A new species of *Cirolana* Leach, 1818 (Crustacea, Isopoda, Cirolanidae) from the western Ross Sea, Antarctica, the first record of the genus from polar waters

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ABSTRACT
Cirolana mclaughlinae n. sp. is described from specimens collected in the Ross Sea, Antarctica. The species is characterised by the head having a prominent anterior marginal ridge, lacking a rostrum, and being dorsally depressed; the posterior submarginal surfaces of pereonites 5-7 and the pleonites are nodulose and pitted; the pleotelson has weakly concave lateral margins converging to a narrowly rounded apex, the dorsal surface is provided with a low, longitudinal median ridge. The genus has a world-wide distribution, but has hitherto not been recorded from polar waters, the previous most southerly record being at about 44°S.

KEY WORDS
Crustacea,
Isopoda,
Cymothoida,
Cirolanidae,
Cirolana,
Antarctica,
Ross Sea,
new species.

RÉSUMÉ
Une nouvelle espèce de Cirolana *Leach, 1818 (Crustacea, Isopoda, Cirolanidae) provenant de la mer de Ross occidentale dans l'Antarctique, première récolte du genre dans les eaux polaires.*
Cirolana mclaughlinae n. sp. est décrite d'après des spécimens récoltés dans l'Antarctique, en mer de Ross. L'espèce se caractérise par la tête dépourvue de

MOTS CLÉS
Crustacea,
Isopoda,
Cymothoida,
Cirolanidae,
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Antarctique,
mer de Ross,
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rostre, déprimée dorsalement et ayant une arête marginale antérieure proéminente ; les surfaces sous-marginales postérieures des péréonites 5-7 et les pléonites avec des nodules et des petits trous ; le pléotelson à face dorsale pourvue d'une arête basse, médiane et longitudinale, tandis que ses bords latéraux faiblement concaves convergent vers un apex étroit et arrondi. Le genre a une distribution mondiale, mais n'avait jamais été récolté dans les eaux polaires, la récolte faite le plus au sud se situant, jusqu'à présent, à 44°S.

INTRODUCTION

The isopod fauna of the Ross Sea remains exceptionally poorly known, despite the number of historic and recent expeditions to the region. The few comprehensive accounts of isopods of this region are now close to a century old (Hodgson 1910; Vanhöffen 1914; Tattersall 1913, 1921), the most recent being those of Hale (1937, 1952). A recent assessment (compiled by NLB for an unpublished NIWA report) of the isopod fauna of the Ross Sea yielded a total of 48 named species (one further has since been described from the region by Just & Wilson 2004). This is in contrast to the 72 described species known from the Weddell Sea (Brandt 1991, 1999; Brandt *et al*. 2004 and references therein), and more particularly to the known (but largely undescribed) total of more than 317 species recently reported for that region by Brandt *et al*. (2004) to a depth of 6348 m. The Ross Sea would be expected to have an equally rich isopod fauna. Peracarids are the most diverse group of Antarctic macro-crustaceans and, together with the amphipods and tanaidaceans, isopods form a major component of the crustacean diversity of the region (Kussakin 1967; Brandt 1991, 1999; Brandt *et al*. 2004). The lack of data for isopods (and other peracarids) is therefore a particularly significant gap in our knowledge of the biodiversity of the Ross Sea.

Cirolanid diversity in Antarctica is low, represented by four species of *Natatalona* Bruce, 1981 (Bruce 1986; Brandt 1988; prior to 1981 these species were in combination with *Cirolana*). This paper describes one further cirolanid species – the first record of the genus *Cirolana* from Antarctica – from the western Ross Sea region, from the approximately 40 species of isopod obtained from 220 stations collected during a recent (February-March 2004) New Zealand Ministry of Fisheries expedition to the Ross Sea. The new species is evidently common, and draws attention to the dearth of knowledge for isopods of the Ross Sea region in what is, in Antarctic waters, a highly speciose crustacean group.

MATERIAL AND METHODS

Material was collected during the 2004 BIOROSS expedition to the western Ross Sea on board RV *Tangaroa*. Samples were taken using heavy-duty, 2 cm mesh "epibenthic sledges" (similar to a compact Agassiz beam trawl with a short net length) and grabs.

The species description was prepared in DELTA (Descriptive Language for Taxonomy, see Dallwitz *et al*. 1997) using a general cirolanid character set. Type material is all held at the National Institute of Marine and Freshwater Research, NIWA Invertebrate Collection (NIWA), Wellington. Voucher specimens have been deposited at the National Museum of New Zealand, Te Papa Tongarewa, Wellington (NMNZ), and the Muséum national d'Histoire naturelle, Paris (MNHN).

Classification follows Brandt & Poore (2003).

ABBREVIATIONS

CP circumplumose;
PMS plumose marginal setae;
RS robust seta/setae.

SYSTEMATICS

Suborder CYMOTHOIDA Wägele, 1989
Family CIROLANIDAE Dana, 1852

Genus *Cirolana* Leach, 1818

REMARKS

The genus *Cirolana*, with 100 described species, is the largest in the family Cirolanidae (Bruce 1986; Brusca *et al*. 1995; Bruce *et al*. 2002). It is known world-wide, having previously been recorded from all oceans except the Southern Ocean and polar waters. The genus occurs primarily in the shallow waters of the intertidal and on the shallow continental shelf, with only three species reliably recorded at depths greater than 1000 m (these being *Cirolana australis* Keable, 2001, *C. bisulcata* Hobbins & Jones, 1993 and *C. epimerias* Richardson, 1910). With the exception of *C. bougaardti* Kensley, 1984 and *Cirolana stebbingi* Nierstrasz, 1931 (both regarded as *incertae sedis* by Bruce 1986), all other species have been recorded at depths of less that 200 m. The genus has hitherto not been recorded from polar waters, or from latitudes greater than about 44°S and 54°N. The recent discovery of a new species of *Cirolana* in the Ross Sea at latitudes of 71° to 72°S is therefore a substantial extension of the known geographic distribution of the genus.

The species conforms with the generic diagnoses given by Bruce (1986), Brusca *et al*. (1995), and Kensley & Schotte (1989).

Cirolana mclaughlinae n. sp.
(Figs 1-4)

TYPE MATERIAL. — **Antarctica, western Ross Sea.** Holotype: BIOROSS, RV *Tangaroa*, stn TAN0402/14, 71°43.88'S, 171°45.00'E, 451 m, 2.II.2004, ♂ 14.9 mm (NIWA 17948).
Paratypes: same data as holotype, 9 ♂♂, 12.5 (dissected), 12.5, 12.5, 12.3, 12.0, 11.9, 11.5, 11.5, 10.3 mm; 7 ♀♀, non-ovig. 12.5, 12.4 (dissected mx2), 12.0, 11.5, 9.3, 9.0, 8.5 mm; 2 mancas, 7.2, 6.5 mm (NIWA 17949).

OTHER MATERIAL EXAMINED (sex not recorded). — **Antarctica, western Ross Sea.** BIOROSS, RV *Tangaroa*, stn TAN0402/14, 71°43.88'S, 171°45.00'E, 451 m, 5.II.2004, 6 specimens (NIWA 17950). — Stn TAN0402/15, 71°43.67-43.85'S, 171°44.12-44.67'E, 466-467 m, 5.II.2004, 2 specimens (NIWA 17951, NIWA 17962). — Stn TAN0402/17, 71°44.39-44.11'S, 171°39.24-39.70'E, 409-403 m, 5.II.2004, 1 specimen (NIWA 17952). — Stn TAN0402/82, 72°03.63-03.89'S, 172°54.23-54.77'E, 526-527 m, 14.II.2004, 1 specimen (NIWA 17953). — Stn TAN0402/107, 71°16.63'S, 170°36.13'E, 400 m, 18.II.2004, 4 specimens (NMNZ Cr.10021). — Stn TAN0402/108, 71°16.63-16.64'S, 170°35.98-36.91'E, 400-405 m, 18.II.2004, 1 specimen (NIWA 17954); 1 specimen (NIWA 17955); 9 specimens (MNHN-Is5887). — Stn TAN0402/112, 71°17.61-17.77'S, 170°34.60-35.45'E, 346-357 m, 18.II.2004, 23 specimens (NIWA 17956, NIWA 17957). — Stn TAN0402/116, 71°17.93-18.21'S, 170°32.43-33.02'E, 312-315 m, 18.II.2004, 10 specimens (NIWA 17958). — Stn TAN0402/117, 71°18.55'S, 170°34.39'E, 322 m, 18.II.2004, 1 specimen (NIWA 17959). — Stn TAN0402/150, 71°58.77-58.91'S, 171°58.09-58.41'E, 480-461 m, 26.II.2004, 1 specimen (NIWA 17960). — Stn TAN0402/156, 71°59.56'S, 172°12.42'E, 675 m, 26.II.2004, 4 specimens (NIWA 17961).

ETYMOLOGY. — Named for Pat McLaughlin, in recognition of her considerable contribution to knowledge of the Crustacea, the Paguroidea in particular.

DISTRIBUTION. — Known from several locations in the western Ross Sea, at latitude 71-72°S, at depths from 312 to 675 m.

DESCRIPTION

Male

Body 2.3 times as long as greatest width, dorsal surfaces coarsely pitted, widest at pereonite 5, lateral margins subparallel. Head with rostral point absent; anterior margin rounded, medially weakly indented; with prominent interocular ridge. Eyes separated by about 76% width of head, each eye composed of *c.* five transverse rows of ommatidia, each row with *c.* seven ommatidia; eye colour black. Pereonite 1 and coxae 2-3 each with posteroventral angle right-angled; coxae 5-7 with entire, strongly developed oblique carina; posterior margins of pereonites 5-7 dorsally with irregular submarginal nodules. Pleon with pleonite 1 largely concealed by pereonite 7; pleonite 3-5 each with posterior margin with irregular small nodules; pleonite 2 not posteriorly produced; pleonite 3 with posterolateral margins extending to but not beyond posterior margin of pleonite 5, narrowly

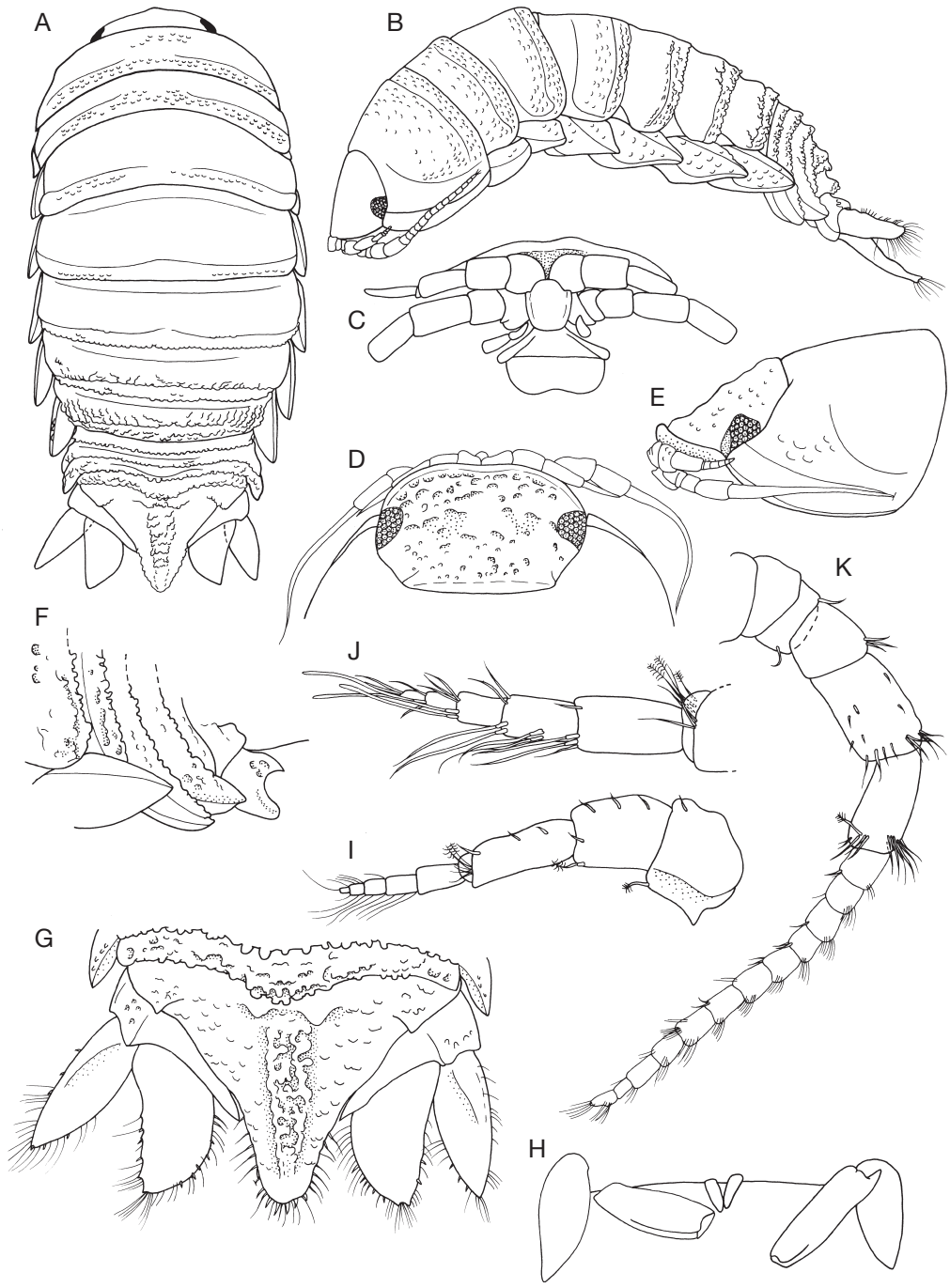

FIG. 1.— *Cirolana mclaughlinae* n. sp.: **A**-**H**, holotype, 14.9 mm (NIWA 17948); **I**-**K**, paratype, 12.5 mm (NIWA 17949); **A**, dorsal view; **B**, lateral view; **C**, frons; **D**, head dorsal view; **E**, head, pereonite 1, lateral view; **F**, pleon, lateral view; **G**, pleotelson and uropods, dorsal view; **H**, sternite 7 and penes; **I**, antennule; **J**, antennule flagellum; **K**, antenna.

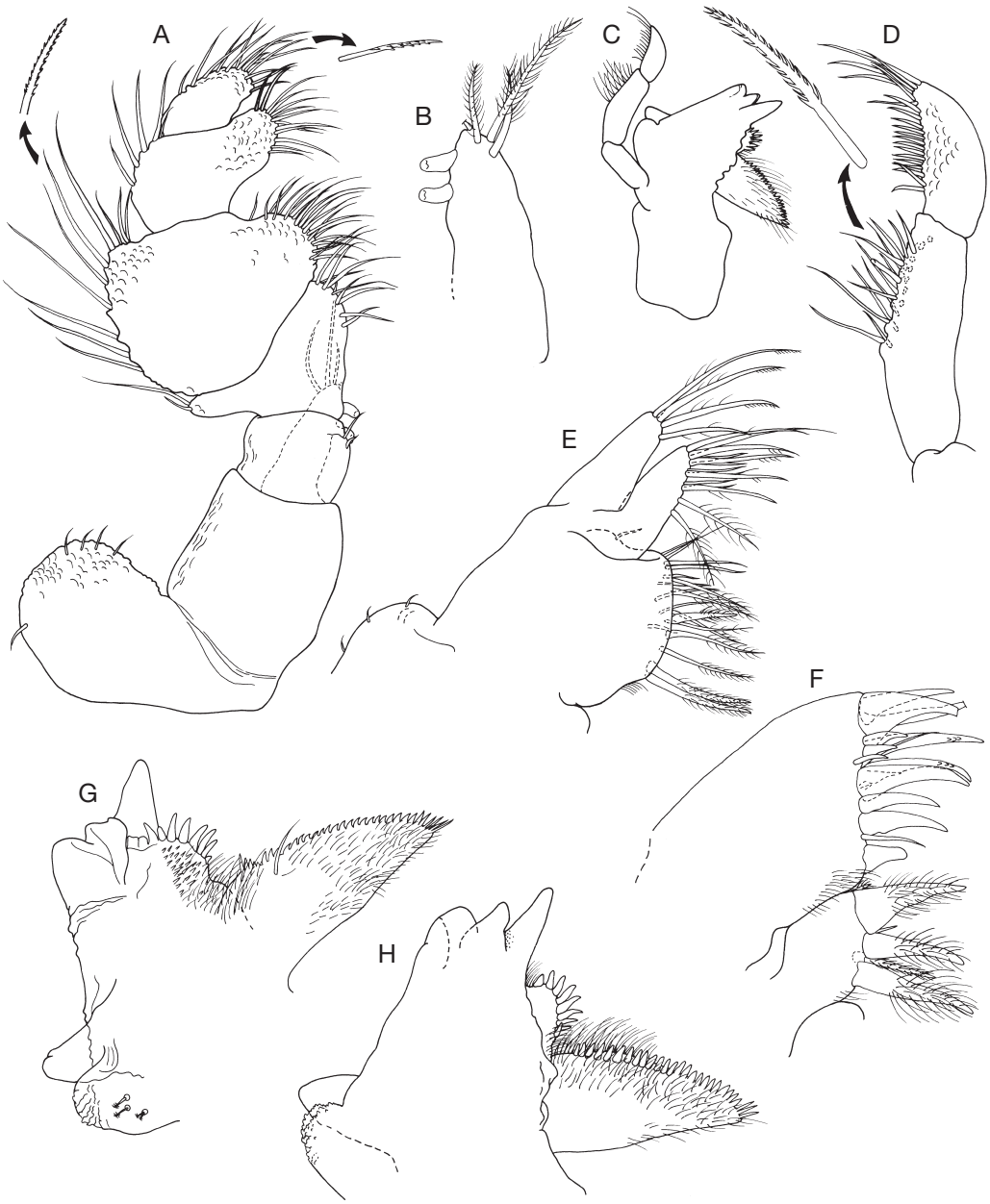

FIG. 2.— *Cirolana mclaughlinae* n. sp., paratype, 12.5 mm (NIWA 17949): **A**, maxilliped; **B**, maxilliped endite; **C**, left mandible; **D**, mandible palp; **E**, maxilla; **F**, maxillule; **G**, left mandible, distal; **H**, right mandible, distal.

rounded; pleonite 4 clearly extending beyond posterior margin of pleonite 5, posterolateral margin narrowly rounded; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. Pleotelson 0.7 times as long as anterior width, dorsal surface with two large submedian nodules

anteriorly, with single median longitudinal carina (irregularly nodular, with obscure median depression); lateral margins sinuate, smooth, posteriorly narrow; posterior margin evenly rounded, without median point, with six RS.

Antennule peduncle articles 1 and 2 distinct, articulated; article 2 about as long as article 1, article 3 0.8 times as long as combined lengths of articles 1 and 2, 2.6 times as long as wide; flagellum with five articles, extending to anterior of pereonite 1. Antenna peduncle article 4 1.4 times as long as wide, 1.5 times as long as article 3, inferior margin without plumose setae, with seven short simple setae (submarginal, including distal margin); article 5 about as long as article 4, 2 times as long as wide, inferior margin without pappose setae, anterodistal angle with cluster of seven short simple setae; flagellum with 12 articles, extending to posterior of pereonite 1.

Frontal lamina with ventral surface entirely flat, longer than greatest width, lateral margins straight, diverging slightly towards anterior, anterior margin rounded, with anterolateral "step", without median point.

Mandible molar process anterior margin with 27-30 flat teeth; without proximal cluster of long simple setae, with abundant long scale-setae; right mandible spine row composed of eight spines, left with eight spines; palp article 2 with 15 distolateral setae, palp article 3 with 20 robust biserrate setae. Maxillule mesial lobe with four large and CP RS (three large, one small); lateral lobe with 13 RS. Maxilla lateral lobe with four long, finely plumose slender setae; middle lobe with 13 long slender setae (eight ventral placed, five dorsal; some finely plumose); mesial lobe with four distal simple setae and nine proximal simple and plumose slender setae. Maxilliped palp article 2 mesial margin with nine slender setae, lateral margin distally with three slender setae; article 3 mesial margin with *c.* 19 slender setae, lateral margin with 10 slender setae; article 4 mesial margin with *c.* 13 slender setae, lateral margin with five slender setae; article 5 distal margin with eight setae (some of which are finely serrate), lateral margin with six setae; endite with four long CP setae and two coupling hooks.

Pereopod 1 basis 2.7 times as long as greatest width, superior distal angle with cluster of five short, acute setae; ischium 0.5 times as long as basis, inferior margin with eight setae (three submarginal molariform, five short acute simple), superior distal margin with one acute RS (and five simple setae); merus inferior margin with six molariform RS, set as single row, superior distal angle with five setae (two RS, three simple); carpus inferior margin with one RS (and one simple seta); propodus 2.1 times as long as wide, inferior margin with three RS (largest opposing base of dactylus); dactylus 0.5 as long as propodus; inferior margin without setal fringe. Pereopod 2 ischium inferior margin with two stout, bluntly rounded RS, superior distal margin with two RS (and three short simple setae); merus inferior margin with seven stout RS, superior distal margin with four acute RS; carpus inferodistal angle with three RS (two large, one small). Pereopod 3 similar to pereopod 2. Pereopod 6 similar to pereopod 7 (but slightly longer). Pereopod 7 basis 2.6 times as long as greatest width, superior margin convex, inferior margin with two palmate setae; ischium 0.6 as long as basis, inferior margin with six RS (set as two and four), superior distal angle with seven RS, inferior distal angle with seven RS; merus 0.7 as long as ischium, inferior margin with five RS (set as one and four), superior distal angle with 10 RS (some biserrate), inferior distal angle with four RS; carpus 0.7 as long as ischium, 1.3 times as long as wide, inferior margin with two RS, superior distal angle with 10 RS (some biserrate), inferior distal angle with seven RS; propodus as long as ischium, 3.2 times as long as wide, inferior margin with four RS (set as two and two), superior distal angle with two slender setae (and two acute RS), inferior distal angle with three RS.

Penes flat lobes separated by 5% of sternal width; penial process 2.3 times as long as basal width, tapering to narrowly rounded apex.

Pleopod 1 exopod 1.5 times as long as wide, broadly rounded distally, mesial margin strongly convex, with PMS on distal one-third, with *c.* 40 PMS; endopod 1.8 times as long as wide, narrowly rounded distally, lateral margin straight, with PMS on distal one-third, mesial margin with PMS on

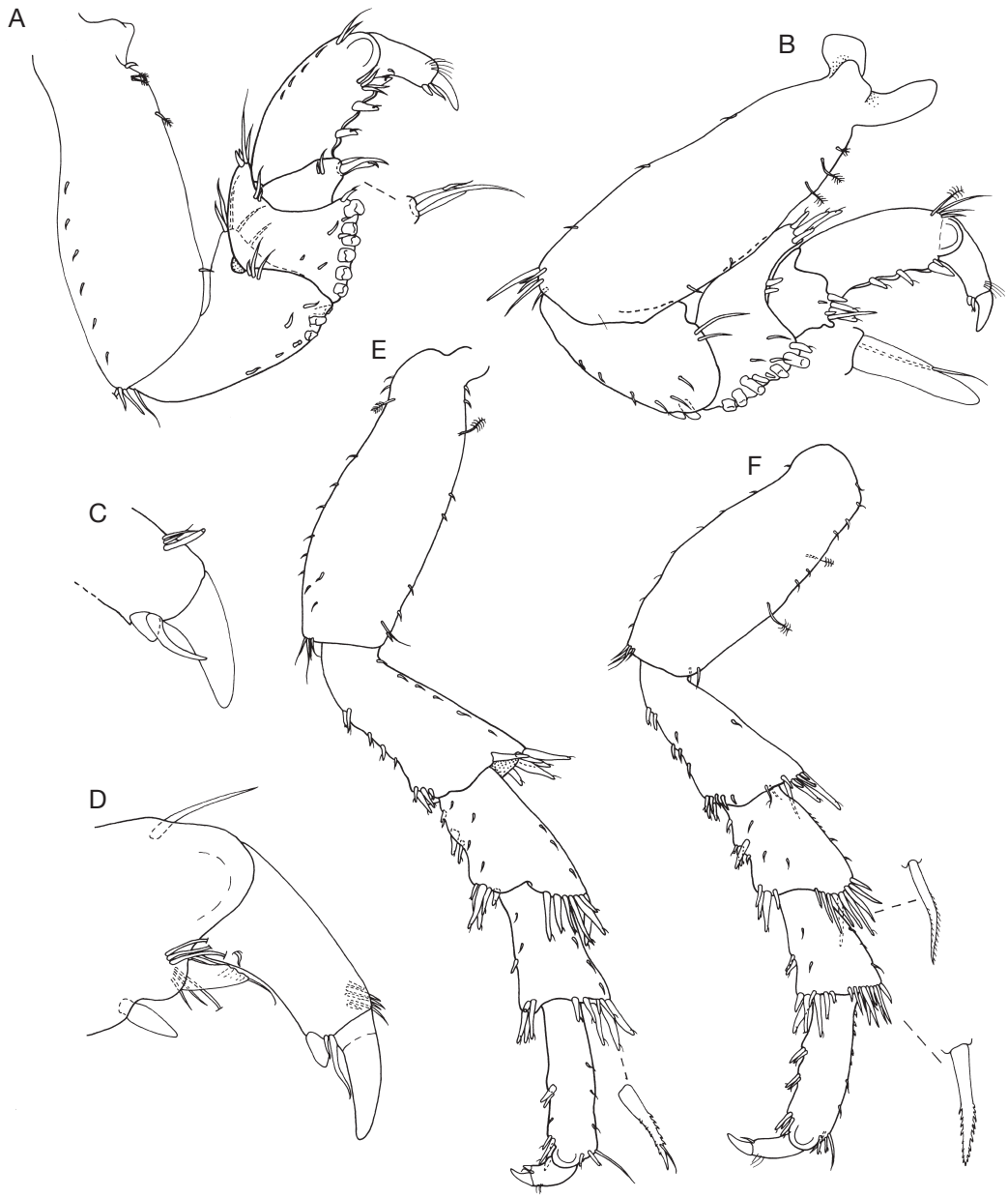

FIG. 3. — *Cirolana mclaughlinae* n. sp., paratype, 12.5 mm (NIWA 17949): **A**, pereopod 1; **B**, pereopod 2; **C**, pereopod 1, tip of dactylus; **D**, pereopod 1 dactylus; **E**, pereopod 6; **F**, pereopod 7.

distal one-third, with *c.* 20 PMS; peduncle 1.5 times as wide as long; mesial margin with seven coupling hooks. Pleopod 2 exopod with *c.* 51 PMS, endopod with *c.* 22 PMS; appendix masculina with parallel margins, 1.4 times as long as endopod, distally bluntly rounded. Pleopod 3 exopod with

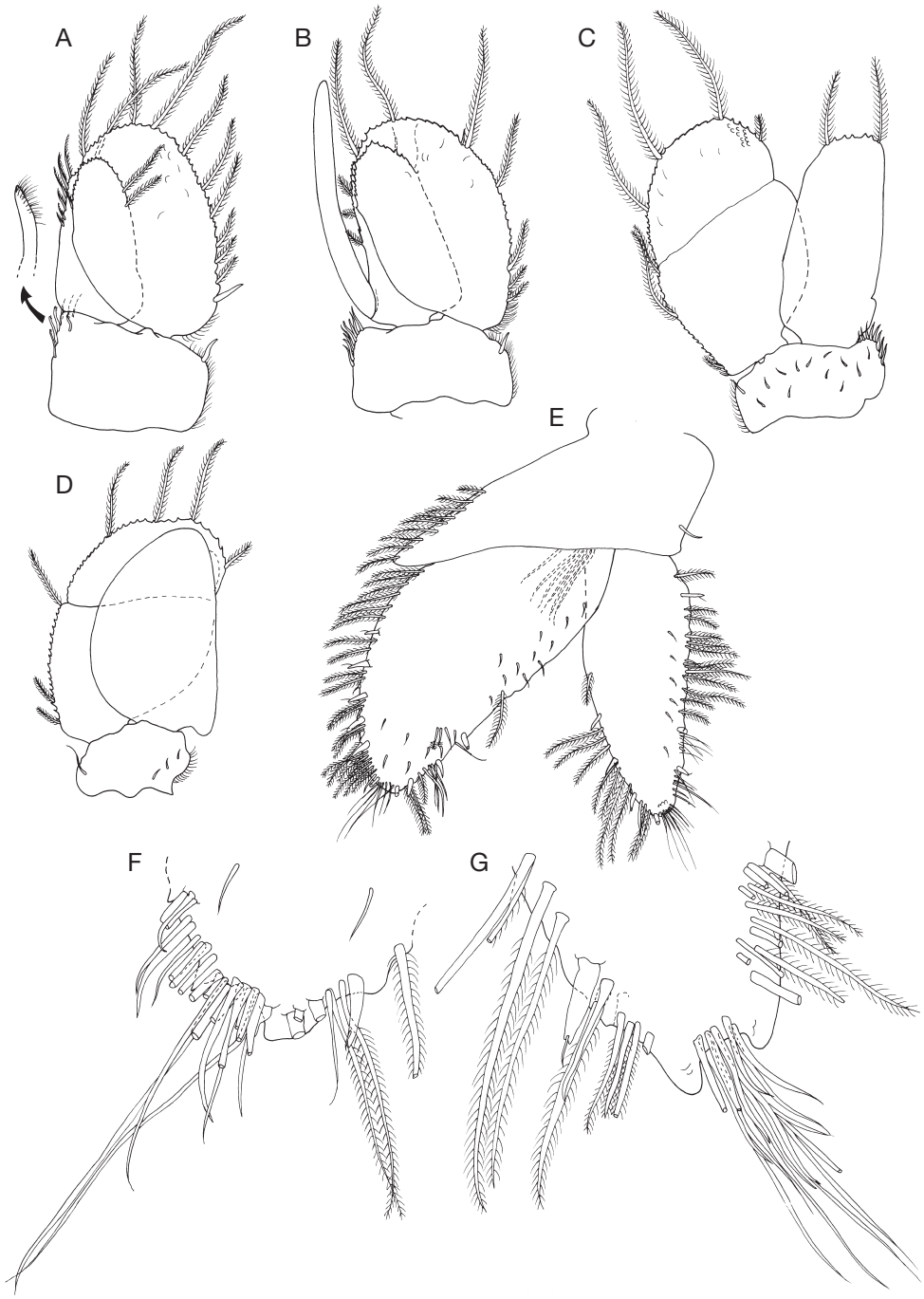

FIG. 4. — *Cirolana mclaughlinae* n. sp., paratype, 12.5 mm (NIWA 17949): **A**-**D**, pleopods 1-3 and 5 respectively; **E**, uropod; **F**, uropodal endopod, apex; **G**, uropodal exopod, apex.

c. 53 PMS, endopod with seven PMS. Pleopod 4 similar to pleopod 3. Pleopod 5 exopod with *c.* 47 PMS. Pleopods 2-5 peduncle distolateral margin without prominent acute RS, 3-5 endopods without distomesial serrate scales.

Uropod peduncle ventrolateral margin with nine plumose setae, without RS, lateral margin without medial short acute RS, posterior lobe about three-quarters as long as endopod; rami extending to pleotelson apex, marginal setae in single tier, apices narrowly rounded. Endopod apically sub-bifid, lateral process prominent; lateral margin straight, with two RS sub-distally and two RS distally; mesial margin weakly convex, with seven RS. Exopod not extending to end of endopod, 0.8 times as long as endopod, 2.6 times as long as greatest width, apically deeply bifid, mesial process prominent; lateral margin straight, with five RS, distal marginal setae in two tiers, dorsal tier shorter than ventral tier; mesial margin weakly convex, with three RS.

Female

Similar to males, with exception of primary sexual characters.

Size

Adults measure 9.3-14.8 mm; no ovigerous females present in material examined; mancas up to 7.2 mm.

Variation

Taken from holotype and paratypes; n = 15. Pleotelson with six RS (94%), with five once. Uropod endopod (n = 28) mesial margin with four to seven RS, with five (46%) and six (32%) and seven (14%) most frequent; lateral margin with 1-4 RS, with two (36%) and three (50%) most frequent; exopod mesial margin with two to five RS, with two (21%), three (57%) and four (14%) most frequent, with five twice (one individual); lateral margin with four to six RS, with four and five most frequent (each 46%), three and six occurring once.

The marginal robust setae on the uropodal rami are irregularly set, and the level of variation is relatively high when compared to some other cirolanids (e.g., Bruce 2004). Variation is not obviously correlated with size or sex of the individuals.

REMARKS

Cirolana mclaughlinae n. sp. may be identified by the heavily and irregularly nodular and pitted dorsal surface of the posterior pereonites, pleon and pleotelson; the dorsal surface of the pleotelson has two large, submedian nodules anteriorly and a prominent irregular longitudinal ridge; and the uropods do not extend posteriorly beyond the pleotelson apex. The most similar species is the deep-water *C. australis* Keable, 2001 (from off southeastern Australia), which differs in being far less nodular, lacking the median longitudinal ridge on the pleotelson, has larger eyes, a more acute frontal lamina, the uropods extend beyond the pleotelson posterior margin, shorter penial processes and usually has two to four robust setae on the pleotelson posterior margin (95% of specimens – Keable 2001) compared to six (94% of specimens) in *C. mclaughlinae* n. sp.

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