

## Deep-sea mites (Halacaridae, Acari), from the southwestern Pacific.

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**Abstract :** Sediment samples taken at slope sites at 570-1420 m depths, off the islands New Caledonia and Lifou, southwestern Pacific, contained 9 halacarid species: *Bathyhalacarus sordidus* n. sp., *B. dictyotus* n. sp., *B. speciosus* n. sp., *Halacarus* sp., *Agauopsis bathyalis* n. sp., *Agauides pacifica* n. sp., *Copidognathus inusitatus* n. sp., and *Copidognathus* spp. A and B. The species are described. Numerically dominant is *Bathyhalacarus*, a genus common in the deep-sea. *Agauopsis bathyalis* and *Agauides pacifica* are most closely related to species recorded from the northeast Atlantic Ocean.

**Résumé :** Sur les pentes devant les îles Nouvelle Calédonie et Lifou, Pacifique sud-ouest, à une profondeur de 570-1420 m, ont été récoltés les halacariens *Bathyhalacarus dictyotus* n. sp., *B. sordidus* n. sp., *B. speciosus* n. sp., *Halacarus* sp., *Agauopsis bathyalis* n. sp., *Agauides pacifica* n. sp., *Copidognathus inusitatus* n. sp. et *Copidognathus* spp. A et B. Les espèces sont décrites. Le genre *Bathyhalacarus*, plus abondant dans les échantillons, est caractéristique pour la méiofaune d'une zone profonde. *Agauopsis bathyalis* et *Agauides pacifica* sont apparentés à des espèces provenant de l'Atlantique nord-est.

### INTRODUCTION

The first deep water halacarid mites were described almost a century ago (see Trouessart 1896), yet knowledge on the mite fauna is sparse. These are the first records of halacarids from the southwestern Pacific, where samples were taken off New Caledonia.

### MATERIAL AND METHODS

As part of the project BIOGEOCAL, which was conducted for the Laboratoire de Sédimentologie, Lyon (Dr. P. Cotillon), and the Muséum National d'Histoire Naturelle, Paris (Dr. Cl. Monniot), the fauna around New Caledonia was investigated. Bottom material was collected aboard the CORIOLIS in April and May 1987. Amongst others, a corer (carottiers USNEL) was used for collecting sediments. The fraction 500-250 µm, sorted in Centre National de Tri d'Océanographie Biologique (CENTOB), contained halacarids. All samples with halacarids are from the slope region.

The species described are deposited in the Muséum National d'Histoire Naturelle, Paris.

Abbreviations used in the descriptions : AD anterior dorsal plate ; AE anterior epimeral plate ; ds dorsal setae on idiosoma, ds-1 first pair of dorsal setae ; E epimeral plate(s) ; GA genitoanal plate ; GO genital opening ; GP genital plate ; OC ocular plate(s) ; P palp, P-2 2nd palpal segment ; pas parambulacral setae ; PD posterior dorsal plate ; PE posterior epi-

meral plate ; pgs perigenital setae ; sgs subgenital setae ; vs ventral setae on idiosoma. Legs numbered I to IV, leg segments 1 to 6, I-6 tarsus on leg I.

#### DESCRIPTIONS

##### *Bathyhalacarus dictyotus* n. sp. (Figs 1-9)

*Material* : One male (holotype).

*Collecting data* : 21°29'33 S, 166°25'44 E, 1410 m, 13 April 1987, NE of New Caledonia, KG 234, BIOGEOCAL.

*Male* : Idiosoma length 477 µm, width 333 µm. All dorsal plates reticulate. AD wide, with a small upward turned frontal spine (Fig. 1), posterior AD truncate ; two gland pores at anterolateral corners of AD. OC large, wide, the two gland pores not markedly raised. PD rounded. Dorsal setae slender ; ds-1 inserted on AD, between gland pores, ds-2 to ds-4 within striated integument, ds-5 on PD, adanal setae at anal cone.

Ventral plates finely porose. AE with 3 pairs of ventral setae. PE with 3 ventral and 5-6 dorsal (marginal) setae. GA truncate anteriorly. GO placed within a groove which is surrounded by almost 150 pgs (Fig. 5). Five pairs of small sgs at genital slit. Spermapositor extending almost to level of anterior GA (Fig. 2).

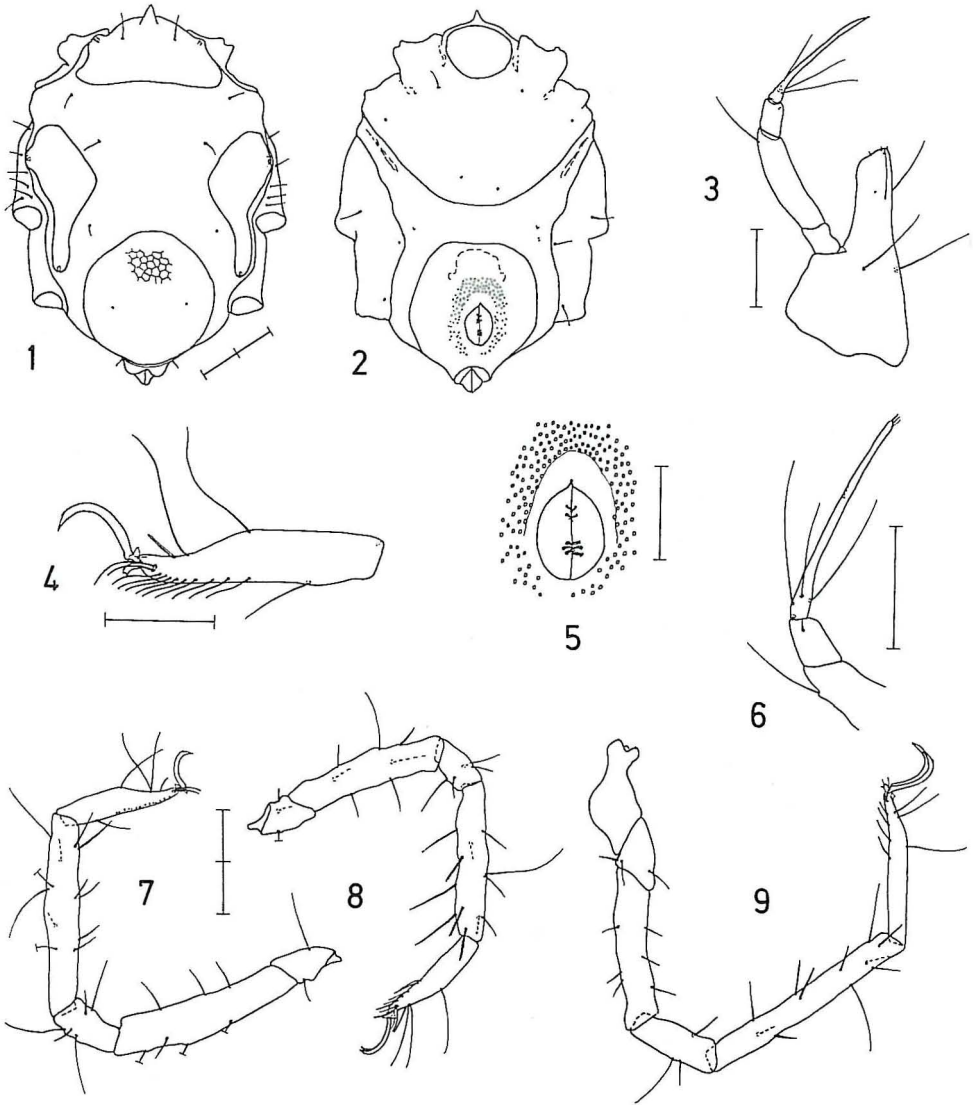
Gnathosoma length 144 µm. Rostrum short, triangular. Palps longer than gnathosoma (Fig. 3). P-2 with 1 dorsal seta, P-3 with a very minute median seta, P-4 with 3 setae in a basal whorl, 1 lateral seta midway and 2 spurs and a minute seta distally (Fig. 6). P-4 slender, longer than P-2.

All legs slender, longer than idiosoma. Telfemora I and II (Figs 7, 8) almost as long as tibiae I and II respectively, telfemora III and IV (Fig. 9) longer than tibiae. Leg chaetotaxy (segment 1 to 5) : leg I 1, 2, 7-8, 5, 12 ; leg II 1, 3, 7, 4, 12 ; leg III 2, 3, 6-7, 3, 10 ; leg IV 0, 3, 6, 3, 11. Most of setae short, bristle-like. I-5 with 3 pairs of ventral bristles, II-5 with 3 pairs of bristles, the ventral ones smooth, tapering, the ventromedial ones finely bipectinate, III-5 with 4 ventral smooth bristles and 1 ventromedial, bipectinate bristle, IV-5 with 3 tapering, smooth ventral and 3 short, bipectinate ventromedial bristles. All tarsi with 3 dorsal setae. I-6 (Fig. 4) with a ventral seta and 19 eupathidia in line, with the basal one at level of anterior dorsal setae ; tarsus tip with a pair of doubled pas. II-6 with 4 pairs of eupathidia and doubled pas. III-6 with 3 and IV-6 with 3-4 ventral setae and a pair of single pas.

Claws long, slender, with minute accessory process. Posterior claws with very delicate comb. Median claw small, bidentate.

*Remarks* : *B. dictyotus*, with its small frontal spinelet, the wide OC and round PD is most similar to *B. acutus* Bartsch, a species recorded from the South Atlantic Ocean (Bartsch 1982 a). *B. dictyotus* is separated from the latter by the wide, posteriorly truncate AD,

numerous dorsal setae on PE, long palps (in relation to gnathosoma length), and number of setae on tibiae III and IV.



Figs 1-9: *Bathyhalacarus dictyotus* n. sp., ♂

1) idiosoma, dorsal view ; 2) idiosoma, ventral view ; 3) gnathosoma, lateral view ; 4) tarsus I, lateral view (medial appendages omitted) ; 5) genital region ; 6) end of palp, medial view ; 7) basifemur to tarsus I, medial view ; 8) basifemur to tarsus II, medial view ; 9) leg IV, medial view.  
Each scale division = 50  $\mu$ m.

*Bathyhalacarus sordidus* n. sp. (Figs 10-21)

Material : 1 female (holotype), 2 deutonymphs, 2 larvae

Collecting data : Southwest of Lifou, 21°02'26 S, 167°02'03 E, 1380 m, 18 April 1987, BIO-GEOCAL, KG 262.

*Female* : Idiosoma length 558  $\mu\text{m}$ , width 509  $\mu\text{m}$ . Idiosoma truncate anteriorly and posteriorly, intensely villose, with detritus trapped amongst the very fine and long epicuticular filaments. All plates porose, with very fine canaliculi. Dorsal plates small, separated by large areas of densely striated integument (Fig. 10). AD hardly surpassing insertion of leg I ; anterior and posterior margin truncate, with two gland pores on small cones at lateral edges. OC narrow, elongate, hourglass-like divided, the posterior portion with a medial edge, both anterior and posterior portion with a slightly raised gland pore. PD not seen. Dorsal setae short ; ds-1 inserted on AD at level of gland pore I, ds-2 to ds-5 within the striated integument, adanal setae at posterior margin of idiosoma.

Ventral plates large, separated by rather narrow areas of striated integument. Anterior epimera form together with anterior AD an almost straight line (Fig. 11). AE very large, with 3 pairs of vs. PE with 3 dorsal and 3 ventral setae. Idiosoma ending at level of epimera IV. GA anteriorly rounded, posteriorly truncate. GO large, occupying most of the GA, with 3-4 pgs on either side of GO ; ovipositor slightly surpassing GO. Anal opening very small, on ventral side of idiosoma, flanked by a pair of pore canaliculi and adanal setae.

Gnathosoma length 222  $\mu\text{m}$ . Tectum truncate. Rostrum slender triangular. One pair of maxillary setae inserted on gnathosoma base, one pair on rostrum (Fig. 12). P-2 with a strong dorsal seta (Fig. 18), P-3 with a small median spinelet, P-4 with 3 setae in the basal whorl, no seta midway. P-4 only slightly longer than P-2.

All legs slender, longer than idiosoma, posterior legs longer than anterior (Figs 13-16). Leg segments, in particular telofemora, covered with fine epicuticular filaments ; similar filaments on the numerous short, bristle-like setae. Leg chaetotaxy (from segment 1 to 5) : leg I 1, 2, 7, 5, 15 ; leg II 1, 3, 6-8, 5, 14 ; leg III 2, 3, 5, 4, 11 ; leg IV 2, 3, 6, 4, 13. Majority of setae short, bristle-like. I-4 with a pair of finely serrate ventral bristles, I-5 with 4 pairs of ventral bristles, with the ventromedial ones bipectinate ; II-5 with 7 ventral bristles, most of them bipectinate ; III-5 with 6 and IV-5 with 8 stout, finely serrate ventral bristles. All tarsi with 3 dorsal setae. Furthermore tarsus I with 1 ventral bristle, 5-6 eupathid ventral setae and on either side of tip of tarsus ca 15 pas in line ; solenidion dorsolaterally (Fig. 19) ; tarsus II with 1 ventral seta and 5 ventral eupathidia, tip of tarsus with 6-7 pas on medial flank (Fig. 17), 12 pas on lateral flank ; tarsi III and IV each with 3 dorsal setae, a pair of pas but no ventral setae.

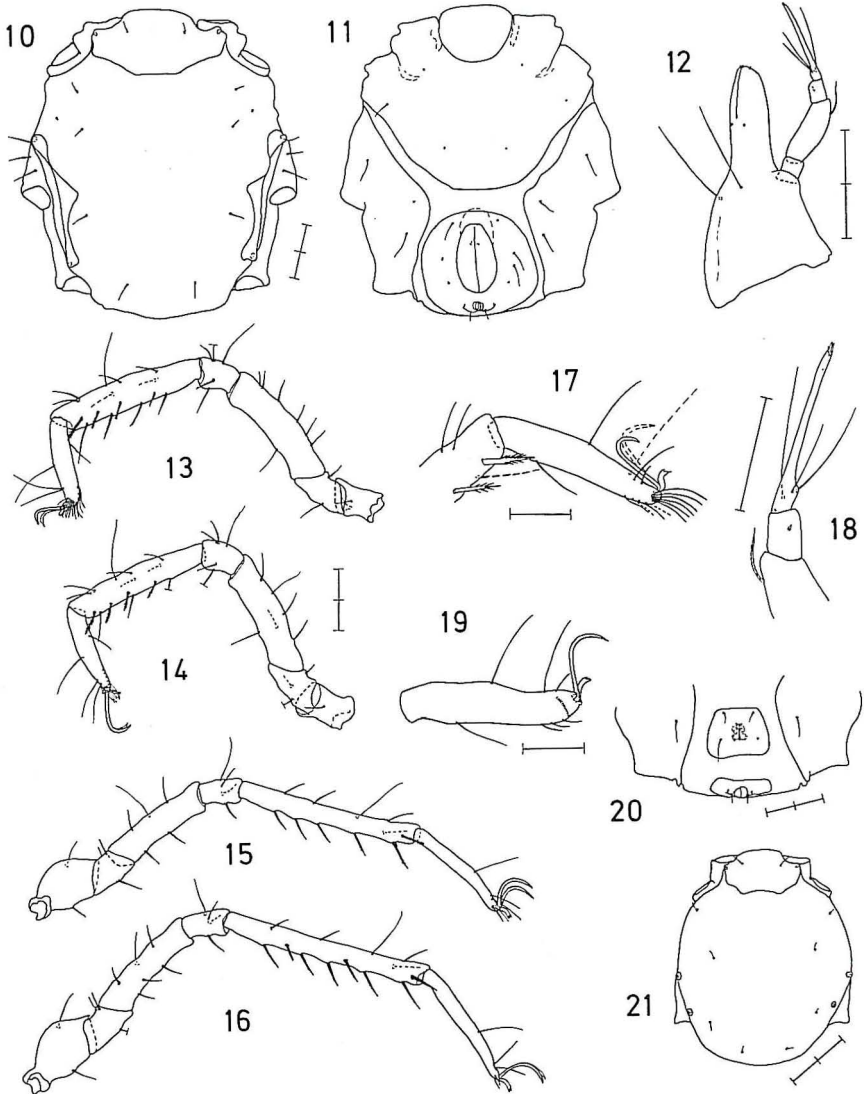
Claws slender, no claw comb present. Median claw bidentate, much shorter than claws.

*Deutonymph* : Idiosoma length 497-531  $\mu\text{m}$ , width 420-496  $\mu\text{m}$ . Densely fouled. Similar to adult. Anterior and posterior portions of OC distinctly separated. PE with 3 pairs of dorsal setae. Genital plate separated from anal plate. GP squarish (Fig. 20), with 2 pairs of pgs and 2 pairs of sgs ; two pairs of large genital acetabula beneath GP.

*Larva* : Idiosoma length 332-362  $\mu\text{m}$ , width 267-310  $\mu\text{m}$ . Idiosoma almost globular. AD wide. OC absent, the two pairs of gland pores present (Fig. 21). AE with two pairs of ven-

tral setae, PE with a single ventral setae. anal plate small, with anal opening and adanal setae.

*Remarks* : *Bathyhalacarus sordidus* differs from all other species in the outline of its idiosoma, with its posterior truncate idiosoma hardly surpassing level of insertion of leg IV.



Figs 10-21 : *Bathyhalacarus sordidus* n. sp.

10) idiosoma, dorsal view, ♀ ; 11) idiosoma, ventral view, ♀ ; 12) gnathosoma, lateral view, ♀ ; 13) leg I, medial view, ♀ ; 14) leg II, medial view, ♀ ; 15) leg III, medial view, ♀ ; 16) leg IV, medial view, ♀ ; 17) tibia and tarsus II, medial view, ♀ (lateral setae in broken line) ; 18) tip of palp, medial view, ♀ ; 19) tarsus I, lateral view, ♀ (medial appendages omitted) ; 20) posterior idiosoma, ventral view, deutonymph ; 21) idiosoma, dorsal view, larva.

Each scale division = 50 µm.

*Bathyhalacarus speciosus* n. sp. (Figs 22-35)

*Material* : Two females, 5 males (holotype), 1 deutonymph.

*Collecting data* : 22°38'81 S, 166°33'63 E, 570 m, 10 April 1987, southwest of New Caledonia, BIOGEOCAL, KG 219.

*Male* : Idiosoma length 416-478  $\mu\text{m}$ , width 267-317  $\mu\text{m}$ . Dorsal plates large, reticulate (Fig. 22). AD almost as wide as long, anterior and posterior margin slightly concave, almost truncate. Gland pores present, though not markedly conspicuous. OC long, wide, anteriorly extending almost to level of posterior AD ; posteriorly tail-like, extending just beyond gland pore. PD large, reaching to level of leg III, with 2 narrow, hyaline costae which posteriorly form a lamella that surpasses the anal sclerites. Dorsal setae small ; ds-1 inserted on AD, between gland pores ; ds-2 to ds-4 on minute sclerites within striated integument, ds-5 on PD, and adanal setae on GA on either side of anal papilla (Fig. 23).

Ventral plates finely porose, large, leaving narrow areas with striated integument. AE with 3 pairs of ventral setae, PE with 3 ventral and 3 dorsal setae. GO in middle of GA, surrounded by approximately 100 slender perigenital setae (Fig. 23). Five pairs of sgs at genital slit (Fig. 24).

Gnathosoma length 149-162  $\mu\text{m}$ . Rostrum distinctly longer than base of gnathosoma, narrow, parallel-sided (Fig. 25). One pair of maxillary setae on gnathosoma base, one pair in posterior rostrum. P-2 with 1 dorsal seta, P-3 with a minute spinelet, P-4 with 3 setae in basal whorl, 1 lateral seta in posterior third and 1 minute seta and 2 spurs at the tip. P-4 shorter than P-2.

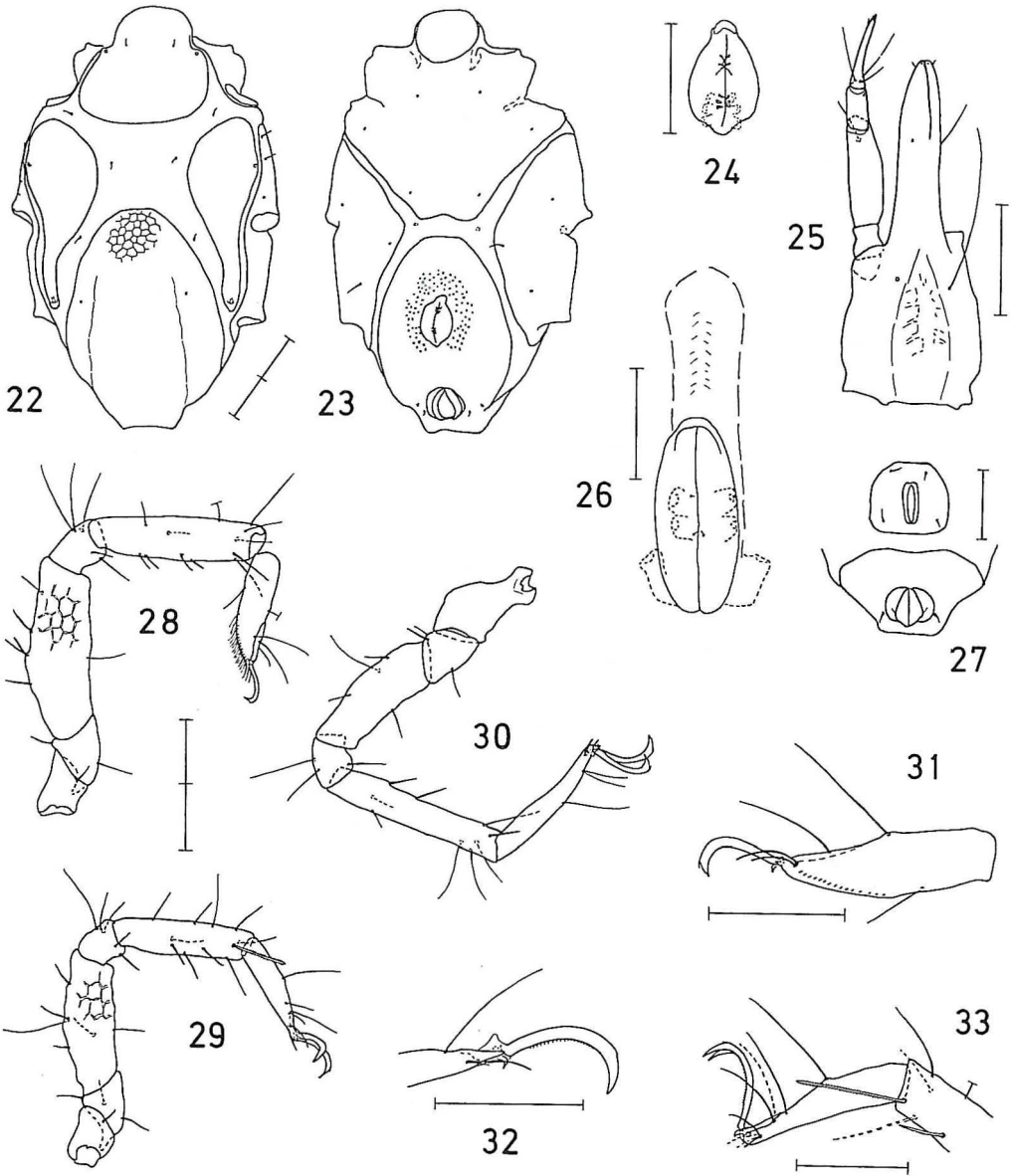
Legs slightly longer than idiosoma. Integument on telofemora faintly panelled (Figs 28, 29). Leg chaetotaxy (segment 1 to 5) : leg I 1, 2, 6, 5, 12 ; leg II 1, 3, 6, 5, 10-12 ; leg III 2, 3, 4, 3, 8-10 ; leg IV 0, 3, 4, 3, 9-12. Tibia I with 3 pairs of smooth ventral bristles ; tibia II with 4-6 ventral bristles, the distimedial one strong, bipectinate ; tibiae III and IV (Fig. 30) both with 4-5 ventral bristles. All tarsi with 3 dorsal setae ; solenidion on tarsus I dorsolateral, on tarsus II dorsomedial in position. Tarsus I with 1 ventral setae and a long row of 17 pairs of eupathidia (pas included) (Fig. 31), tarsus II with 0-2 ventral eupathidia, and pas with 1 long eupathid and 1 very short seta (Fig. 33) ; similar pas on tarsi III and IV (Fig. 32).

Claws slender, with a minute accessory process and a very faint claw comb. Median claw minute.

*Female* : Idiosoma length 416-497  $\mu\text{m}$ , width 260-341  $\mu\text{m}$ . PD smaller than in males, not extending beyond level of ds-4 (Fig. 34). GA slender, GO slender, large, with two pairs of pgs. Ovipositor extending beyond GO for slightly less than length of GO (Figs 26, 35). Gnathosoma length 149-165  $\mu\text{m}$ .

*Deutonymph* : Idiosoma length 353  $\mu\text{m}$ , width 204  $\mu\text{m}$ . GP quadrangular, with 2 pairs of pgs (Fig. 27). Primordial genital slit large. Two pairs of genital acetabula beneath GP.

*Remarks* : *B. speciosus* differs from all other species of *Bathyhalacarus* on the basis of the large ocular plates, the hyaline costae and the posterior lamella on PD, and the slender gnathosoma.



Figs 22-33: *Bathyhalacarus speciosus* n. sp.

22) idiosoma, dorsal view, ♂; 23) idiosoma, ventral view, ♂; 24) genital opening, ♂; 25) gnathosoma, ventral view, ♂; 26) genital region, ventral view, ♀; 27) posterior idiosoma, ventral view, deutonymph; 28) leg I, medial view, ♀; 29) leg II, medial view, ♀; 30) leg IV, medial view, ♂; 31) tarsus I, medial view, ♂ (lateral appendages omitted); 32) tip of tarsus IV, lateral view, ♀; 33) tibia and tarsus II, medial view, ♂ (lateral setae in broken line).  
Each scale division = 50 µm.

*Halacarus* sp. (Figs 36-42)

*Material* : One deutonymph.

*Collecting data* : 22°38'81 S, 166°33'63 E, 570 m, 10 April 1987, southwest of New Caledonia, BIOGEOCAL, KG 219.

*Deutonymph* : Idiosoma length 502  $\mu\text{m}$ , width 428  $\mu\text{m}$ . AD and PD present, OC absent. Anterior AD constricted by epimera I, anterior margin truncate, posterior margin slightly excavated, gland pores at lateral edges of AD (Fig. 40). Second pair of gland pores at margin of idiosoma, third and fourth pairs of gland pores on small sclerites within striated dorsal integument, fifth pair of pores on posterior PD. Halfway between pores II and III a tiny depression visible, obviously a pair of pore canaliculi. Dorsal setae minute ; ds-1 on AD, posterior to gland pores, ds-2 to ds-5 within striated integument, adanal setae on PD, lateral to gland pores.

Epimera I partly surrounding camerostome (Fig. 41). GP quadrangular, with 2 pairs of pgs. Anal plate fused with PD, with a pair of pore canaliculi, and a pair of adanal setae.

Gnathosoma length 202  $\mu\text{m}$  ; with a stout basis and parallel-sided rostrum. Palps short, stout, inserted on dorsal flank of gnathosoma base ; third and fourth segment directed outward. Both maxillary setae inserted on rostrum (Fig. 42). P-2 with 1 basal and 1 distal seta (Fig. 39) ; P-3 with a small blunt spine, P-4 with 3 setae in a basal whorl.

All legs longer than idiosoma. Leg I markedly longer and stronger than other legs. I-4 slightly shorter than I-3 or I-5 ; telofemora III and IV shorter than tibiae. Majority of setae on legs short. I-3 and I-4 both with 1 ventromedial seta and 1 short ventrolateral spinelet (Fig. 38), I-5 with 2 ventromedial setae and 2 ventrolateral spinelets, the basal spine stout, short, the distal spine tapering. II-5 with 2 pairs of short bristles (Fig. 36), III-5 (Fig. 37) and IV-5 both with 4 short ventral setae, the 3 basal ones bristle-like, the distal one spine-like. All tarsi with 3 dorsal setae ; I-6 with 2 ventral setae, and a pair of single and doubled pas, II-6 with 2 ventral setae, a pair of eupathidia and doubled pas, III-6 and IV-6 both with 2 ventral setae and singlet pas.

Claws very slender ; claws on leg I distinctly shorter than those on following legs. Claw comb not developed. Median claw small, blunt.

*Remarks* : This species differs from all other species of *Halacarus* in its enlarged epimera I, almost surrounding the camerostome and constricting the AD, the short palps, inserted on dorsal flank of gnathosoma, and leg I with short ventrolateral spines, and the ventromedial ones replaced by minute setae.

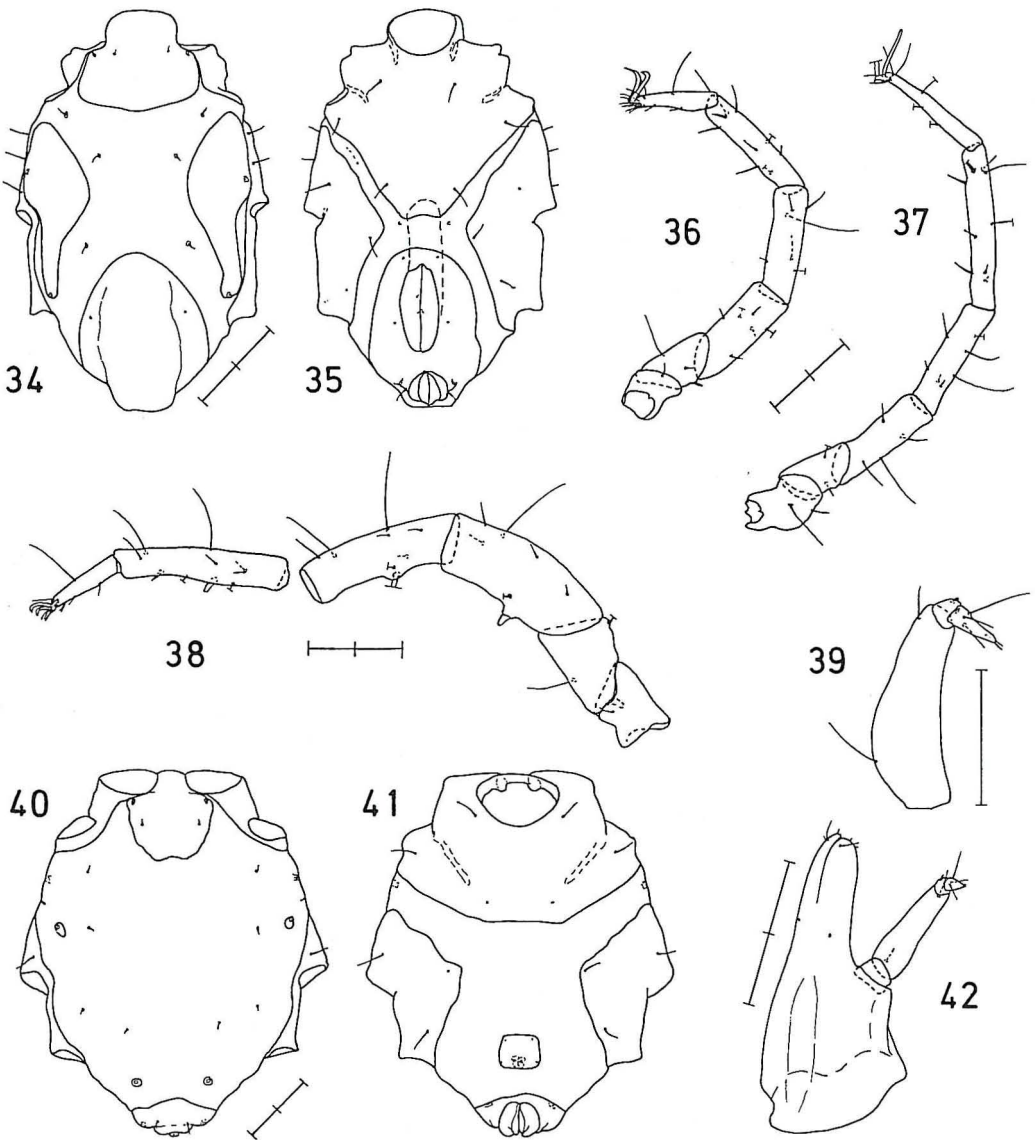
*Agauopsis bathyalis* n. sp. (Figs 43-51)

*Material* : One female (holotype).

*Collecting data* : Southwest of Lifou, 21°02'26 S, 167°02'03 E, 1380 m, 18 April 1987, BIOGEOCAL, KG 262.

*Female* : Idiosoma length with frontal spine 360  $\mu\text{m}$ , without frontal spine 335  $\mu\text{m}$ , width 205  $\mu\text{m}$ . Dorsal plates coarsely reticulate, with reticulation punctate. AD and PD with nar-





Figs 34 and 35 : *Bathyhalacarus speciosus* n. sp., ♀.  
34) idiosoma, dorsal view ; 35) idiosoma, ventral view.

Figs 36-42 : *Halacarus* sp., deutonymph  
36) leg I I, medial view ; 37) leg I I I, lateral view ; 38) leg I, dorsomedial view ; 39) palp, lateral view ; 40) idiosoma, dorsal view ; 41) idiosoma, ventral view ; 42) gnathosoma, ventral view.  
Each scale division = 50  $\mu$ m.

row longitudinal ridges, that on PD fused posteriorly (Fig. 43). AD with frontal spine ; posterior margin of AD truncate ; with a pair of gland pores at lateral margin just posterior to insertion of leg I. OC large, with a slightly raised lateral triangular area, with gland pore and pore canaliculus ; corneae lacking. PD large, with narrow striae of striated integument between AD and PD, OC and PD. Scattered pores (canaliculi) within ridges. Dorsal setae small ; ds-1 inserted on AD, at anterior end of ridges, ds-2 on minute sclerites within striated integument, ds-3 and ds-4 at margin of PD and ds-5 on PD lateral to ridges, adanal setae on anal plate.

Ventral plates very finely reticulate ; marginal areas on PE and raised areolae on either side of GO with coarse, irregularly shaped pores (Fig. 44). AE with a pair of epimeral pores between EI and EII and 3 pairs of ventral setae ; PE with round pits at anterior margin, markings from insertion for muscle strings to leg III and IV ; 3 ventral and 1 dorsal setae. GO in posterior GA, removed from anterior margin of GA for more than twice the length of GO. Area around GO slightly raised ; a pair of small lamellae flanking posterior GO. GA with 3 pairs of pgs, no sgs on genital sclerites.

Gnathosoma length 127  $\mu\text{m}$ . Palps small, hardly surpassing tip of rostrum (Fig. 45). P-2 with a dorsal seta, P-3 with a mediadorsal bristle, P-4 with one seta in the basal whorl. One pair of maxillary setae inserted close to rostrum base, one pair on posterior rostrum.

Integument of legs panelled. Leg chaetotaxy (segment 1 to 5) : leg I 1, 2, 7-8, 5, 11 ; leg II 1, 2, 6, 4, 7 ; leg III 1, 2, 3, 3, 6 ; leg IV 0, 2, 3, 3, 6. Leg I wider than other legs. I-3 with 1 ventral and 2 ventromedial spines, I-4 with a slender ventral and a strong ventromedial spine, I-5 with 2 ventral and 3 ventromedial spines (Fig. 49). Base of ventral spines flanked by small, lamellar cuticular spinelets. Tibiae II, III (Figs 50, 51) and IV each with 3 ventral bristles. Tarsus I with a medial spine, 3 dorsal setae, a pair of ventral eupathidia and at tip of tarsus a pair of doubled pas. Tarsi II, III and IV each with ventral setae.

Claws on tarsus I smooth, those on tarsi II, III and IV with claw comb (Figs 46-48).

*Remarks* : *Agauopsis bathyalis* belongs to the *conjuncta* group (cf. Bartsch 1986). It differs from the species known (*conjuncta*, *minor*, *meteoris*) in its slender frontal spine.

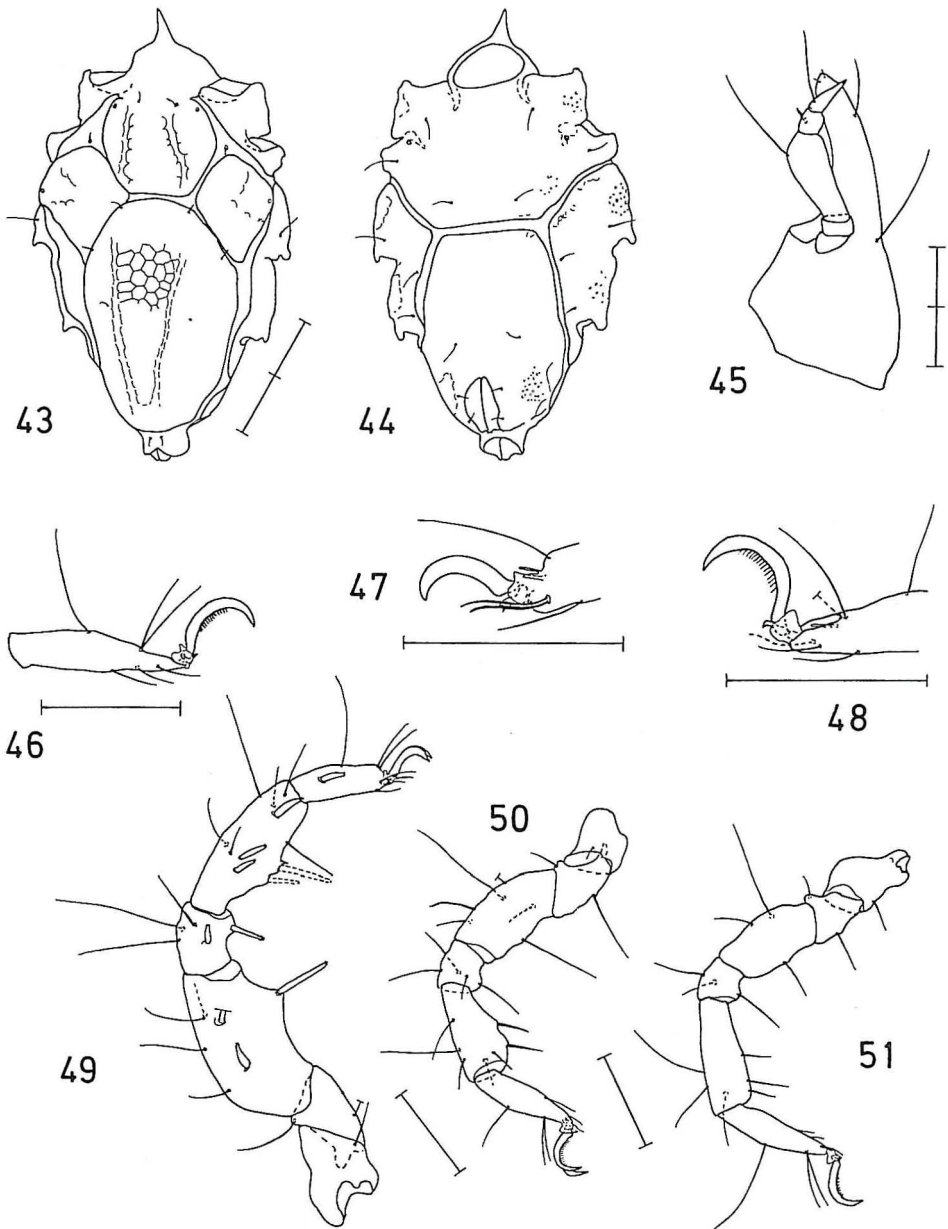
*Geographic distribution* : The 3 species *A. conjuncta* Viets, *A. meteoris* Bartsch and *A. minor* (Trouessart) live in the NE-Atlantic in shelf regions. *A. bathyalis* is the first member of this group of closely related species recorded from the Pacific and the deep-sea. *A. bathyalis* lack corneae and eye pigment, otherwise the outline of idiosoma, gnathosoma and legs, sculpturing of integument and chaetotaxy of legs show no characters to support the supposition that this species is specialized to life in the abyss.

*Agauides pacifica* n. sp. (Figs 52-59)

*Material* : One female.

*Collecting data* : 22°38'81 S, 166°33'63 E, 570 m, 10 April 1987, southwest of New Caledonia, BIOGEOCAL, KG 219.

*Female* : Idiosoma length 620  $\mu\text{m}$ , width 410  $\mu\text{m}$ . Dorsal plates reticulate. Membranous areas densely folded. AD posteriorly condverging ; posterior edge truncate. OC form small



Figs 43-51 : *Agauopsis bathyalis* n. sp., ♀  
 43) idiosoma, dorsal view ; 44) idiosoma, ventral view ; 45) gnathosoma, lateral view ; 46) tarsus IV, medial view ; 47) tip of tarsus I, lateral view (medial setae omitted) ; 48) tip of tarsus II, medial view (lateral setae in broken line) ; 49) leg I, medial view (spines on tibia completed from right leg I) ; 50) leg II, medial view ; 51) leg III, medial view.  
 Each scale division = 50  $\mu$ m.

sclerites, much wider than long. Anterior PD quadrangular ; slightly protruding corners beset with gland pores (Fig. 52). Marginal areas of PD pierced by fine canaliculi. Ds-1 inserted on posterior PD, ds-2, ds-3 and ds-4 within striated integument, ds-5 on PD and adanal setae on anal plates.

Ventral epicuticula pierced by very delicate canaliculi. Epimeral lamellae flanking medial base of trochantera I and II. Ventral setae vs-1 doubled, vs-2 doubled or tripled, vs-3 are singlets. AE with crescent apodemes for muscle strings. PE with 1 dorsal, 1 marginal and 1 ventral seta (ventral seta on one side doubled). GA short, most of its length occupied by GO ; 4-5 pgs on either side of GO (Fig. 53).

Gnathosoma slender, 190  $\mu\text{m}$  in length. Maxillary setae very short, both pairs of setae inserted close together, near rostrum base. Tectum scale-like. Palps 4-segmented. P-2 with a strong dorsal bristle, P-3 lack seta, P-4 with the small dorsal pore always found on P-4, 2 strong bristles, inserted basally and distally ; tip of tarsus with 1 minute seta and 2 spinelets (Fig. 55). Movable digit of chelicerae with serrate dorsal edge.

Legs slender, shorter than idiosoma. Legs and setae with fine cuticular filaments. Leg chaetotaxy (from segment 1 to 5) : leg I 1, 3, 10-11, 4, 15-16 ; leg II 1, 3, 11, 4, 14-15 ; leg III 2, 2-3, 4-7, 3-4, 7-13 ; leg IV 2, 2, 9, 3, 11-12. Tibia I with 3 ventrolateral and 4 ventromedial bristles, the posterior one spine-like (Fig. 56). Tibia II with 2 ventrolateral and 4 ventromedial bristles, the distal one spine-like. Tibiae III and IV with 3 (injury?) to 6 (Fig. 57) ventral bristles. Tarsus I with a strong, spine-like dorsal bristle and 2 slender distal setae ; at tarsus tip doubled pas and 5 ventral eupathidia ; solenidion on dorsolateral membrane of claw fossa (Fig. 59). Tarsus II with a minute ventral seta, a lateral pas, a dorso-medial solenidion, and 3 dorsal setae, the basal one spine-like, the distal ones slender, delicate. IV-6 with a minute ventral seta. The basal one of the 3 dorsal setae on tarsi III (Fig. 58) and IV bristle-like, distinctly less strong than corresponding setae on tarsi I and II ; pas lacking.

All claws slender, smooth. A small unidentate median claw present on all tarsi.

*Remarks* : *Agauides pacifica* is very similar to *A. cryosi* Bartsch, a species recorded from the northeast Atlantic (Bartsch 1988). Both species are similar in size ; outline and sculpturing of dorsal and ventral plates are almost identical. The most marked differences are the form of the tarsi, more slender in *A. pacifica* than in *A. cryosi*. Height : length ratio of tarsi II and III : 2.8 and 3.3 in *A. cryosi* (Fig. 60) ; 3.2 and 4.3 in *A. pacifica* (Fig. 58).

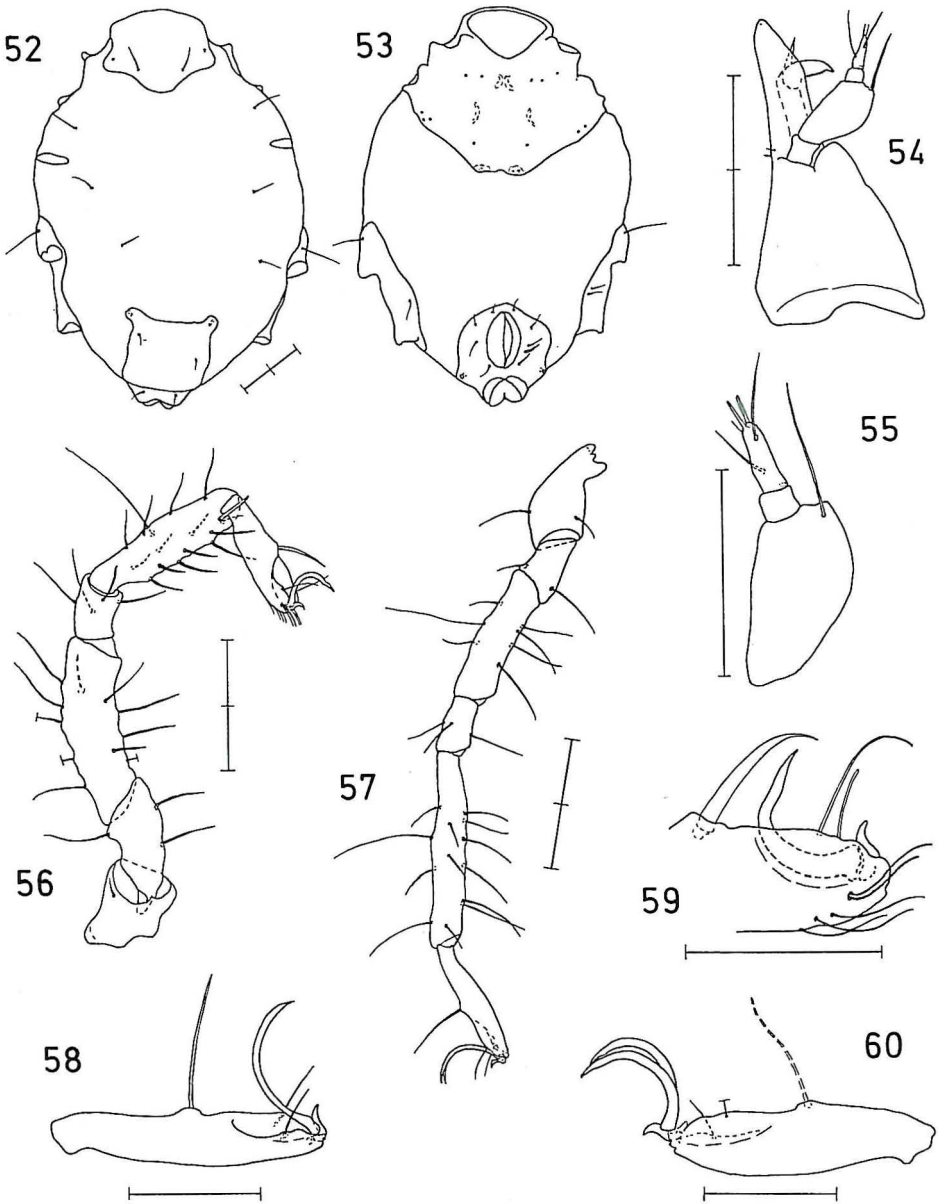
The female taken held a single large egg, 204  $\mu\text{m}$  in length, 182  $\mu\text{m}$  in width.

*Copidognathus inusitatus* n. sp. (Figs 61-68)

*Material* : One male.

*Collecting data* : 21°02'04 S, 167°02'32E, 1508 m, 18 April 1987, southwest of Lifou, BIOGEOCAL, KG 261.

*Male* : Idiosoma length 358  $\mu\text{m}$ , width 347  $\mu\text{m}$ . Dorsal plates large, faintly reticulate (Fig. 61) ; no porose areolae present. AD distinctly wider than long, with gland pores at anterior margin. OC with a pair of gland pores and a small pore canaliculus at lateral mar-



Figs 52-59: *Agauides pacifica* n. sp. ♀

52) idiosoma, dorsal view ; 53) idiosoma, ventral view ; 54) gnathosoma, lateral, view ; 55) palp, lateral view ; 56) leg I, medial view ; 57) leg III, lateral view ; 58) tarsus III, lateral view ; 59) tip of tarsus I, lateral view (medial setae omitted).

Fig. 60: *Agauides cryosi* Bartsch ♀

60) tarsus III, lateral view (dorsal setae completed from tarsus IV)  
Each scale division = 50 µm.

gin. Anterior margin of PD truncate ; posterior gland pores on raised cones, with the ostium ventral in position. Dorsal setae broken ; ds-1 on AD adjacent to gland pores, ds-2 within OC at anterior margin of plate ; ds-3, ds-4 and ds-5 on PD, adanal setae on basis of the elongate anal cone.

All ventral plates fused ; integument delicately foveate. AE wide, epimera I with lateral projections ; area of AE with a pair of epimeral pores and 3 pairs of setae, area of PE with 1 dorsal and 3 ventral setae. On either side of GO 5 pairs of pgs (Fig. 62). Genital sclerites with 2 pairs of sgs. Spermapositor large, extending beyond GO for GO's length.

Gnathosoma length 111  $\mu\text{m}$  ; gnathosoma may have been fused to AE. Rostrum triangular, much shorter than gnathosoma base (Fig. 63). Palps slender. P-2 with 1 dorsal setae, P-4 with 3 setae in basal whorl. One pair of maxillary setae on rostrum, 5-6 setae on either side of pharyngeal plate on gnathosoma base. Tectum large, scale-like (Fig. 65).

Legs very slender, much longer than idiosoma. Integument finely punctate (Fig. 66). Leg chaetotaxy (segment 1 to 5) : leg I 1, 2, 5, 3, 6 ; leg II 1, 2, 5, 3, ?, ? ; leg III 1, 2, 3, 3, 5 ; leg IV 1, 2, 3, 5, 5. Tibia III with a bipectinate ventromedian and a slender, smooth ventral seta. Tarsus I with 3 dorsal setae, tarsi III and IV with 4 setae (Figs 67, 68). I-6 with 3 ventral setae, a solenidion dorsolateral in position, and a pair of doubled pas ; III-6 and IV-6 with a seta-like medial pas and a bristle-like lateral one.

Claws long, very slender on all legs. Median claw long, slender, bidentate. Claw comb not discernable.

*Remarks* : With its tubular anal cone, *C. inusitatus* resembles *C. bruuni* Newell, found in the abyss in the southeast Pacific (Newell 1967). Yet, the two species are not closely related. *C. inusitatus* is easily distinguished from *C. bruuni* by the wide idiosoma ; the wide AD, with gland pore and ds-1 close to anterior margin ; the large, posteriorly rounded OC ; the gnathosoma with the scale-like tectum.

*Copidognathus curiosus* Bartsch, a species found in the Mozambique Channel (Bartsch 1982b), seems to be related to *C. inusitatus*.

The majority of *Copidognathus* species have 2 pairs of maxillary setae ; 3 pairs of setae are common in adults of the *C. pulcher* group, and in males of *C. curtus* Hall, *C. granulatus* (Hodge) and *C. richardi* (Trouessart). More than 3 pairs of setae have been found in males only, e.g. in *C. neutrichius* Newell, a member of the *pulcher* group, *C. pseudosetosus* Newell and *C. gigas* Newell.

The leg chaetotaxy within the genus *Copidognathus* is very uniform, often with a constant number of setae on trochanters, basifemora, genua and tibiae. *C. inusitatus* differs from other *Copidognathus* species by its 3 dorsal setae on I-5, 5 setae on IV-4 and 1 seta on IV-1.

#### *Copidognathus* sp. A

*Material* : One protonymph.

*Collecting data* : 22°38'81 S, 166°33'63 E, 570 m, 10 April 1987, southwest of New Caledonia, BIOGEOCAL, KG 219.

*Protonymph* : Idiosoma length 385  $\mu\text{m}$ , width 220  $\mu\text{m}$ . AD, OC and PD present ; AD with frontal protuberance ; corneae present. AD, PD and marginal epimera with rosette pores. Gnathosoma with a spiniform tectum. Legs short. Telofemora with lamellae.

*Remarks* : The species belongs to the *gibbus* group, a natural group distributed worldwide in littoral waters, with the majority of the representatives psammophilic.

*Copidognathus* sp. B (Figs 69, 70)

*Material* : One protonymph

*Collecting data* : 20°38'88 S, 167°12'23 E, 1420 m, 27 April 1987, northeast of Lifou, BIO-GEOCAL, KG 294.

*Protonymph* : Idiosoma length 303  $\mu\text{m}$ , width 204  $\mu\text{m}$ . Dorsal plates fused with heavily sclerotized striated integument, dorsum uniformly sculptured with scattered pits (Fig. 70) ; outline of dorsal plates distinguishable. OC with 2 distinct corneae. PD with a pair of longitudinal costae. Ventral plates foveate.

Gnathosoma length 80  $\mu\text{m}$ . Rostrum slender, parallel-sided (Fig. 69)

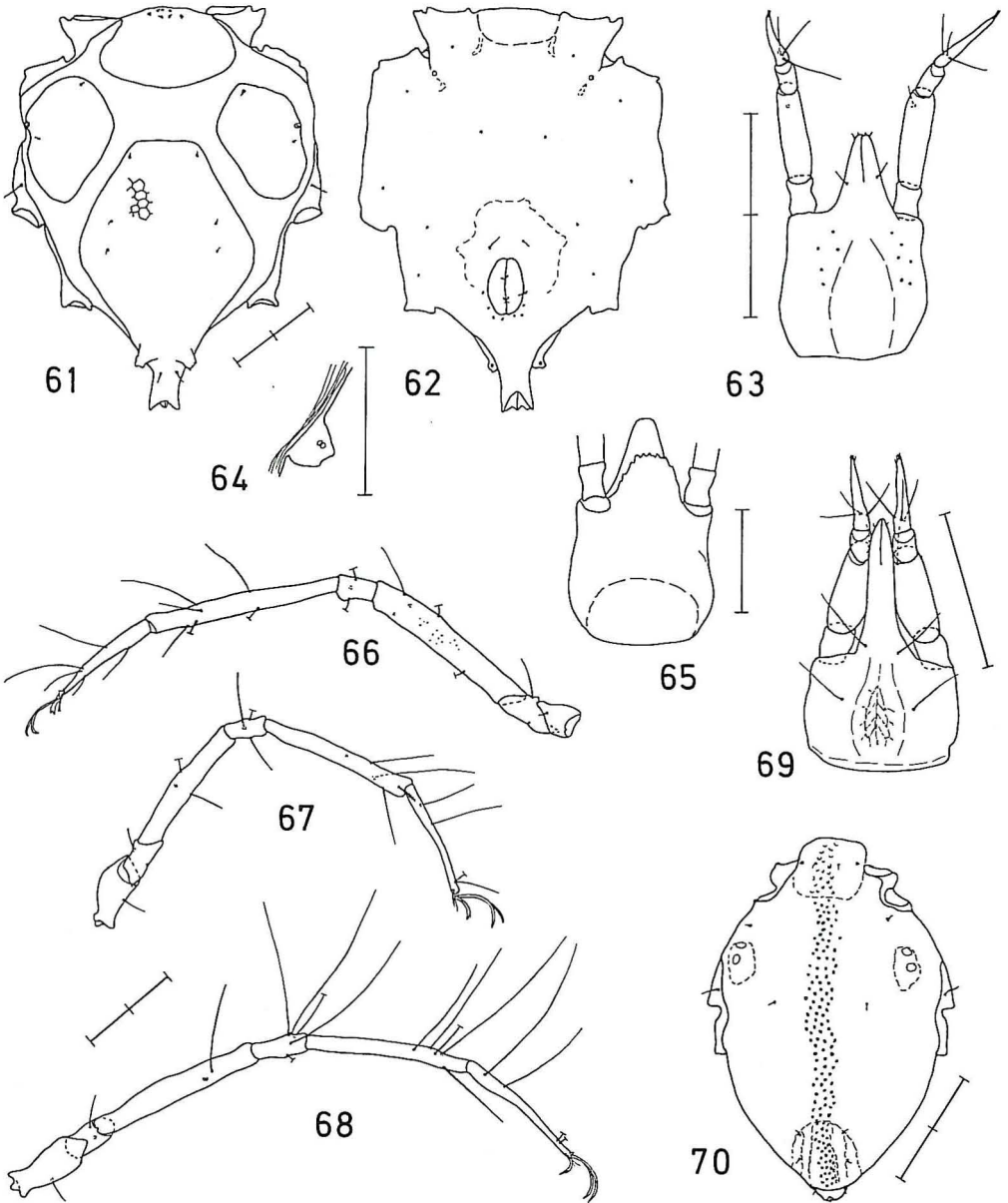
Legs stout. Claws stout ; claw comb with few, strong tines.

*Remarks* : The quiescent protonymph contained a male ; with dorsal plates large, all plates distinctly separated by membranous integument, AD with 3 porose areolae, PD with 4 longitudinal costae. The species, protonymph and adult, is characterized by the narrow, parallel-sided rostrum, a shape rare within the genus *Copidognathus*. *Copidognathus* sp. B might be ectoparasitic in habit. Never noticed before within the genus *Copidognathus* is the fusion of the dorsal plates with the membranous integument, with both plates and membranous integument uniformly sculptured.

## DISCUSSION

New Caledonia is in the southwest Pacific Ocean, 1200 kilometres east of Australia, at approximately 21°S, 166°E. The island New Caledonia is continental, the island Lifou a raised atoll. The islands are surrounded by fringing reefs. Most of the islands slope steeply downward to abyssal plains. The islands New Caledonia and Lifou are separated by the Loyaute Basin, with steep slopes at either side and a plateau at 2300 m. Within several "boxes", samples were taken with an USNEL corer, one of the sampling sites was on the gentle slope at the southern edge of New Caledonia, two on either side of the Loyaute Basin, off New Caledonia and off Lifou, another site off the northern coast of Lifou. The fraction 500-250  $\mu\text{m}$  also held marine mites, though, in total the number is low both in respect to species and specimens.

*Bathyhalacarus* is numerically most important. This genus is a common member of deep-sea sediments and widely spread in the North Pacific (Sokolov & Yankovskaya 1968, Yankovskaya 1978), southeast Pacific (Newell 1967) and North and South Atlantic (Bartsch 1982a).



Figs 61-68: *Copidognathus inusitatus* n. sp., ♂

61) idiosoma, dorsal view ; 62) idiosoma, ventral view ; 63) gnathosoma, ventral view ; 64) posterior gland pore, ventral view ; 65) gnathosoma base, dorsal view ; 66) leg I, medial view ; 67) leg III, medial view ; 68) leg IV, ventromedial view.

Figs 69 and 70: *Copidognathus* sp. B, protonymph

69) gnathosoma, ventral view ; 70) idiosoma, dorsal view.

Each scale division = 50  $\mu$ m.



Four halacarid species were found on the gentle slope south of New Caledonia, at 570 m depth : *Halacarus* sp., *Agauoides pacifica*, *Bathyhalacarus speciosus* and *Copidognathus* sp. A. The juvenile *Copidognathus* sp. A is closely related to the *gibbus* group, with its members widely spread in shallow waters in both cold and warm waters. The genus *Halacarus* is known from tidal to deep-sea habitats, the species found off New Caledonia is unique in several features, it is not related to any other *Halacarus* described. The only previously recorded *Agauoides* was a single specimen (*A. cryosi*) taken in the northeast Atlantic Ocean (Bartsch 1988) ; *A. cryosi* and *A. pacifica* are very similar in shape and chaetotaxy. Most records of *Bathyhalacarus* are from deep water regions ; *B. speciosus* is not closely related to any of these deep-sea forms.

A sample taken on the steep slope northeast of New Caledonia, at 1410 m depth, contained a specimen of *Bathyhalacarus dictyotus*. This is a species similar and related to species known from deep-sea regions in the Atlantic.

At the slope site south of Lifou, two of the samples, from 1380 and 1508 m depth, held halacarids (*Bathyhalacarus sordidus*, *Agauopsis bathyalis*, *Copidognathus inusitatus*). *B. sordidus* has a very podgy idiosoma and long legs ; it is not related to any of the species hitherto described. *C. inusitatus* with its extremely long and slender legs and prolonged anal cone is similar, though not closely related to *C. bruuni*, recorded from the southeast Pacific (29°S, 80°W) from 3680-4100 m (Newell 1967). *A. bathyalis* has no markedly long legs, no long protuberances, the idiosoma is neither extremely slender nor fat ; it is very similar to the closely related species *A. conjunctus*, *A. meteoris* and *A. minor*, all recorded from shelf regions in the northeastern Atlantic (Bartsch 1986).

From north of Lifou a single halacarid specimen, a quiescent protonymph of *Copidognathus* was found. The dorsal membranous integument is almost as heavily sclerotized and sculptured as the plates, a character not described before for any *Copidognathus*.

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