

Potamalpheops pininsulae sp. nov., a new stygiophilic shrimp from New Caledonia (Crustacea: Decapoda: Alpheidae)

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Abstract

A new species of the alpheid shrimp genus *Potamalpheops* Powell, 1979, *P. pininsulae*, is described and illustrated. This shrimp is the first stygiophilic alpheid to be reported from the Indo-West Pacific region, and only the second species of its genus from this area. The shrimps were collected from a calcareous anchialine grotto on the Isle of Pines, New Caledonia. The new species is closely related to the only other Indo-West Pacific species, *P. hanleyi* Bruce, an inhabitant of mangroves, rather than the troglobic Central American species, *P. stygicola* Hobbs, found in a freshwater cave in Mexico. *P. pininsulae* is easily distinguished from all other species of the genus by its longer rostrum armed with a ventral tooth. The key to the genus *Potamalpheops* provided by Bruce (1991a) is revised to include *P. pininsulae*.

Résumé

Description illustrée d'une nouvelle espèce de crevettes alpheides du genre *Potamalpheops* Powell, 1977: *P. pininsulae*. Il s'agit du premier alpheide stygophile de la région Indo-Ouest Pacifique, et de la seconde espèce du genre connue de cette région. Les exemplaires ont été collectés dans une grotte calcaire anchialine de l'île des Pins, Nouvelle Calédonie. L'espèce nouvelle est étroitement apparentée plutôt à l'autre espèce connue de l'Indo-Ouest Pacifique (*P. hanleyi* Bruce, habitant la zone des mangliers) qu'à *P. stygicola* Hobbs, espèce troglobie connue d'une grotte à eau douce du Mexique. *P. pininsulae* se distingue facilement de toutes les autres espèces du genre par son long rostre armé d'une dent ventrale. La clé de détermination fournie par Bruce (1991a) pour le genre *Potamalpheops* est modifiée pour inclure la nouvelle espèce.

At present the alpheid shrimp genus *Potamalpheops* Powell (1979) includes five described species. One of these, *P. stygicola* Hobbs, is remarkable as the only representative of the genus in the New World, occurring at Oaxaca, Mexico, where it was found in a freshwater cave. The four Old World species are represented by three described species and one undescribed species from West Africa, and one from northern Australia, all occurring in shallow coastal estuarine or fresh waters. Alpheid shrimps are almost exclusively marine and *P. stygicola* is the only species of this family to have been reported from a fresh water cave habitat. The discovery of a second stygiophilic species on the Ile des Pins, New Caledonia, almost as remote from Mexico as possible, is therefore of interest.

ALPHEIDAE Rafinesque, 1815

Potamalpheops Powell, 1979

Potamalpheops pininsulae sp. nov.

(Figs. 1–53)

Material examined; locality and habitat.—48 specimens (1 ovigerous female); stn. 88–049, Grotte de la Troisième (Paradise Cave), Ile des Pins, New Caledonia, 1 June 1988, anchialine limestone cave, depth 0–6 m, coll T.M. Iliffe and S. Sarbu.

Holotype male and ovigerous female allotype are deposited in the collection of the Northern Territory Museum, Darwin, catalogue numbers NTM Cr.009494 A-B. Male and female paratypes are

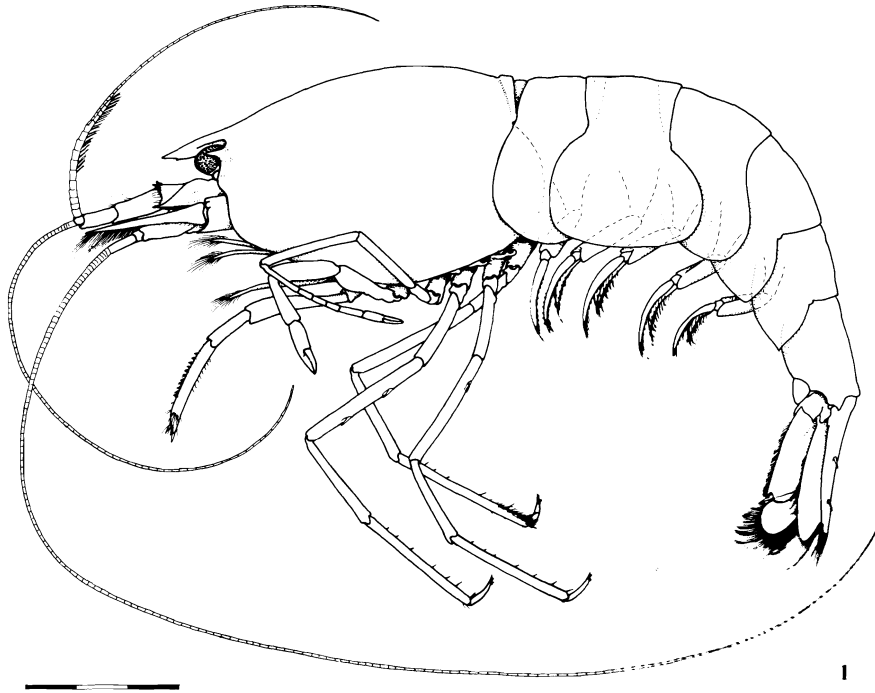


Fig. 1. *Potamalpheops pininsulae* sp. nov., male holotype, Ile des Pins, New Caledonia. Scale bar divisions in millimetres.

deposited in the collections of the National Museum of Natural History, Washington, (USNM 256966), Muséum National d'Histoire Naturelle, Paris (MNHN-Na. 12887), the Nationaal Natuurhistorisch Museum, Leiden, The Netherlands (RMNH D. 42356).

Grotte de la Troisième (Fig. 33) is an anchialine limestone cave located about 2 km inland from the west coast of the Isle of Pines. From a 10 m diameter sink-hole entrance, rubble slopes descend to two interconnected pools having a total surface area of about 100 m². Water level in the pools is about 12 m below the surface of the ground. These clear, still pools are situated in an area of almost total darkness. Water temperature and salinity ranged from 21°C and 1.5‰ at the surface, to 22°C and 11.5‰ at 6 m, the deepest point in the pool. No underwater passages were found extending away from the pool. In shallower water, the bottom is flowstone and rubble, while thick silt is present at deeper depths. The shrimps were found on the bottom, especially in the deeper sections of the lake. Also collected from the cave pool were oculate amphipods from the families Lysianassi-

dae and Melitidae, mysids from the genera *Speleomysis* and *Heteromysoides*, the podocopid ostracod *Kennethia major*, copepods, and anthurid isopods.

The Isle of Pines (Fig. 7) is located 70 km southeast on the main island of Grand Terre. It consists of a central, highly eroded, volcanic plateau with elevations to 260 m. Surrounding this plateau is a ring of uplifted and highly karstified reef limestone. Streams descending the volcanic slopes typically disappear underground upon reaching the limestone. All drainage in limestone areas of the Ile des Pins is subterranean.

Description (CL and carapace length refer to the postorbital carapace length):

Holotype male, carapace length, 5.6 mm; carapace and rostrum, 7.0 mm; total body length (approx.), 19.0 mm. Allotype female, carapace length, 5.0 mm; total body length, 16.5 mm; ovum length, 2.1 mm; width, 1.5 mm.

Largely transparent, with anterior margin of carapace dark red-brown with vague transverse bar across central region, with similar transverse bands

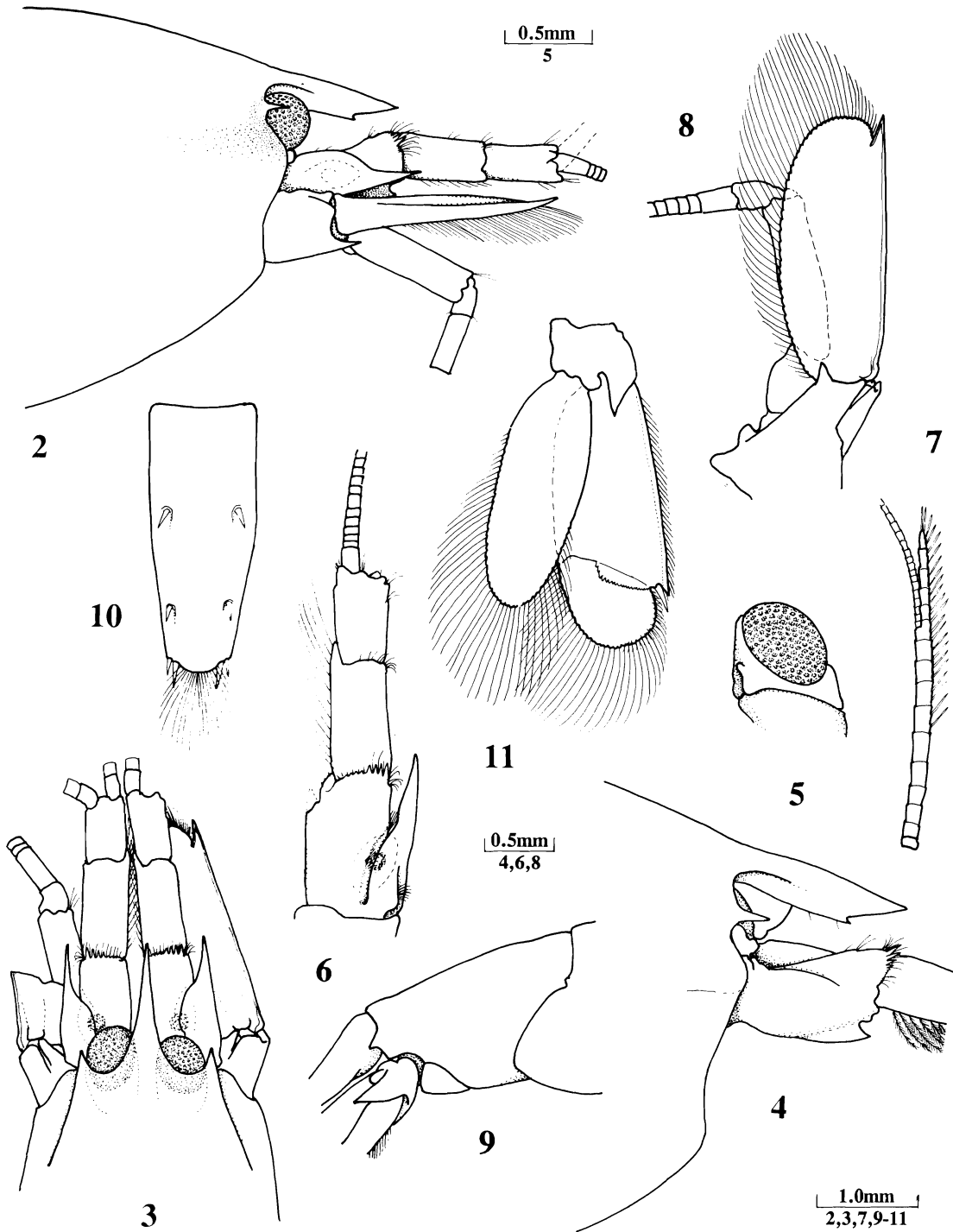


Fig. 2-11. *Potamalpheops pininsulae* sp. nov., male paratype. 2, anterior carapace and appendages, lateral. 3, same, dorsal. 4, anterior carapace and rostrum, right eye and antennae removed. 5, eye, dorsal. 6, antennulae. 7, same, detached upper flagellum. 8, antenna. 9, sixth abdominal segment. 10, telson. 11, uropod.

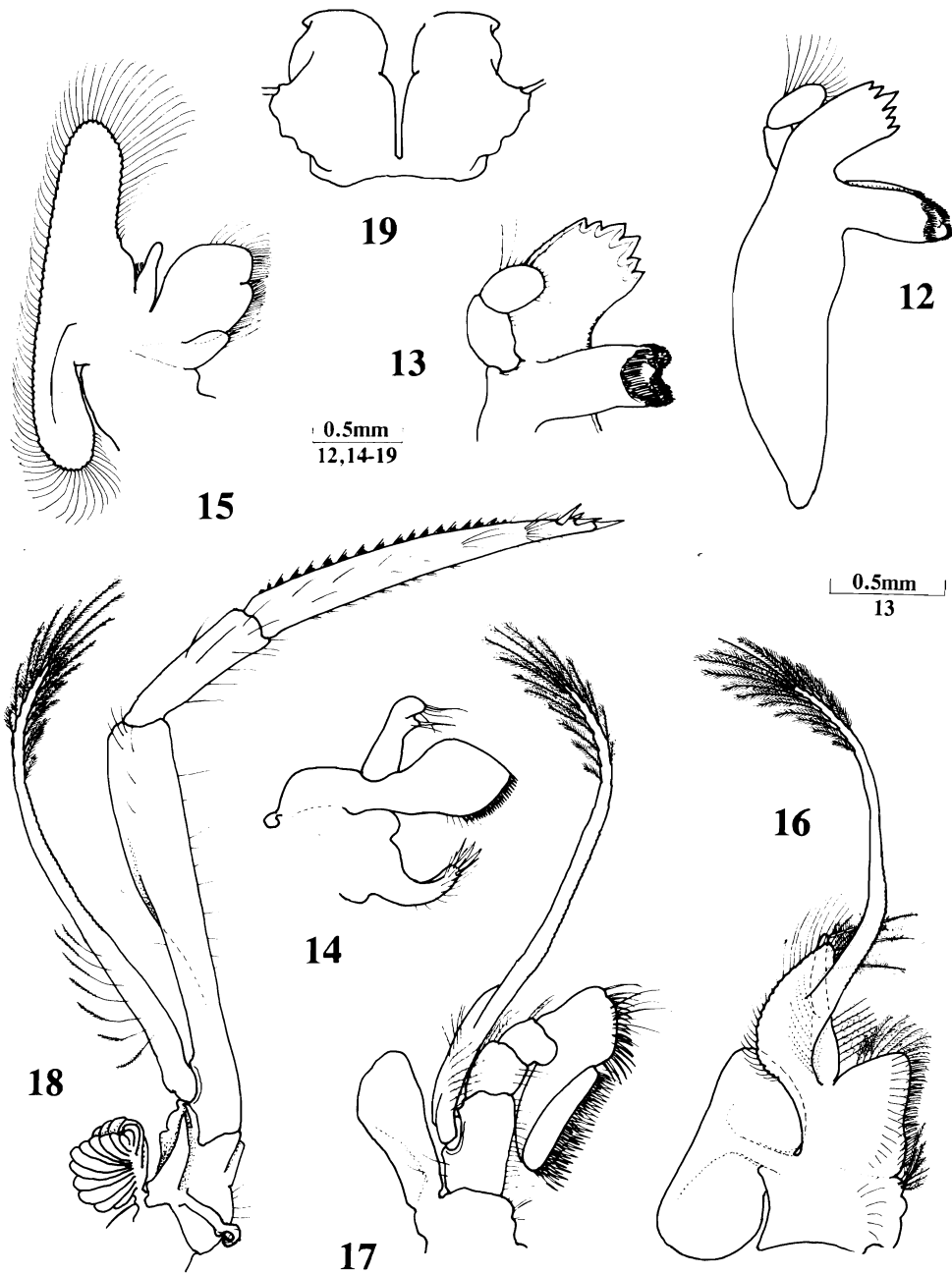


Fig. 12–19. *Potamalpheops pininsulae* sp. nov., male paratype, mouthparts. 12, mandible, 13, same, molar and incisor processes, palp, opposite side. 14, maxillula. 15, maxilla. 16, first maxilliped. 17, second maxilliped. 18, third maxilliped. 19, paragnath.

across anterior and posterior margins of first abdominal segment, and posterior margins of second to sixth segments; medial and lateral margins of antennal peduncle and carapocerite similarly dark red brown; lateral borders of telson and rami of uro-

pods similar, with dark red brown bar across dieresis of exopodite; cornea black, flagella feebly brownish, pereopods transparent (from colour photograph).

Small sized alpheid shrimp of subcylindrical,

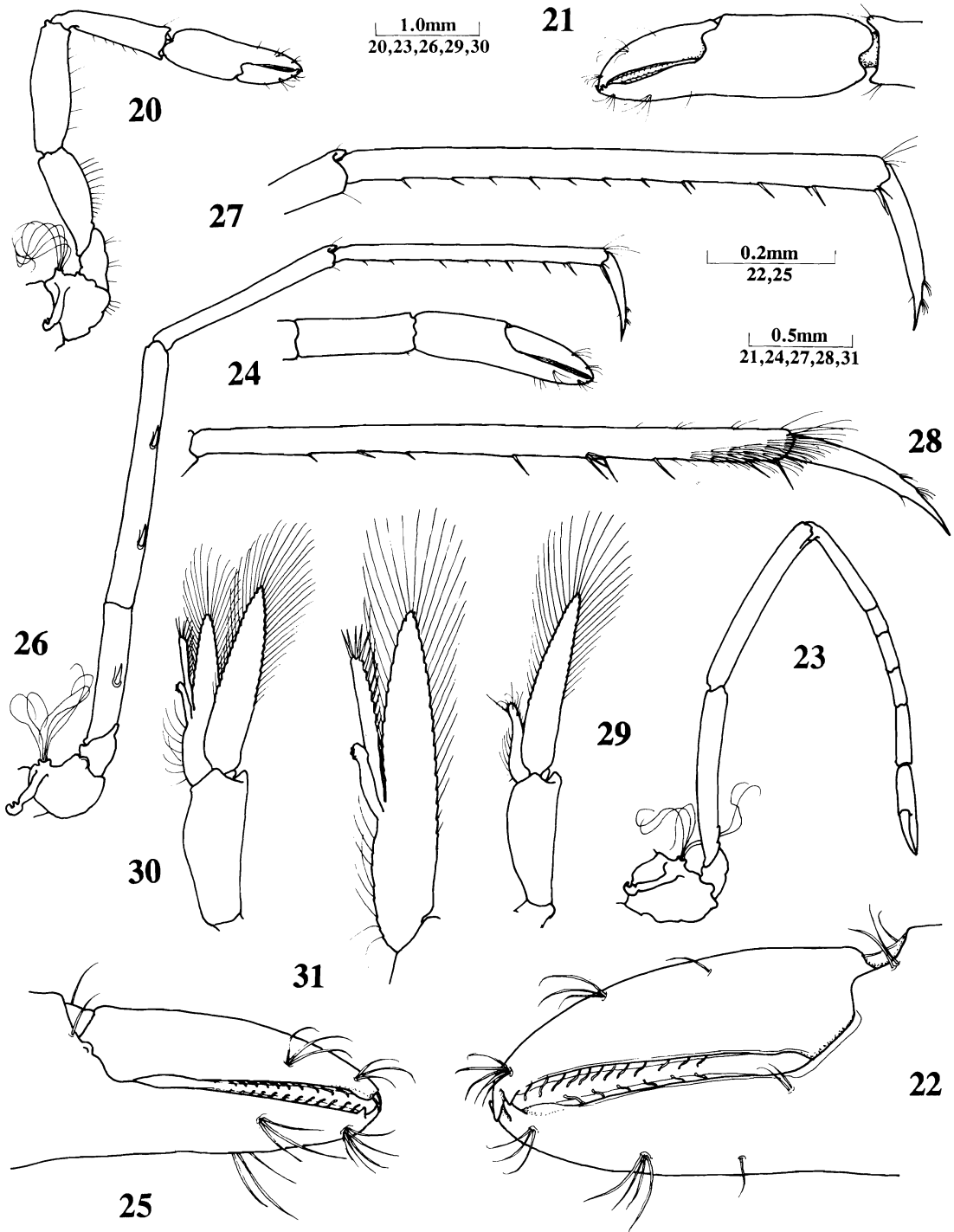


Fig. 20–31. *Potamalpheops pininsulae* sp. nov., male paratype. 20, first pereiopod. 21, same, chela. 22, same, fingers. 23, second pereiopod. 24, same, chela. 25, same, fingers. 26, third pereiopod. 27, same, propod and dactyl. 28, fifth pereiopod, propod and dactyl. 29, first pleopod. 30, second pleopod. 31, same, endopodite.

slightly compressed body form (Fig. 1). Rostrum short, acute, compressed, reaching to about level of distal border of proximal segment of antennular peduncle (Fig. 3), about 2.2 times longer than proximal width, about 0.24 of carapace length, slightly depressed, dorsal margin straight or slightly sinuous (Fig. 4), without carina, unarmed, without setae, ventral border variable, proximally straight, subparallel to dorsal margin, usually with single small acute tooth at 0.75 of length; lateral carinae feebly developed, slightly expanded posteriorly, concealing posterior part of cornea.

Carapace smooth, glabrous; anterolateral region leaving major part of cornea exposed, with strong extracorneal tooth, inferior orbital angle produced, broadly rounded, unarmed; pterygostomial angle bluntly round, non-setose; ventral margin of branchiostegite non-setose; cardiac notch distinct.

Abdomen smooth, glabrous; sixth segment (Fig. 9) about 1.4 times length of fifth, 1.5 times longer than deep, compressed, posterolateral angle acute, posteroventral angle with articulated triangular plate; pleura of first three segments broadly rounded, fourth bluntly rectangular, fifth feebly acute, with small acute posteroventral tooth. Telson (Fig. 10) about 1.3 times sixth segment length, 2.5 times longer than proximal width, lateral margins subparallel proximally, slightly convergent distally, with well developed dorsolateral spines at 0.4 and 0.75 of telson length, about 0.07 of the telson length, posterior margin broad, about 0.6 of anterior width, anal tubercles absent, with two pairs of robust lateral spines (Fig. 43), lateral spines subequal to dorsal spines, median spines about 0.13 of telson length, subventral, curved dorsally (Fig. 44), central posterior margin broadly convex, with about 18 long plumose setae, overlying the medial marginal spines.

Antennule with peduncle robust (Fig. 6), about 0.5 of carapace length; proximal segment about 1.5 times longer than proximal width, distodorsal margin (Fig. 32) finely dentate, with about eight acute teeth, small medially, largest laterally, with well developed distally acute ventromedial carina, statocyst well developed with slender acute stylocerite distinctly exceeding distal margin of proximal segment; intermediate segment subcylindrical, 0.78 of

proximal segment length, 1.8 times longer than proximal width, ventromedial margin with long plumose setae; distal segment subcylindrical, 1.5 times longer than wide, 0.8 of intermediate segment length; upper flagellum (Fig. 7) biramous, with proximal 11 segments fused, shorter free ramus with five segments, about 0.4 of fused portion length, with about 22 groups of short rigid aesthetascs, longer free ramus about 1.15 of carapace length, 3.5 times fused portion length.

Antenna with stout basicerite (Fig. 8), with acute ventrolateral tooth, carpocerite robust, extending to about 0.75 of scaphocerite length, subcylindrical, about 3.7 times longer than wide, flagellum long, slender, about 4.5 times carapace length, proximal segments not thickened, scaphocerite well developed, extending to about middle length of distal segment of antennular peduncle, about 2.4 times longer than central width, greatest width at about 0.5 of length, broadly rounded distally, lateral margin straight, with strong acute tooth distally (Fig. 33), slightly exceeding anterior margin of lamella.

Eye with oval oblique cornea (Fig. 5), less than hemispherical, with facets, irregularly pigmented, stalk short, medially flattened, with ventromedial boss articulating against knob on ophthalmic somite (bec ocellaire?), devoid of setae medially.

Epistomal region normal, with anteromedian carina, labrum not protuberant. Right mouthparts dissected. Mandible with corpus robust, with 2-segmented palp (Fig. 13), distal segment oval (Fig. 36), compressed, with about 20 plumose marginal setae, several submarginal setae, proximal segment subcylindrical, with 3 distomedial plumose setae, molar process stout (Fig. 34), subcylindrical, distally truncate, with 2 low processes, surfaces squamate, densely fringed by bands of microspinules; incisor process (Fig. 35) well developed, broad, distally truncate, with 6 acute teeth, lateral tooth of central pair enlarged; left mandible similar, molar process with scoop-like ventral process, fringed with small spines, incisor process with both central pair of teeth enlarged. Maxillula (Fig. 14) with slender bilobed palp (Fig. 37), distal lobe larger than proximal, with 4 slender setae, lower lobe with 1 spiniform seta, 1 simple seta; upper lacinia

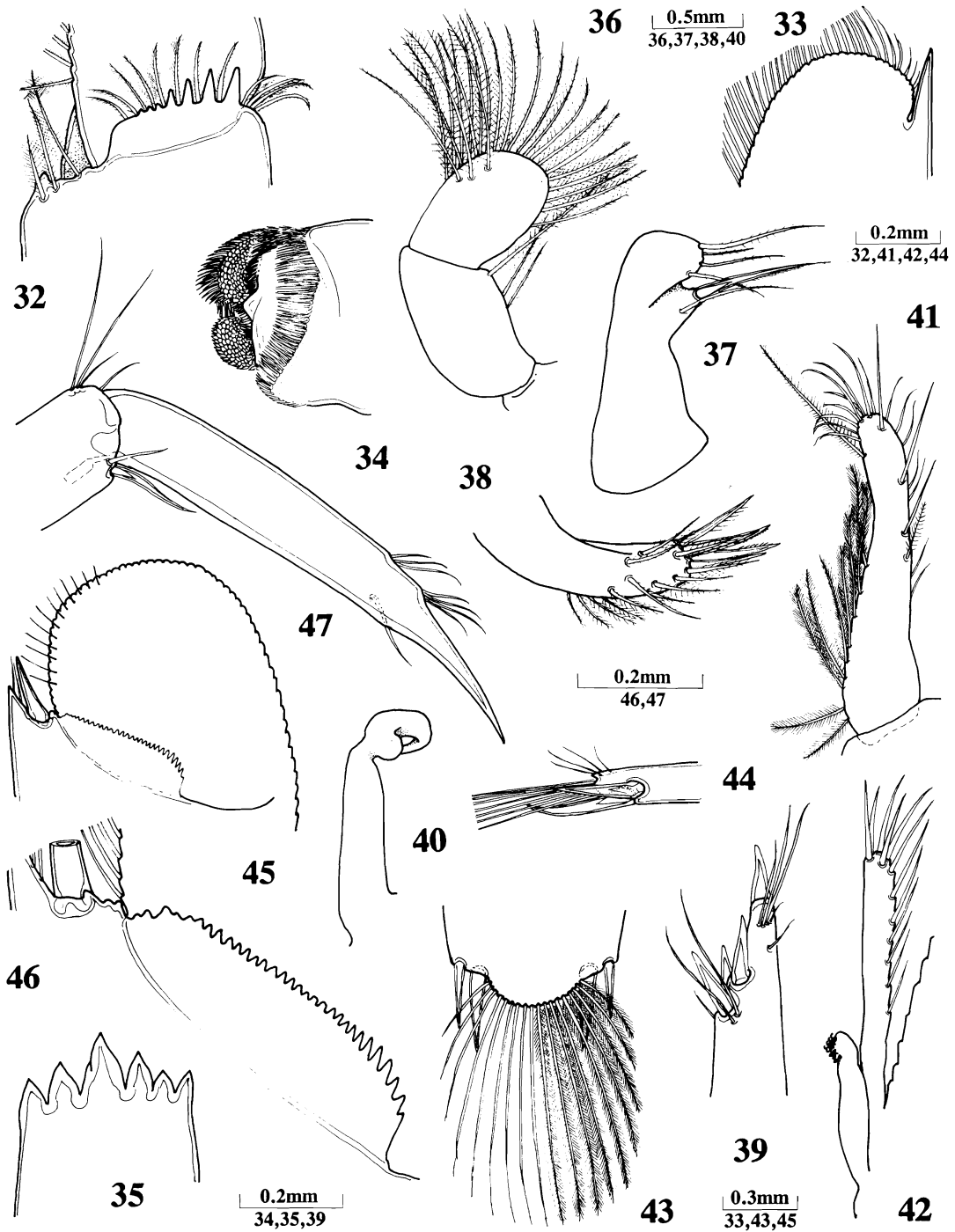


Fig. 32–47. Potamalpheops pininsulae sp. nov., male paratype. 32, antennular peduncle, distodorsal margin of proximal segment. 33, distal scaphocerite. 34, mandible, molar process. 35, same, incisor process. 36, same, palp. 37, maxillula, palp. 38, same, lower lacinia. 39, third maxilliped, tip of distal segment of endopodite. 40, same, epipodite. 41, first pleopod, endopodite. 42, second pleopod, appendices interna and masculina. 43, telson, posterior margin, dorsal. 44, same, right lateral. 45, uropod, distal exopodite. 46, same, diaeresis. 47, third pereopod, dactyl.

broad, distally truncate, with dense double row of short acute spines; lower lacinia (Fig. 38) subcylindrical, with 3 stout spines terminally, numerous feebly plumose setae. Maxilla (Fig. 15) with short stout palp, with few very short setae proximolaterally; basal endite broad, with feeble indications of division into 2 lobes, with dense short simple marginal setae medially, coxal endite feebly developed, sparsely setose medially; scaphognathite normal, about 3.75 times longer than wide, posterior lobe slender, about 1.7 times longer than wide, anterior lobe about 1.9 times longer than wide, distally narrowed, medial border excavate. First maxilliped (Fig. 16) with elongate, slender, feebly tapering palp exceeding distal margin of caridean lobe, with 3 long robust plumose distomedial setae, with 7 shorter slender plumose setae proximomedially, basal endite broad, angular, medial margin sinuous, densely setose, with short setulose setae, coxal endite distinct, medially thickened, feebly trilobed, sparsely setose; exopodite well developed, with flagellum distally slender, with numerous plumose setae distally, caridean lobe small, narrow; epipod large, oval. Second maxilliped (Fig. 17) with normal endopodite, dactylar segment narrow, with medial ventral marginal row of short, regular, uniform peg-like biserrate spines, with numerous rows of longer densely serrulate spines dorsally, propodal segment with distal margin expanded, distomedial margin with about 12 sparsely setulose spines, with several slender setae, coxa with ventromedial margin broadly rounded, ischiomerus feebly setose medially, basis with numerous medial setae; exopodite well developed, as in first maxilliped, flagellum with narrow elongate setose lateral lamella proximally; epipod large, simple, elongate, slightly expanded distally, without podobranch. Third maxilliped (Fig. 18) with slender endopodite extending to about end of antennular peduncle; ischiomerus completely fused to basis, subcylindrical, slightly swollen distally, compressed proximally, 7.0 times longer than broad, penultimate segment about 0.37 of proximal segment length, subcylindrical, slightly expanded distally, sparsely setose; distal segment about 0.85 of proximal segment length, 7.6 times longer than proximal width, subcylindrical, tapering distally, terminally obli-

quely truncate with 4 stout spines (Fig. 39), medial surface with about 18 transverse rows of short serrulate spines, lateral surface sparsely setose; exopodite similar to second maxilliped without proximal lateral lamella, with 7 plumose lateral setae; coxa robust, sparsely setose medially, lateral plate well developed, distolaterally acute, with hooked strap-like epipod (Fig. 40), small well developed arthrobranch. Paragnaths (Fig. 19) deeply bilobed, rounded distal lobe with small lateral angle.

Thoracic sternites narrow, without special armament, posterolateral region of anterior thoracic sternites with transverse angular plate, larger on fourth segment, decreasing in size on posterior segments, fifth and sixth segments with short longitudinal median carina anteriorly, absent on posterior segments.

First pereopods (Fig. 20) similar in male and female, small, subequal, similar, extending to about 0.5 of length of proximal segment of antennular peduncle; chela (Fig. 21) small, about 0.2 of carapace length, palm subcylindrical, moderately compressed, about 2.0 times longer than deep, smooth, fingers (Fig. 22) robust, about 0.7 of palm length, dactyl about 3.7 times longer than proximal depth, tapering, distally bidentate, cutting edge sharp, simple, slightly laterally situated, with numerous short peg-like setae, fixed finger similar; carpus about 0.8 of chela length, 3.7 times longer than distal width, feebly expanded distally, unarmed; merus about 0.95 of chela length, 3.0 times longer than central width, feebly expanded centrally, compressed, sparsely setose ventrally; ischium subequal to carpal length, 2.6 times longer than central width, ventral border convex, setose, unarmed; coxa robust, unarmed, with 5-setose setobranch dorsally, strap-like epipod laterally.

Second pereopods (Fig. 23) slender, subequal, similar, extending to about end of antennular peduncle; chela (Fig. 24) small, about 0.6 of first chela length, palm subcylindrical, moderately compressed, about 2.0 times longer than deep, fingers (Fig. 25) subequal to palm length, dactyl about 4.0 times longer than proximal depth, tapering to slender tip with two short stout articulated spines, cutting edge entire, slightly laterally situated with

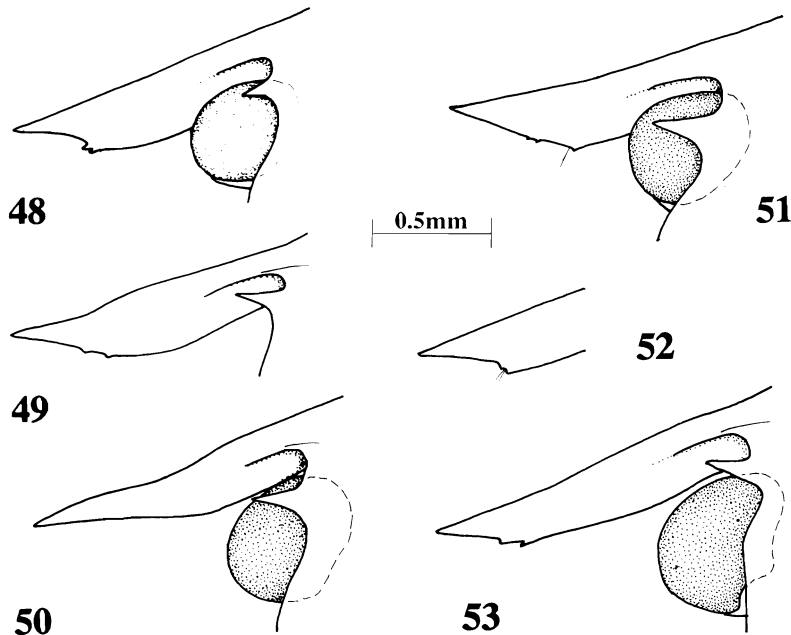


Fig. 48–53. *Potamalpheops pininsulae* sp. nov., rostral variations. 48–50, females, CL 5.7, 5.2, 5.3 mm. 51–53, males, CL 5.0, 4.4, 4.75 mm.

numerous short peg-like setae, fixed finger similar, distally bidentate, with non-articulated teeth; carpus slender, 5-segmented, about 3.0 times chela length, segments in ratio 21:6:7:6:10, first segment about 1.2 of chela length; merus about 0.75 of carpal length, 9.2 times longer than wide, uniform, slightly bowed, unarmed; ischium subequal to meral length, 8.0 times longer than distal width, slightly tapered proximally, unarmed; basis normal; coxa robust, with 5-setose setobranche dorsally and strap-like epipod laterally.

Ambulatory pereiopods slender; third pereiopod (Fig. 26) reaching to beyond antennular peduncle by dactyl and 0.75 of propod, dactyl (Fig. 47) slender, simple, compressed, without distinct unguis, about 7.5 times longer than proximal depth, about 0.3 of propod length, with 2 small groups of short simple setae distodorsally, single seta distomedially; propod (Fig. 27) about 0.5 of carapace length, 27.0 times longer than central depth, subuniform, with 1 long very acute distroventral spine, 10 shorter ventral spines, sparse short ventromedial spines, sparsely setose; carpus about 0.7 of propod length, 8.5 times longer than distal width, with

small distodorsal lobe, unarmed; merus subequal to propod length, about 8.5 times longer than deep, uniform, with 2 strong mobile ventrolateral spines at 0.25 and 0.6 of length; ischium about 0.45 of meral length, 4.6 times longer than distal width, with 1 strong mobile ventrolateral spine; basis normal, without exopodite; coxa robust with 6-setose setobranche dorsally, strap-like epipod laterally. Fourth pereiopod similar to third. Fifth pereiopod with propod (Fig. 28) about 1.1 times third propod length, dactyl 0.3 of propod length, merus with 1 mobile ventrolateral spine proximally; ischium unarmed; basis normal; coxa with setobranche; without epipod.

Abdominal sternites with narrow transverse ridge posterior to pleopods, unarmed. Anal tubercles absent.

Pleopods normal; basipodites (Fig. 29, 30) without lamellar medial expansions. Male with endopodite (Fig. 41) of first pleopod about 0.45 of exopodite length, about 4.25 times longer than proximal width, tapering distally, feebly curved medially, apex rounded, distal 0.6 of lateral margin with 14 short simple setae, with 6 longer dorsal subla-

teral setae, simple, except first, feebly setulose; distomedial margin with 1 long preterminal plumose seta; proximal 0.5 of medial margin with 10 densely plumose setae. Second male pleopod (Fig. 30) with endopodite about 0.9 of exopodite length, 5.0 times longer than proximal width, with appendices (Fig. 31) at about 0.4 of length; appendix masculina (Fig. 42) subcylindrical, about 0.45 of endopodite length, 8.0 times longer than distal width, with 5 short simple spines distally, 7 simple spines of proximally decreasing length along lateral margin; appendix interna (Fig. 42) reaching to about 0.4 of appendix masculina length, with few distal cincinnuli.

Uropod (Fig. 11) with protopodite bearing large acute distodorsal lobe, rami slightly exceeding posterior telson margin; exopodite 2.5 times longer than wide, greatest width at 0.5 of length, lateral margin straight, with well developed submarginal setal fringe laterally, with small acute distal tooth with larger mobile spine medially, diaeresis (Fig. 45) well developed with dentate dorsal flange laterally, extending across about 0.65 of width, with about 32 small teeth (Fig. 46), blunter, smaller, more irregular laterally, more acute, larger, more regular laterally, distal lamella broadly rounded, highly flexible, with short simple spiniform setae proximo-laterally, otherwise with long densely plumose marginal setae; endopodite about 0.9 of exopodite length, 2.8 times longer than wide.

Ova few, about 12.

Variations. —The ovigerous female allotype lacked the distal rostrum and several other specimens also had damaged rostra. Most specimens in which the rostrum was intact had only a single small acute ventral tooth present, but some specimens (Figs. 48–53) were without any trace of a ventral tooth and others had two or even three minute teeth (Fig. 51), and in some specimens a few short isolated simple setae were present.

The ambulatory pereiopods also showed some variation in the ischio-meral spinulation. Many are detached and cannot be attributed to individual specimens. The “normal” complement appears to be 2 spines in the merus and 1 spine on the ischium of the third and fourth pereiopods, with 1 spine on

the merus and no spines on the ischium of the fifth pereiopod.

Etymology. —From *pinus*, pine tree (Latin), and *insula*, an island (Latin), from the locality of capture.

Systematic position. —The six presently known species of *Potamalpheops* fall into two groups, (1) with one pair of posterior telson spines only, and (2) with two pairs of posterior telson spines. The latter group includes *P. stygicola* (Hobbs, 1983). The former group, with two species only, *P. haugi* (Coutière, 1906) and *P. pylorus* (Powell, 1979), is also characterized by the position of large robust chelae on the first pereiopods, carried in a flexed position, which contrasts strongly with the second group, in which these chelae are feebly developed and not carried in a flexed position. *Potamalpheops pininsulae* sp. nov., clearly belongs to the second group and appears most closely related to *P. hanleyi* Bruce, 1991a.

Potamalpheops pininsulae sp. nov., may be most easily distinguished from *P. hanleyi*, and all other species of the genus, by its much longer rostrum, very acute in dorsal view, and reaching far beyond the anterior corneal margin and also beyond the distal margin of the proximal segment of the antennular peduncle, with typically, a small acute ventral tooth. In all other species of the genus, the ventral rostral margin is unarmed and the rostrum is much shorter, barely if at all exceeding the anterior corneal margin. Other differences from *P. hanleyi* shown by *P. pininsulae* are: the inferior orbital angle of the carapace is less produced; the pterygostomial angle is more broadly rounded and devoid of marginal setae; the antennular peduncle is less stout, with a less strongly developed ventromedial carina on the proximal segment; the distal dorsomedial margin of the proximal segment of the antennular peduncle is more strongly dentate; the stylocerite distinctly exceeds the distal margin of the proximal segment; the scaphocerite is 2.5 times longer than broad with the greatest width at about 0.5 of the length, instead of 2.0 times the greatest width proximally; the third maxilliped has the tip of the endopodite with four stout spines, instead of

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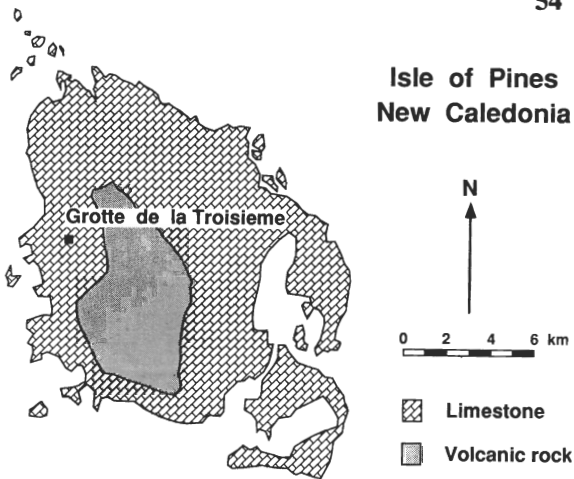


Fig. 54. Map of the Isle of Pines, New Caledonia, showing the location of the Grotte de la Troisième.

three; the first pereiopod has the chela length subequal to the carpus, instead of distinctly longer; the second pereiopod carpus has the proximal segment considerably longer than the chela, instead of shorter; ambulatory pereiopods with propods much more slender, with stronger spines; endopodite of male first pleopod much more densely setose, of second pleopod with appendices arising proximal to 0.5 of length, as opposed to distally, with twelve distolateral spines as opposed to four terminal spines; exopodite of uropod with dieresis bearing about 30 distolateral denticles, instead of less than 20, with distolateral spine much less robust; telson with shorter, more numerous posterior marginal setae, about 18 instead of 6, and lacking anal tubercles.

Discussion. —*Potamalpheops stygicola* occurs in freshwater caves in Mexico (Hobbs, 1973, 1983), and shows more marked specialization to its habitat than *P. pininsulæ*, which is closely related to other estuarine or brackish water Atlantic and Indo-West Pacific species, and is found in anchialine water of 1.5–11.5% salinity. In *P. stygicola* the rostrum is much more strongly reduced and the eyes are greatly reduced, with marked reduction and depigmentation of the cornea, and the complete loss of spines from the ambulatory pereiopods. The mouthparts

of the two species are essentially very similar in the two species, but in *P. pininsulæ* the incisor process is more strongly dentate and the basal endite of the maxilla is distinctly, if feebly, bilobed instead of entire. The most striking difference between the two species is the complete absence in *P. pininsulæ*, of the remarkable longitudinal hepatico-branchiostegal groove found on the carapace of *P. stygicola*.

The undeveloped ova of *P. pininsulæ*, at 1.0×0.8 mm, are of distinctly larger size than the ova of *P. monodi*, *P. haugi* and *P. pylorus*, at ca. 0.6×0.4 mm, which suggests that larval development may be abbreviated (Powell, 1979). This is further supported by the small number of ova. The dimensions of the ova of *P. hanleyi* and *P. stygicola* are as yet unknown. Powell (1979) commented on the low proportion of ovigerous females in his sample of *P. monodi* (3:15) with a high ratio of males to females (40:15). In the present sample of *P. pininsulæ* only a single ovigerous female is present. In the original sample of 20 specimens, with 11 females, there were no ovigerous females of *P. stygicola* (Hobbs, 1973).

A key to the species of the genus *Potamalpheops* was provided by Bruce (1991a). *P. pininsulæ* can be readily included in this key by the modification of the final couplet, as follows:—

4. Rostrum well developed, distinctly exceeding anterior corneal margin and anterior margin of proximal segment of antennular peduncle, typically with single small acute ventral tooth *P. pininsulæ* sp. nov.
- Rostrum feebly developed, scarcely exceeding anterior margin of cornea, not exceeding anterior margin of proximal segment of antennular peduncle, unarmed 5
5. Carpus of first pereiopod longer than palm; convex posterior margin of telson about 0.65 of posterior margin width; intermediate segment of antennular peduncle longer than proximal *P. monodi* (Sollaud, 1932)
- Carpus of first pereiopod shorter than palm; convex posterior margin of telson about 0.33 of posterior margin width; intermediate segment of antennular peduncle shorter than proximal *P. hanleyi* Bruce, 1991a

Although, other than *P. stygicola*, no alpheid shrimps have been reported from limestone caves, one other species has recently been reported from a related habitat: *Hamalpheops acanthops* has been

reported from coastal lava tubes on Samoa (Bruce, 1991).

Acknowledgements

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