Pacific Insects 9 (4): 693–708 20 November 1967

ABYSSAL HALACARIDAE (Acari) FROM THE SOUTHEAST PACIFIC[1]

By Irwin M. Newell[2]

Abstract: *Thalassarachna bandyi* n. sp., *T. humboldti* n. sp., and *Copidognathus bruuni* n. sp. from the SE Pacific are described. The 3 species were taken during cruise 17 of the ANTON BRUUN, at depths between 3680 to 4100 meters, 3 times the depth at which Halacaridae have been previously collected. The mites show marked structural differences from species found in shallow waters and the intertidal zone; these differences appear to be related to the absence of light, the absence of wave action, and the softness of the bottom.

The Halacaridae are the most diverse family, ecologically, in all the Acari. Their biological plasticity has enabled them to invade habitats not only in salt water, but also fresh water lakes, streams, and springs, as well as interstitial and cavernicolous habitats in fresh and saline waters. There are phytophagous forms, and carnivorous forms, and among the latter are predators, parasites, and probably scavengers. Of the animal parasites, there are both external and internal parasites on a wide variety of hosts. Without exception, no other group of Acari accorded the rank of family has such a range of habit and habitat. This wide range is no statistical accident, but a reflection of an evolutionary versatility unequaled by any other family of organisms.

The majority of the Halacaridae have been recorded from intertidal or shallow subtidal habitats, and even above sea level, including perhaps the highest mountain springs occupied by living animals. It is perhaps not surprising that a group as labile as the Halacaridae should invade the oceans to considerable depths, but with one exception, published reports on the occurrence of Halacaridae in deeper waters of the oceans are non-existent. The absence of reports, however, is scarcely convincing proof of the non-existence of marine mites at great depths. It is just as likely that the absence of reports is a reflection of technical difficulties of recovery of mites from bottom samples of deep sea origin.

The greatest depth at which Halacaridae have been recorded previously was reported by Trouessart (1896). Several species were listed from depths of 400 to 1400 meters in the Bay of Biscay. The forms recorded were: *Agaue abyssorum* (Trouessart) 1896 (=*Halacarus a.*), *Arhodeoporus gracilipes* (Trt.) 1889 (=*Halacarus g.*), *Copidognathus oculatus* (Hodge) 1863 (=*Halacarus o.*), *Agauopsis aculeata* (Trouessart) 1896 (=*Agaue a.*), *Atelopsalis tricuspis* Trouessart 1896, and *Coloboceras koehleri* Trouessart 1896, a total of six species

1. This study was supported by a grant (GB-5027) from the National Science Foundation to the University of California, Riverside.

2. Department of Life Sciences, University of California, Riverside, 92502.

in six genera. Certain of these, in particular *Agauopsis aculeata* and *Coloboceras koehleri* showed evidence of being especially modified by evolution at considerable depths in the ocean.

The German South Polar Expedition of 1901–1903 reported 15 species at a depth of 380 meters at the winter station of the expedition off the coast of Kaiser Wilhelm II Land (Lohmann 1907, Gimbel 1919). Viets (1938) reported an intestinal parasite (*Enterohalacarus minutipalpus* Viets) from a deep sea urchin, *Plesiodiadema indicum* (Döderlein), taken at a depth of 421 meters off the west coast of Halmahera I., Strait of Molucca.

For many years, I have felt that lack of reports of Halacaridae from collections made at depths greater than 1400 meters was due more to the lack of suitable collecting techniques than to their real absence from such depths. The opportunity to test this hypothesis came in 1966, when I was invited by Orville Bandy to participate in Cruise 17 of the ANTON BRUUN off the west coast of Peru and Chile. During this cruise, collections were made at many stations and depths. One of these collections was especially significant from the standpoint of the vertical distribution of the Halacaridae. At station 678E, at a log depth of 3680 to 4100 meters, eight specimens of Halacaridae were captured. These belonged to no fewer than three species in two genera. This is three times the depth at which Halacaridae have been reported previously. The exceptional structural modifications found in these species and the faunal diversity in this small sample leave little doubt that Halacaridae are capable of adapting themselves to even greater depths. Possibly they extend into the hadal zone or even to the bottoms of the deepest oceanic trenches.

While the species recorded from this one deep station are exceptional structurally, they show no characteristics which would require the establishment of new genera. Certain characters, in particular the long legs, reduction of the pecten of the claws, and the ocular plate, and the total absence of corneae are unquestionably correlated with the great depth, absence of light and the soft nature of the sediments there. The extreme projection of the anal papilla (*Copidognathus bruuni*) and of the genital papilla (*Thalassarachna bandyi*) and the presence of two pairs of setae on the anal sclerites (*Copidognathus bruuni* and *Thalassarachna humboldti*) are so exceptional in the Halacaridae as to require special notice. In one way or another, these probably represent modifications related to the soft nature of the bottom sediments or the depth.

The three new species are given patronyms: *Thalassarachna bandyi* new species for Orville Bandy, Chief Scientist of Cruise 17 of the ANTON BRUUN, Southeastern Pacific Biological Oceanographic Program; *Copidognathus bruuni* new species for the late Anton Bruun, and the ship named in his honor; and *Thalassarachna humboldti* new species, for Alexander von Humboldt, whose scientific genius led to many discoveries including the identification of the Humboldt (or Peru) Current and the elucidation of its effects on the climate of the west coast of South America.

Trouessart's records extended the potential area of the world oceans occupied by the Halacaridae from virtually sea level to 625,000 square kilometers; the collections made from the ANTON BRUUN extend this to 3,242,187 square kilometers, or an increase of roughly five times. Approximately 58% of the area of world oceans is thus potentially inhabited by Halacaridae. (Based on hypsographic chart and data, Lyman 1962). Factorial increases in the efficiency of deep sea collecting are absolutely essential, however, to convert this new potential into knowledge about the Halacaridae occupying the deeper parts of the ocean. For one thing, their distribution is undoubtedly not uniform; there must be localized centers of concentration, probably related to bottom conditions. Some species are probably more or less restricted to isolated patches of hard bottom or to scattered patches of hard organisms which provide a substrate for the Halacaridae. It would appear, however, *Thalassarachna bandyi* and *Copidognathus bruuni* are definitely soft-bottom forms, and this is an essential prerequisite for the success of any benthonic species which is to succeed in invading the deep ocean basins.

Station 678E (29°22′ S. latitude, 80°00′ W. longitude) is roughly midway between San Felix and Juan Fernandez Islands, and approximately 700 km west of the coast of Chile. The sample at Station 678E was collected in a Riedl Dredge with a finer net sewn into the cod end of the 500 μ mesh bag. The change in depth during the dredging operation indicated a rather rapid shelving. The bottom was a red clay with some volcanic ash. Manganese nodules were present (rock dredge sample). Unfortunately, the camera was not used at this particular station because of a dwindling battery supply (Bandy, 1967, and personal communication), so that the only information available concerning bottom conditions is that which can be inferred from the samples obtained. In addition to the Halacaridae, the sample contained a few (1-10 each) ostracods, copepods and nematodes, many sponge spicules and numerous hydroid fragments, and Foraminifera. No annelids or isopods were seen.

The illustrations for this paper were prepared by Margaret Anne Dornay. In the scales for the figures, each small division represents 10 μ, so that a scale with 3 divisions represents 30 μ, etc. The only exceptions are in the case of figures 1, and 18 in which the scale is 500 μ long; these scales are drawn with a double base line.

Notes on Terminology

The abbreviations used here are those which I have employed in previous papers on the Halacaridae: AD=anterodorsal plate, AE=anterior epimeral plate, GA=genitoanal plate, OC=ocular plates, PD=posterodorsal plate, PE=posterior epimeral plates, tr= trochanter, bf=basifemur, tf=telofemur, pa=patella, ti=tibia, ta=tarsus.

Extensive study in other families of mites has given me greater insight into the nature of the specialized setae on the tarsi of Halacaridae. The seta which I (1947) called the bacillum is a solenidion, and the term bacillum should be dropped. The prebacillum is probably the famulus. The *parambulacral setae* are either eupathidia or modified eupathidia. Since they occur in a variety of forms, the term parambulacral setae should be retained for that cluster of eupathidia or their homologues at the sides of the ambulacrum. If the seta is hollow throughout, thin walled, and with a rounded tip (or with a minute "probe" at the tip), it is called a *eupathid.* If only the basal half or so is hollow, beyond which the shaft tapers to a sharp or sharply rounded tip it is called a *hemieupathid* (new term). If the seta is solid throughout its length, except possibly for a very minute basal lumen 0.2 or less of the length of the seta, it is called a *proeupathid* (new term). Note that the terms hemieupathid and proeupathid are used *only* for setae which unquestionably occupy positions otherwise occupied by typical eupathidia. Thus, setae on the proximal segments of the legs would never be designated by these terms, even if they agreed with the structural definitions of the terms. *Both* structural and positional qualifications must be met.

In earlier works, I have used the expression "divaricate parambulacral setae" to describe the condition in which 2 eupathidia arise from a common alveolar area. However, this leads to difficulties and inconsistencies in certain cases, and it should be dropped. The new term *doublet* is introduced here to replace it. In *Thalassarachna* and *Agaue*, *triplet* groupings of parambulacral setae are fairly common, and even up to 7 or 8 eupathidia may arise from a common alveolar area. Each shaft must be considered an individual seta, for good morphological reasons.

The *fossary setae* (new term) are the 3 setae characteristically grouped around the claw fossa. It may appear strange to introduce this term in descriptions of abyssal Halacaridae, in which the claw fossa is totally absent, but the setae are present and the term is very useful.

The *ovipositor index* (new term) is the interval between the anterior end of the ovipositor and the anterior border of the genital foramen, divided by the length of the genital foramen.

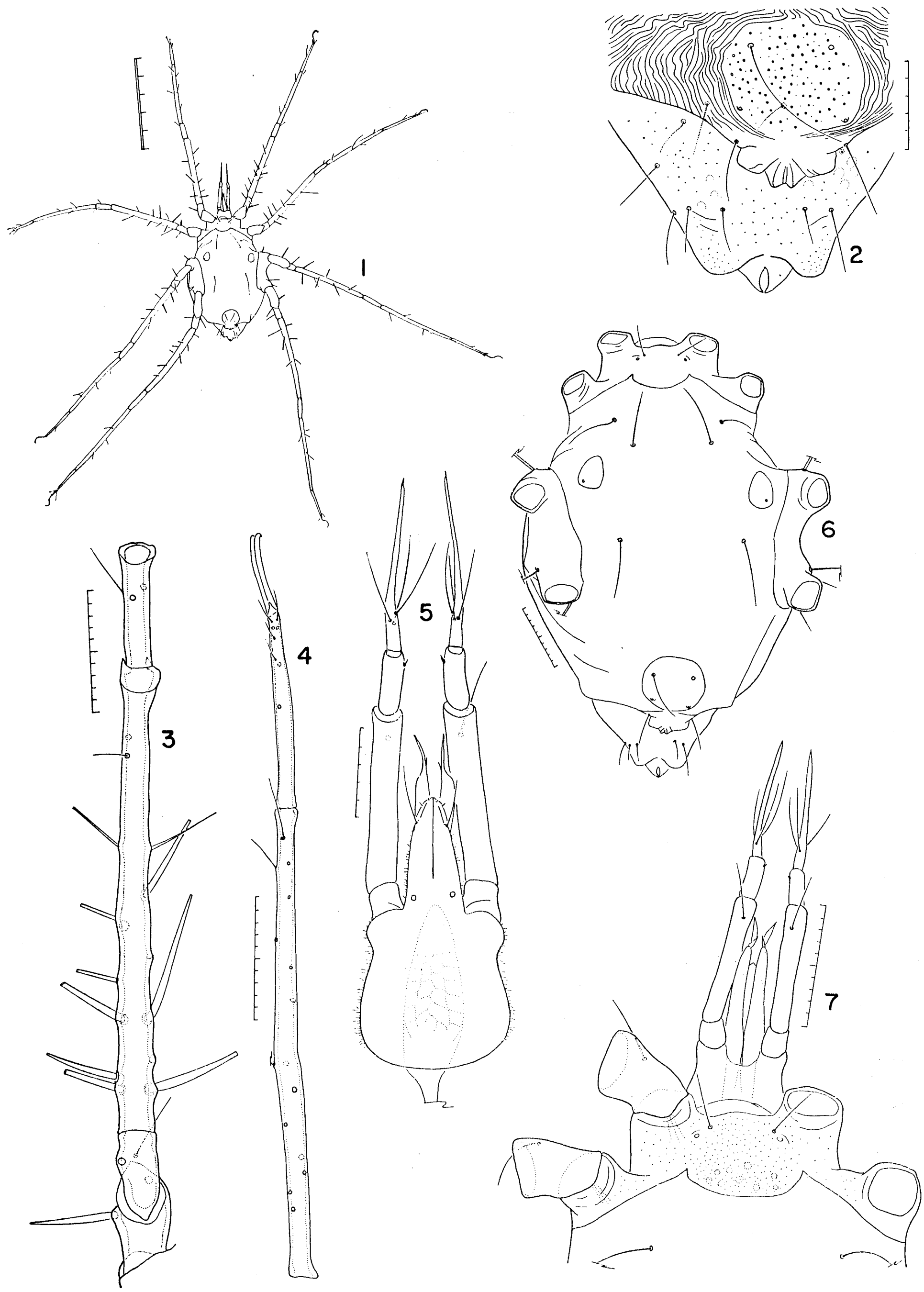
The *genital foramen* (Newell 1967) is the elliptical or subcircular opening within which are included the genital sclerites, associated membranous cuticle, the endogenital setae, genital acetabula and related structures.

The decimal system of noting positions of setae or other structures on the plates always assumes that the anteromedian point on the plate is 0.00, and the posteromedian point is 1.00, even though there may be lateral extensions of the plates which lie anterior or posterior to these points. There are good reasons for this, based on experience in a number of families, and it seems preferable to adopt a standard usage. Apparent inconsistencies can be resolved by using negative values for positions anterior to 0.00 and values greater than 1 for positions posterior to 1.00 (see Newell & Ryckman 1966 for the application of this convention in the Pterygosomidae).

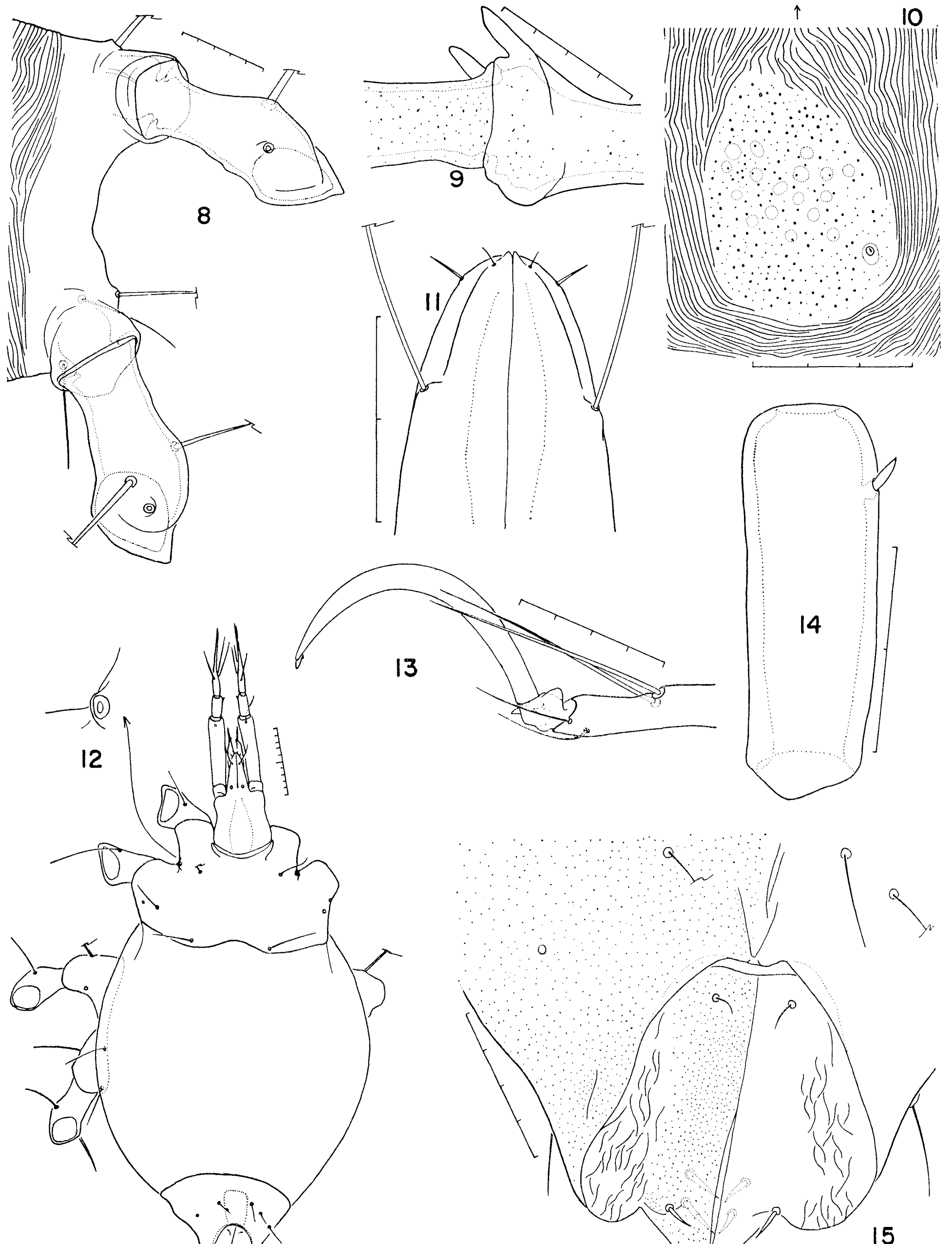
Superscripts indicate the number of cases; right and left sides of one specimen may constitute 2 cases.

Thalassarachna bandyi Newell, new species Figs. 1–17.

♀. Idiosoma 648 μ long to center of margin of AD, 461 μ wide between widest points on PE (L/W 1.41). Dorsal plates widely separated, probably in part due to maturity of individual, but also due to real reductions in relative size of AD and PD. AD broadly fused to AE laterally. Setae of AD far forward, at .19. Concave bulge between AD and gnathosoma in fig. 6 represents the membranous cuticle joining idiosoma to gnathosoma. All dorsal setae between sclerites arise directly from striated membranous cuticle, not from setigerous sclerites. Third dorsal setae very long, 104 μ^1. Legs I and II very slender and long, arising from large coxal protuberances (figs. 1, 6, 7, 12). OC very small, only 52–57 μ^2 long, delimited only by a change in cuticular texture (fig. 10), faintly marked with cuticular canals and internal panels. Corneae totally absent; a pore near posterolateral margin. PD greatly reduced, a single pair of setae longer than plate, and a pair of pores near posterolateral margins (fig. 2). PD and anal papilla feebly joined medially.



Figs. 1–7. *Thalassarachna bandyi* n. sp., ♀. 1, dorsum; 2, PD and GA, dorsal; 3, tr-pa III, left, anteroventral; 4, ti-ta III, left, anteroventral; 5, gnathosoma, ventral; 6, idiosoma, dorsal; 7, propodosoma and gnathosoma, dorsal.



Figs. 8-15. *Thalassarachna bandyi* n. sp., ♀. 8, PE and tr III, IV, right, dorsal; 9, junction of tf and pa IV, left, anteroventral; 10, OC, right; 11, tip of rostrum, ventral; 12, venter; 13, tip of ta IV, right, anteroventral; 14, pa of palp; 15, genital area.

Anal papilla with a pair of long, slender adanal setae, overlying the much larger genital papilla which has 5 or 6 setae dorsally (fig. 2).

AE with 4 pairs of ventral setae, and a minute epimeral pore in angle between coxal prominences (fig. 12). Membranous cuticle of hysterosoma swollen, bag-like. GA strikingly modified, with a prominent genital papilla extending well beyond anal papilla (figs. 2, 12). First pair of perigenital setae at .30, anterior margin of genital foramen at .46; a total of 10 perigenital setae, 4 on one side, 6 on the other. Genital sclerites with 2 pairs of subgenital setae; 2 pairs of stiff endogenital setae (fig. 15). Subgenital setae widely separated, by a distance equal to .71 of length of genital sclerites. Ovipositor extending only moderately in front of genital foramen, ovipositor index .66.

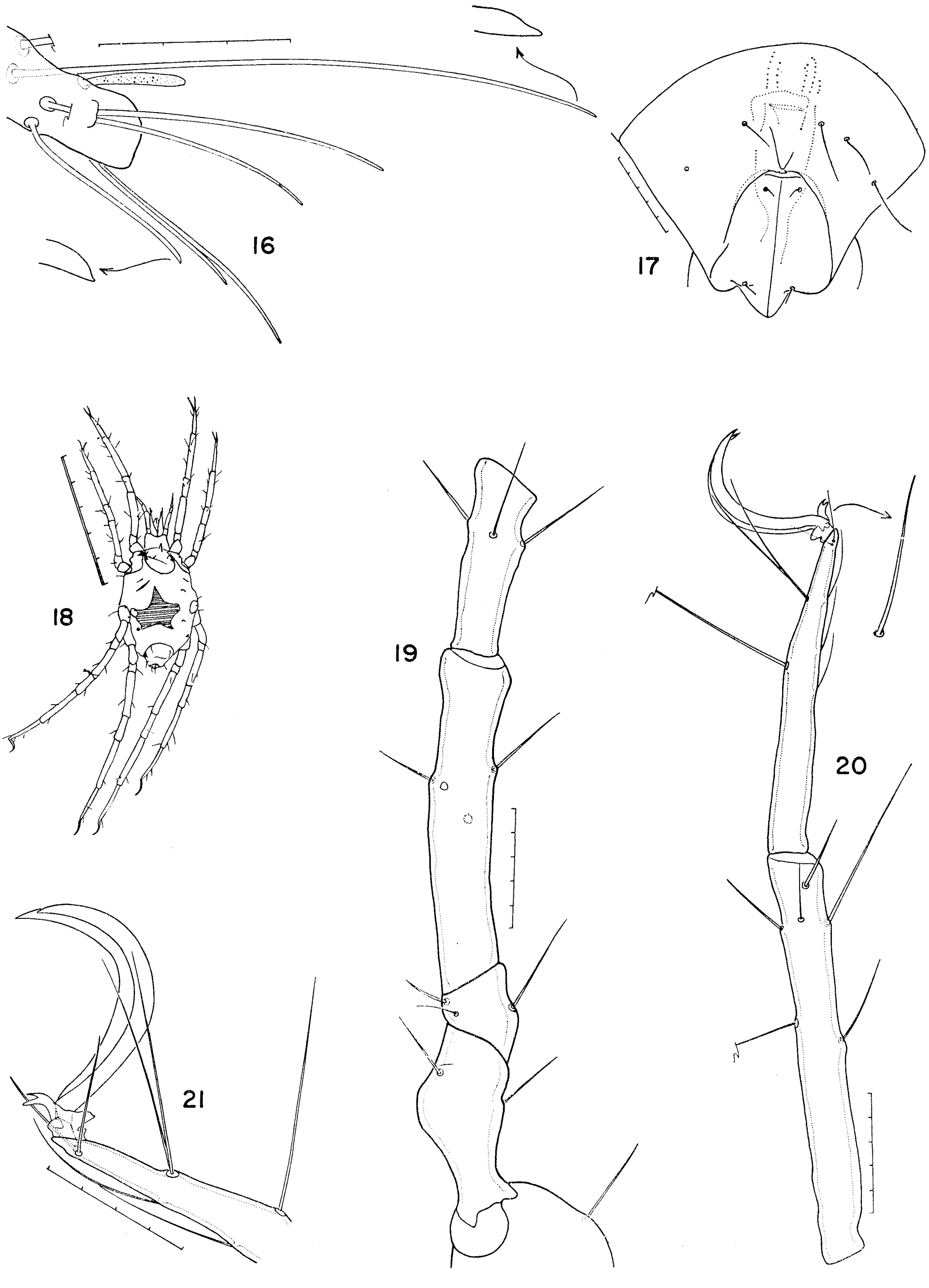
Gnathosoma: Showing no particular structural modifications except for the unusual combination of very long, slender palpi with a short, triangular rostrum which reaches only to middle of femur. Dorsally, tectum (fig. 7) deeply concave, behind palpal trochanters. Pharyngeal plate with 4 or 5 pairs of central cells. Rostrum relatively blunt, short. Proto- and deutorostral setae slender, tapering. Tritorostrals at .25, rostral sulcus ending at .73, basirostrals actually on rostrum, at .87. The basirostrals were broken off in the ♀ holotype, but in an unmolted ♀ within the deutonymphal cuticle, these setae are very long. Palpal femur with a long slender seta at .86d, tibia with a stout short (4 μ) seta at .81a. Tibiotarsus with usual 3 setae near base, and terminal group which cannot be resolved because of thickness of mount. They show no unusual features, however. No seta between basal and distal groups. Base of gnathosoma and rostrum faintly hirsute.

Legs: Chaetotaxy tr 1-1-2-3^2, bf 2-2-4-4^2, tf 13-15-14, 15-16^2, pa 4-4-2, 3-3, 4^2, ti 15-15-17-15^1 and 14-15-15-18^1, ta 19-19-8-8^1 and 21-17-8-8^1. Most of setae on tr, bf and basal 1/2 of tf stiff, spike-like, and project nearly vertically to axis of segment. Tr-bf of all legs nearly cylindrical, except for a slight distal swelling on tf and pa. There are 2 sharp projections distidorsally on tf I-IV (fig. 9). All tarsi with a single long seta between .42 and .62d, and a pair of long setae at .83-.87d. Solenidion located posteriorly near end of ta I, anteriorly on II, both clavate and minutely fenestrated (fig. 16). Tf I with 2 pairs of stiff, slender setae ventrally, plus 1 or 2 others. Legs not marked with panels or pores, but quite smooth; a short, sparse pilosity. Ti I with 8^2 setae ventrally, loosely paired, the distal pair slightly heavier than rest, but not spiniform. All setae of patella I smooth. Claw fossa absent from all legs. Claws slender, smooth at magnifications of 450X, but delicately pectinate under oil. No trace of an accessory process. Median claw small, unidentate.

♂. Unknown.

Deutonymph: A molting ♀ deutonymph was readily recognizable by the long slender legs, heavily armed in the basal portion, and a number of other features visible in the adult.

DISTRIBUTION: SE Pacific, 29°22′ S., lat., 80°00′ W. long., at 3680-4100 m, 15.VII. 1966. Holotype ♀, and paratype deutonymph. Southeastern Pacific Biological Oceanographic Program, R/V ANTON BRUUN, Cruise 17, Sta. 678E. I. M. Newell. Taken in Riedl Dredge with finer net sewn into cod end of 500 μ mesh bag. Types in my collection.



Figs. 16–17. *Thalassarachna bandyi* n. sp., ♀. 16, tip of ta II, left, anteroventral; 17, GA, ventral. Figs. 18–21. *Thalassarachna humboldti* n. sp., deutonymph. 18, dorsum (the 2 cross-hatched areas are tears due to preparation); 19, tr-pa III, left, anterodorsal; 20, ti and ta III, left, anterodorsal.

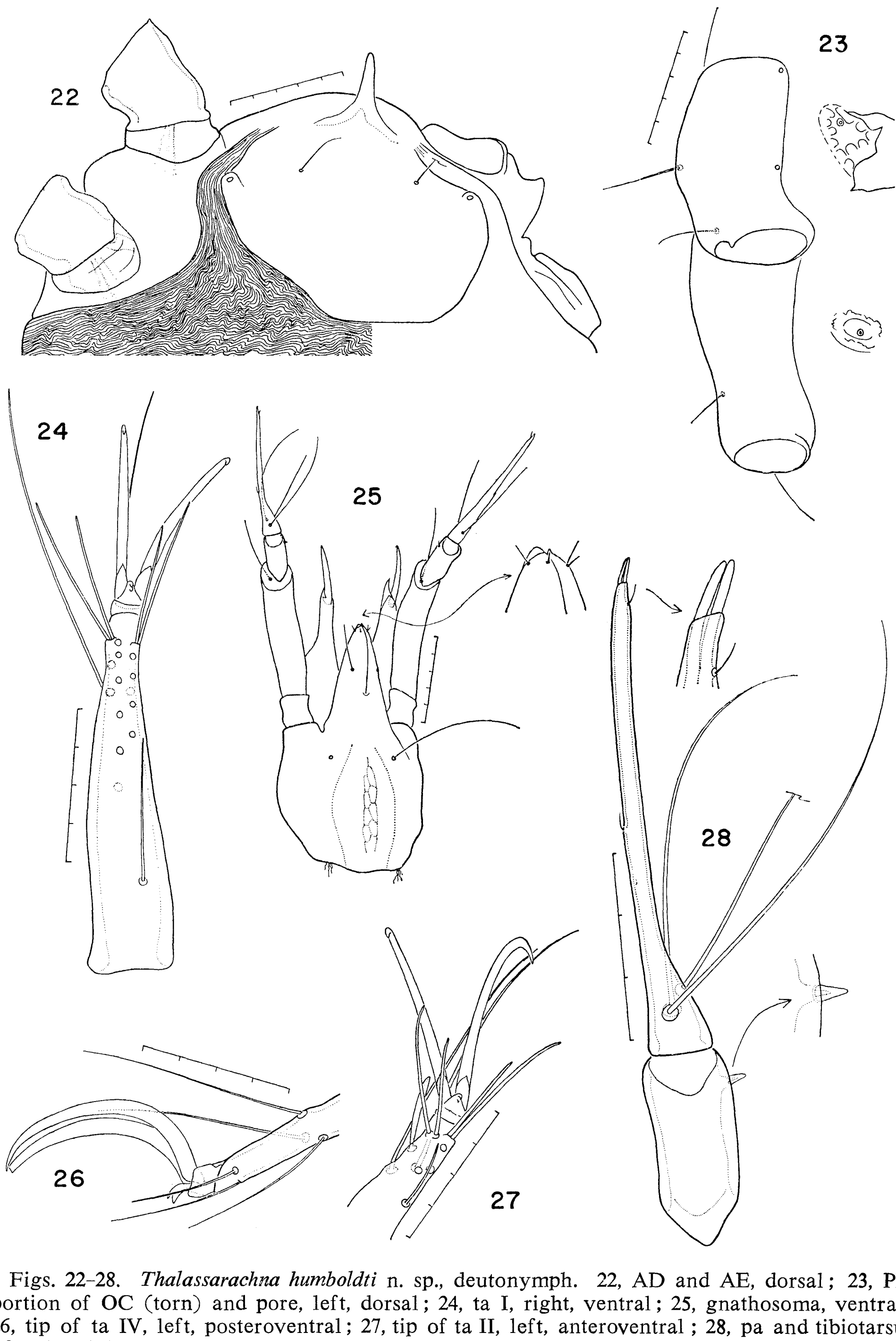
Remarks: This species is unique in several respects, in particular the structure of the legs, the reduction of body armor, and the exceptional structure of the genitoanal plate. The chaetotaxy of this plate is unlike that of any other species, but this character is by no means constant in other species, hence there is no reason to attach undue importance to it. There is little doubt that several of the unusual features represent structural responses to living on soft bottoms found in deep ocean basins.

Thalassarachna humboldti Newell, new species Figs. 18–35.

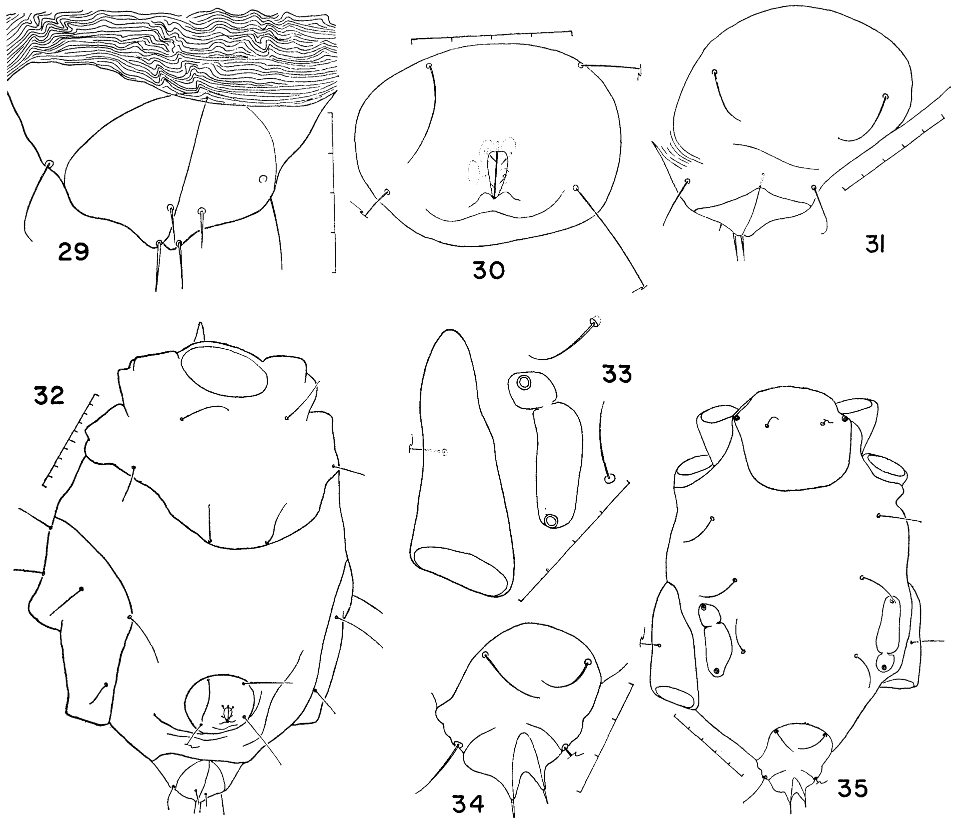
Deutonymph: Idiosoma 461 μ long to tip of frontal spine of AD, L/W 1.51. AD sloping sharply so that the form shown in fig. 22 is foreshortened, and position of setae and pores may be somewhat altered. OC very difficult to see, reduced, displaced far posteriorly. Cornea totally absent; a pore anterolaterally with a few weakly developed panels surrounding it. Left OC fractured in fig. 23, and form of remainder of plate difficult to see due to fouling of cuticle and the generally poor differention between OC and the surrounding cuticle. Usual 5 pairs of dorsal setae present, 1 in AD, 1 in PD, and 3 in intervening cuticle, all of which arise directly from membranous cuticle rather than from setigerous sclerities. The 2nd and 3rd are close together. Third seta of left side torn out. A pore and sclerite behind OC, between levels of III and IV (fig. 23). PD and anal papilla separated in part by a band of striated cuticle.

AE with 3 pairs of setae ventrally, the 3rd setae 47–49 μ long[2]. PE with 5 pairs of setae. Genital sclerite (fig. 30) oval, with 2 pairs of long setae peripherally. Genital groove with 2 pairs of short setae; also 2 pairs of acetabula. Adanal setae (figs. 29, 31) marginal in position. Anal sclerites with 2 pairs of setae (!), their alveoli inconspicuous. Rostrum triangular, extending only to middle of palpal femur. Protorostral setae longer and more slender than deutorostrals. Four pairs of panels in pharyngeal plate. Tritorostrals at .44 of rostral length, rostral sulcus ending at .79, basirostrals behind base of rostrum, at 1.34 (relative to length of rostrum = 1.0). Distal seta of patella of palp a stout spike only 3 μ long (fig. 28). Tibiotarsus with 3 basal setae, minute setae at .48 and .95, and at least 2 distal eupathidia. The thickness of the mount made it difficult to resolve the latter, but no more than 2 eupathidia could be seen.

Chaetotaxy of Legs: Tr 1–1–2–0[2], bf 2–3–3–2[2], tf 5–5–4–3[2], pa 5–4–3–3[2], ti 8–8–6–6[2], ta 17, 18–12–8–7[2]. All setae slender, smooth, although the most distal seta of ti II is noticeably heavier than the others on that segment. Ta I (fig. 24) with 3 dorsal fossary setae plus a lightly clavate solenidion posterodorsally. Single seta at .24v, and either 12 or 13 eupathidia between .64v and end of segment, including 2 doublets (the parambulacral setae). Ta II with 3 fossary setae, and a solenidion like that on I, but anterodorsal in position. Eight eupathidia ventrally including doublet parambulacral setae. Tarsus III with only 3 fossary setae dorsally, 3 slender ventral setae (only 2 distal ones shown in fig. 21), plus single pair of parambulacral setae. On the left ta III, both of the latter are eupathidiform, but on the right side, the anterior parambulacral seta is hollow for only .6 of its length and the tip is more sharply rounded than its partner. Ta IV with 3 fossary setae, 2 ventral setae, plus the 2 parambulacral setae. Of the latter, one is a eupathid, the other a proeupathid, but their positions are exactly reversed on right and left tarsi. Legs (figs. 18, 19, 20) not as long relative to body as in *T. bandyi*, and with setae all slender.



Figs. 22–28. *Thalassarachna humboldti* n. sp., deutonymph. 22, AD and AE, dorsal; 23, PE, portion of OC (torn) and pore, left, dorsal; 24, ta I, right, ventral; 25, gnathosoma, ventral; 26, tip of ta IV, left, posteroventral; 27, tip of ta II, left, anteroventral; 28, pa and tibiotarsus of palp, right, posteroventral.



Figs 29–32. *Thalassarachna humboldti* n. sp., deutonymph. 29, anal papilla, ventral; 30, genital sclerite; 31, PD and anal papilla, dorsal; 32, venter. Figs. 33–35. *Thalassarachna humboldti* n. sp., larva. 33, PE and OC, left, dorsal; 34, PD and anal papilla; 35, idiosoma, dorsal.

Median claw bidentate on all tarsi. Lateral claws totally devoid of accessory process. Pecten virtually invisible at 450x, but a few fine teeth were discernible under oil immersion.

Larva: Idiosoma 235 μ long. AD partially obscured; no frontal spine seen, but pores and setae as in deutonymph. Other dorsal setae as in deutonymph, except that 2nd, 3rd and 4th setae are more equally spaced; 5th pair in PD. OC (figs. 33, 35) between 4th dorsal seta and PE; with 2 pores. Structure of OC not certain; it appears to be vaguely subdivided into an anterior and a posterior portion, but on left side with posterior portion larger than anterior, while on right the reverse is true. In each case the posterior portion includes a pore, and this is undoubtedly the same pore which is represented as lying in the membranous cuticle, detached from OC in the deutonymph (figs. 18, 23). In the deutonymph the extent of OC was obscured by fouling and by damage, but the separation between anterior and posterior pores is probably accurate. This suggests that there is a considerable displacement of the posterior pore in post-larval development. Anal papilla fused with PD. Adanal setae present, and anal sclerites with a single pair of setiform processes, lacking alveoli (fig. 34). Tibiotarsus of palp with 3 basal setae, 1 and possibly 2 terminal eupathidia, and minute subterminal seta as in deutonymph. No seta at or near middle of segment. Chaetotaxy of fe and pa as in the deutonymph.

DISTRIBUTION: As for *Thalassarachna bandyi* n. sp. Holotype deutonymph and one paratype larva, in my collection.

Remarks: Although this species is represented by a single larva and a deutonymph, the latter is so distinctively different from the deutonymph of *T. bandyi* that there is no question that there are at least two species of the genus in the deep waters of this portion of the SE Pacific. Among the more significant differences are (1) the bidentate median claw (unidentate in *T. bandyi*), (2) the presence of a seta about the middle of the tibiotarsus (apparently absent in *T. bandyi*, (3) the greater development of AD, (4) the median spine of AD, (5) the spines at the distal end of tf I-IV (present only in *T. bandyi*), (6) the delicate setae of the femora (mainly heavy, stiff in *T. bandyi*), etc.

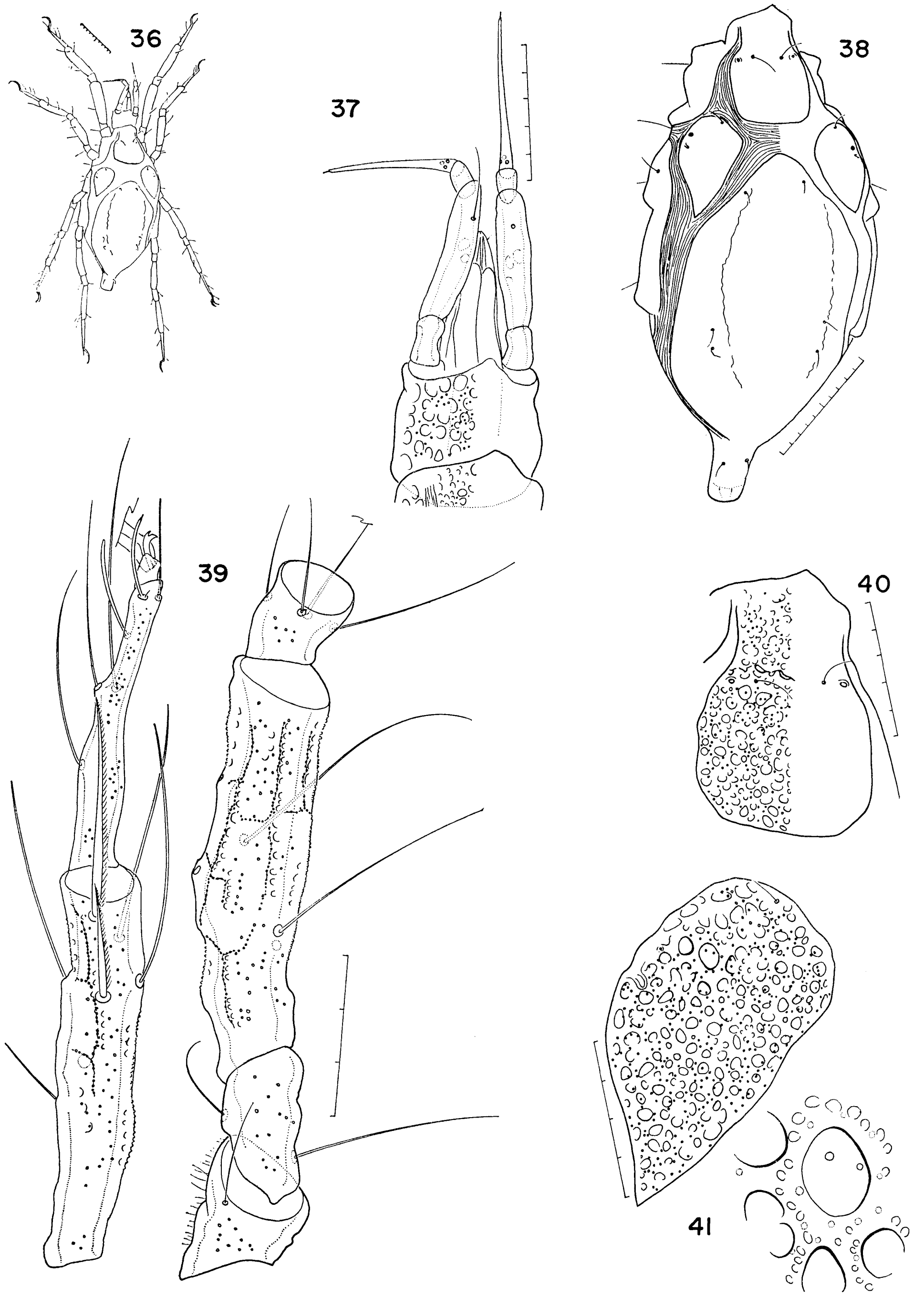
Considering the many differences between these two species, it appears that they evolved independently from quite different stocks within *Thalassarachna*. *T. bandyi* seems to be the more highly specialized of the two, and differs the more markedly from shallow water forms.

Copidognathus bruuni Newell, new species Figs. 36-49.

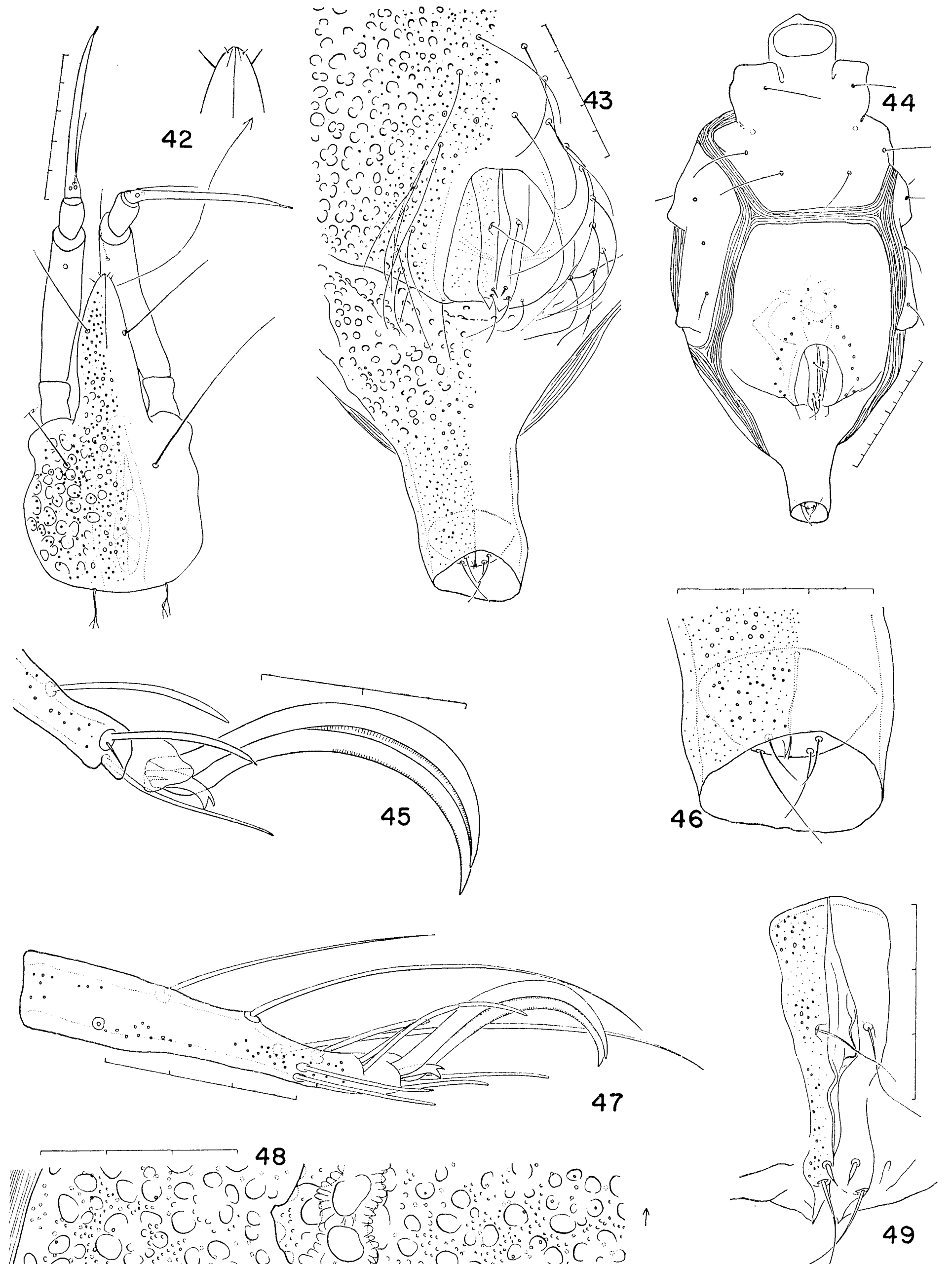
♂. Idiosoma (fig. 38) 418 μ long from tip of AD to tip of anal papilla, L/W=2.18. Pores of AD at .43, widely separated, setae at .44. Posterior groups of pores not typical rosette pores, but irregular sunken panels, interspersed with scattered canaliculi, most of which lie outside the panels, but not all. Second dorsal setae lying in OC. Corneae absent; a sclerotized bar at lateral corner. A few (2-4) strongly developed panels on an elevated area in anterolateral quadrant, walls between panels tuberculate. Posterior end of OC triangular and sharply pointed, no cauda, reaching to a level 0.10 of interval between base of tr III and IV. Striae of membranous cuticle between right and left OC parallel, delicate. Setae of PD at .17, .58 and .66; no gland pore visible, but this may be due to extreme roughness of cuticle. Costae with coarse, deeply depressed panels, walls between which are marked with coarse and fine tubercles (fig. 48); the depressed panels should, perhaps, be regarded as pycnotic rosette pores. Costae not fused posteriorly, and without pronounced local swellings.

AE and GA separated by a narrow band of striated cuticle, only .06 as wide medially as medial length of AE (fig. 44). Epimeral processes undeveloped. Second and 3rd pairs of setae of AE relatively closer together than usual. Epimeral pores scarcely discernible from other cuticular detail of AE. Behind the insertions of I and II, the cuticle is marked by deeply depressed irregularly circular, or oval panels between which are a few scattered canaliculi, opening directly to the surface. Central portion of AE with much smaller circular panels. The same pattern is on GA, and the ventral panelling of PE is like that in the lateral portions of AE and GA. Typical rosette pores not present, although coarser panels could be considered modified rosette pores. Ventral setae of AE very long, 41-48 μ^2.

PE with 1 dorsal and 3 ventral setae. Anterior margin of GA broadly arched in middle 2/3. Anterior end of penis at .19, genital foramen at .43, relative to total length



Figs. 36–41. *Copidognathus bruuni* n. sp., ♂. 36, dorsum; 37, gnathosoma, dorsal; 38, idiosoma, dorsal; 39, leg II, left, anteroventral; 40, AD; 41, OC and detail, left.



Figs. 42–49. *Copidognathus bruuni* n. sp., ♂. 42, gnathosoma, ventral; 43, genitoanal area, ventral; 44, venter; 45, tip of ta II, left, anteroventral; 46, tip of anal papilla, ventral; 47, ta I, left, anteroventral; 48, detail of PD between 3rd and 4th dorsal setae, left; 49, genital sclerites.

of GA, including the anal papilla. With 12–13[2] perigenital setae. Only 3 pairs of subgenital setae (fig. 49), the 1st and 3rd tapering rather uniformly throughout length; 2nd a stiff fusiform spike. Anal papilla drawn out into a long cylinder, with adanal setae dorsolateral in position (fig. 38). Anal sclerites completely concealed in dorsal view, and only partially visible ventrally (fig. 43); bearing 2 pairs of setae.

Gnathosoma: Base of gnathosoma (figs. 37, 42) marked with deep subcircular or oval panels with scattered canaliculi on dorsal, lateral and ventrolateral surfaces; ventromedial portion with small panels and canaliculi. Length of gnathosoma to tip of rostrum 1.95 as great as width of base. Rostrum 2.0 as long as interval between bases of trochanters and .45 as long as gnathosoma exclusive of palpi; not reaching to end of femur. Dorsal wall of gnathosoma richly panelled, tectum produced anteriorly into a blunt triangular process. Cheliceral bases densely punctate; tarsus of chelicera fairly short, but otherwise normal for genus.

Legs: Chaetotaxy of tr 1–1–1–0, bf 2–2–2–2, tf 5–5–2–2, pa 4–4–3–3, ti 7–7–5–5, ta 11–7–6–5. Ta I with 3 fossary setae and solenidion dorsally, 3 setae ventrally (distal 2 are slender eupathidia), plus 4 parambulacral setae (2 doublets), a total of 11 setae. Ta II with 3 fossary setae and a slightly clavate solenidion dorsally, no ventral setae; 3 parambulacral setae, a single slender hemieupathid posteriorly and a doublet anteriorly, the latter consisting of a dorsal eupathid and a minute ventral proeupathid (fig. 45). Both tarsi II had this structure. The anterior eupathid had a distinctive "probe" at distal end. Ta III with 4 setae dorsally plus a pair of subequal parambulacral setae (both are proeupathidia), the anterior one shorter and with 2 or 3 fine barbs (oil immersion). Ta IV with 3 fossary setae dorsally, plus a pair of flattened, short, parambulacral setae, anterior one faintly bipectinate; both are proeupathidia. All tarsi have a delicate pecten in middle 1/3 of lateral claws, and a bidentate median claw; accessory process absent.

All legs long, slender, lacking either keels or lamellae. Femur and tibia of I and II with prominent rectangular panels, walls between panels tuberculate. Anteroventral setae of ti I–II stiff, delicately bipectinate (oil). Posteroventral seta of ti III stiff, apparently smooth, but possibly delicately bipectinate (no compressed specimen available for study). Basidorsal seta of ta III .54–.62 of distance from base of segment to 2nd dorsal seta.

Protonymph: 3 protonymphs are in the type series. Apart from the smaller size and lack of sexual features, these are very similar to the adult ♂ described above. Plates extensive and well sclerotized and anal papilla tubular. Nymphs measured 339–461 (383 μ)[3] to tip of anal papilla, excluding gnathosoma. The genital and anal plates separated; 1 pair of acetabula. Fe III subdivided, fe IV not subdivided. Anal sclerites with only 1 pair of setae.

DISTRIBUTION: As for *Thalassarachna bandyi* n. sp. Holotype ♂ and 3 protonymph paratypes, in my collection.

Remarks: While this is a typical *Copidognathus* in all essential respects, it is unusual in several ways. The tubular anal papilla and the setae of the anal sclerites are unique in the genus. The reduction in subgenital setae of the male is known to occur in at least one other species of the genus which is not otherwise very similar to *C. bruuni.* The absence of corneae is associated with the occurrence of the mite in the aphotic zone.

The parallel appearance of setae on the anal sclerities in two genera at this one locality is significant in view of the fact that this character has not been noted in any other species of Halacaridae. The heavy sclerotization and panelling are remarkable for a deep water species.

REFERENCES

Bandy, Orville L. 1967. Cruise Report, Research Vessel Anton Bruun, Cruise 17. Special Report Number 7, Marine Laboratory, Texas A. & M. University, Galveston (unpublished).

Gimbel, O. 1919. Über einige neue Halacariden. *Mitt. Zool. Mus. Hamburg* **36**: 105-30.

Lohmann, Hans. 1907. Die Meeresmilben der Deutschen Südpolar Expedition 1901-1903. **9** (Zool. I): 361-413, plates 28-43. Berlin.

Lyman, John. 1962. Ocean and oceanography. *In*: Encyclopaedia Brittanica **16**: 681-695.

Newell, I. M. 1947. A systematic and ecological study of the Halacaridae of Eastern North America. *Bingham Oceanogr. Coll. Bull.* **10** (3): 1-232.

1967. Prostigmata: Halacaridae (Marine Mites). *In* Entomology of Antarctica. Antarctic Research Series, American Geophysical Union, National Academy of Sciences, National Research Council. Pp. 81-95.

Newell, I. M. & R. E. Ryckman. 1966. Species of *Pimeliaphilus* (Acari: Pterygosomidae) attacking insects, with particular reference to the species parasitizing Triatominae (Hemiptera: Reduviidae). *Hilgardia* **37** (12): 403-36.

Trouessart, E. L. 1896. Halacariens. *In*: Résultats Scientifiques de la campagne du "Caudan". *Ann. Univ. Lyon* **26**: 325-53.

Viets, Karl. 1938. Eine neue, in tiefsee-echiniden schmarotzende Halacaridengattung und Art (Acari). *Zeit. Parasit.* **10** (2): 210-16.

ADDENDUM

At the Second International Congress of Acarology, at Sutton Bonington, England, in July, 1967, I. A. Sokolov and A. I. Yankowskaya reported a species of Halacaridae dredged from the Kamchatka Trench, at a depth of 5,200 meters. That species (description in press at this writing) is very similar to *Thalassarachna humboldti* Newell, n. sp., but differs significantly in certain specific details. These will not be mentioned here, for obvious reasons. The record of Sokolov and Yankowskaya, in conjunction with the species described here, suggests that the genus *Thalassarachna* has been more successful than any other in invading the deep trenches and basins of the Pacific. These two collections also show that careful attention to recovery of Halacaridae from samples taken at great depths is likely to be rewarding at almost any point in the world oceans.