) baseoendopods confluent with two spiniform setae. Exopod subrectangular with slightly excavate inner edge; posterior margin oblique with four spiniform setae.

P6 (Fig. 10b) forming a common plate, medially constricted, with one spiniform and one slender naked setae.

Variability The right A2 on one female is pathologically deformed and minor differences occur in patterns of ornamentation on the abdomen, otherwise no variability was evident in the specimens examined.



Fig. 9-Laophonte lignosa sp. nov., female. a. P2; b. P3; c. P4.

Etymology The specific name refers to its wood-dwelling habit (L. lignum = wood). Remarks Despite Lang's (1948) apparent success at grouping species of Laophonte into seven seemingly discrete complexes (cornuta, serrata, depressa, setosa, inornata, denticornis, inopinata Groups), he later (1965) admitted difficulty in placing a number of more recently discovered species within any of these established units. This trend has continued and, with the addition here of L. lignosa to other recently described species, another incipient species group has emerged. It is distinguished in the female by a combination of a 6-7-segmented A1, 3-segmented P1 exp., 2-segmented P4 endp., a setal formula of 0:0:1 for P2-P4 endp. 1 and P5 exp. of 5-6 setae with 4-5 on the basp. In the male the P2-P4 endp. 1 setation is 0:0:0 and the P5 exp. has 4-5 setae, the basp. 1-2. Along with L. lignosa the group contains L. pseudooculata Krishnaswamy (although some details are inadequately covered by this author), L. confusa Decho & Fleeger (with a level of sexual dimorphism in seg. 2 of A1, Mxp palm and CR, quite unknown in other species of Laophonte*) and the enigmatic L. danversae Hamond. In all characters except the male P5 basp., L. galapagoensis Mielke also accords with this diagnosis. But if we accept Mielke's statement

^{* (}Dr Frank Fiers of Brussels has recently confirmed through examination of the type material that the male and female of *L. confusa* are not conspecific. He has detailed incompatibilities in the CR, A1, mouthparts, P1, and exopods of P2-P4 and endopod of P2 (Fiers, pers. comm. 1987)).



Fig. 10-Laophonte lignosa sp. nov., male. a. abdomen, dorsal view; b. abdomen, ventral view; c. P3 endopod; d. P4 endopod; e. antennule, setae omitted; f. P5; female, g. P5.

in "Variabilitat" (Mielke, 1981:13) of "einer Seite des Benp. P5. 1 Borste ausgebildet", as normal for the male of this species, rather than an aberration as described, then *L. galapagoensis* comes close to *L. longicaudata* Boeck, both of which should consequently join this group. The temptation to indulge in the formal proposal of yet another *Laophonte* species group, is, however, resisted. I acknowledge that in all probability other like groups will emerge in the future when new species are added and old ones reassessed, leading

ultimately to the redundancy of Lang's species group concept. Clearly what is needed is an in-depth revisional analysis of *Laophonte (cf.* Nicholls, 1941, and see Fiers, 1986) that I am convinced will conclude with the designation of many more new genera to accommodate the great range of species forms. This analysis should reassess the significance of such pivotal characters as, for example, a 2-vs. 3-segmented P1 exp. in the "setosa" and "denticornis" groups (e.g. Raibaut, 1966), and the taxonomic value and stability of the antennular segmentation. A 6-segmented A1 in species showing in all other respects "inormata" group characters has, for instance, already been remarked upon (Vervoort, 1964).

L. lignosa is close to L. galapagoensis, L. confusa and L. pseudooculata, the latter of which incidentally is also found in wood infested with shipworms. But L. lignosa differs from the first two in features of the A1 and P5 of both sexes and from the latter in the cephalosome, P3 endp. of the male and the P5 of both sexes.

ACKNOWLEDGEMENTS

I thank John Wells for reviewing an earlier draft of this paper.

REFERENCES

- Baker, A. N., Rowe, F. W. E. and Clark, H. E. S., 1986. A new Class of Echinodermata from New Zealand. Nature 321: 862-864.
- Becker, K.-H., Noodt, W. and Schriever, G., 1979. Eidonomie und Taxonomie abyssaler Harpacticoidea (Crustacea, Copepoda) Teil II. Paramesochridae, Cylindropsyllidae and Cletodidae. "Meteor" Forschungsergebnisse 31: 1-37.
- Brady, G. S., 1910. Die marinen Copepoden der Deutschen Sudpolar-Expedition 1901-1903. Deutsche Sudpolar-Expedition 11 Zool. 3: 499-593.
- Coull, B. C., 1975. Three new harpacticoid copepods from the North Inlet estuary, Georgetown, South Carolina, U.S.A. Crustaceana 29: 113-126.
- Dell, R. K., 1987. Mollusca of the Family Mytilidae (Bivalvia) associated with organic remains from deep water off New Zealand, with revisions of the genera Adipicola Dautzenberg, 1927 and Idasola Iredale, 1915. National Museum of N.Z. Records 3: 17-36.
- Fiers, F., 1986. Harpacticoid copepods from the West Indian Islands: Laophontidae (Copepoda, Harpacticoida). Bijdragen tot de Dierkunde 56: 132-164.
- Gibbs, P. E., 1987. A new species of *Phascolosoma* (Sipuncula) associated with a decaying whale's skull trawled at 880 m depth in the Southwest Pacific. *N.Z. Journal of Zoology* 14: 135-137.
- Gophen, M. and Harris, R. P., 1981. Visual predation by a marine cyclopoid copepod, Corycaeus anglicus. Journal of the Marine Biological Association of the U.K. 61: 391-399.
- Gurney, R., 1927. Report on the Crustacea: Copepoda (Littoral and Semiparasitic). Transactions of the Zoological Society of London 22: 451-577.
- Hicks, G. R. F., 1986a. Revised keys to Paramphiascopsis Lang (Copepoda, Harpacticoida, Diosaccidae) including a new species from deep water off New Zealand. Journal of Natural History 20: 389-397.

1986b. Phylogenetic relationships within the harpacticoid copepod family Peltidiidae Sars, including the description of a new genus. Zoological Journal of the Linnean Society 88: 349-362.

— 1988. Systematics of the Donsiellinae Lang (Copepoda, Harpacticoida). Journal of Natural History 22: 639-684.

- Krishnaswamy, S., 1956. On a new species of Laophonte (Copepoda: Harpacticoida) from Madras. Records of the Indian Museum 54: 29-32.
- Kunz, H., 1983. Harpacticoiden (Crustacea: Copepoda) aus dem Litoral der Azoren. Arquipelago, Revista do Instituto Universitario dos Acores; Ciencias da Natureza: 117-208.

Lang, K., 1948. Monographie der Harpacticiden. Hakan Ohlsson, Lund.

- ——— 1965. Copepoda Harpacticoidea from the Californian Pacific Coast. Kungliga Svenska Vetenskapsakademiens Handligar 10: 5-560.
- Marshall, B. A., 1983. The family Cocculinellidae (Mollusca: Gastropoda) in New Zealand. National Museum of N.Z. Records 2: 139-143.

^{— 1985}a. Recent and Tertiary deep-sea limpets of the genus *Pectinodonta* Dall (Mollusca: Gastropoda) from New Zealand and New South Wales. *N.Z. Journal of Zoology* 12: 273-282.

— 1985b. Recent and Tertiary Cocculinidae and Pseudococculinidae (Mollusca: Gastropoda) from New Zealand and New South Wales. N.Z. Journal of Zoology 12: 505-546.

1987. Osteopeltidae (Mollusca: Gastropoda): a new family of limpets associated with whale bone in the deep-sea. *Journal of Molluscan Studies* 53: 121-127.

Mielke, W., 1981. Interstitielle Fauna von Galapagos 28. Laophontinae (Laophontidae), Ancorabolidae (Harpacticoida). *Mikrofauna des Meeresbodens* 84: 1-106.

Nicholls, A. G., 1941. A revision of the families Diosaccidae Sars, 1906 and Laophontidae T. Scott, 1905 (Copepoda: Harpacticoida). Records of the South Australian Museum 7: 65-110.

- Raibaut, A., 1966. Laophonte adamsiae n. sp. (Copepoda, Harpacticoida) inquilin d'une actinie, Adamsia palliata (Bohadsch). Crustaceana 11: 123-128.
- Thistle, D. and Coull, B. C., 1979. A revised key to Stenhelia (Stenhelia) (Copepoda: Harpacticoida) including two new species from the Pacific. Zoological Journal of the Linnean Society 66: 63-72.
- Turner, R. D., 1977. Wood, molluscs and deep-sea food chains. Bulletin of the American Malacological Union 1977: 13-19.
- Vervoort, W., 1964. Free-living Copepoda from Ifaluk Atoll in the Caroline Islands. Bulletin of the United States National Museum 236.
- Wells, J. B. J., 1970. Copepoda-1 Sub-Order Harpacticoida. Conseil International Pour L'Exploration de la Mer, Zooplankton Sheet 133.

Hicks, G. R. F. and Coull, B. C., 1982. Common harpacticoid copepods from New Zealand harbours and estuaries. *N.Z. Journal of Zoology* 9: 151-184.

Wolff, T., 1979. Macrofaunal utilization of plant remains in the deep sea. Sarsia 64: 117-136.

Yeatman, H. C., 1962. The problem of dispersal of marine littoral copepods in the Atlantic Ocean, including some redescriptions of species. Crustaceana 4: 253-272.