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Halacaridae (Acari) from Hong Kong
Three new species of *Copidognathus*

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(With 32 figures)

Abstract

The genus **Copidognathus** is well represented in the marine mite fauna of Hong Kong, with 21 species obtained from samples collected in April 1989. Three species, viz., **Copidognathus umbonatus** sp. n., **C. acanthoscelus** sp. n., and **C. monacanthus** sp. n. are described and figured in the present paper. In addition, **Copidognathus spinula** (Trouessart, 1899) is redescribed, a species recorded from Vietnam and being closely related to **C. monacanthus.**

Introduction

The genus **Copidognathus** is cosmopolitan, known from tropical waters as well as from polar regions, inhabiting all depths zones, from intertidal to deep-sea trenches. In the tropics and subtropics about one-third or even half of the tidal and shallow subtidal halacarid fauna belong to the genus **Copidognathus** (Bartsch, 1989a), and, according to present knowledge, in sub-tropical southern China 21 out of 45 species are members of the genus **Copidognathus.** Three of them, obtained from sandy tidal habitats, are described.

Material and Method

From April 12 to 26, 1989, halacarid mites were collected in tidal and shallow subtidal biotopes in Hong Kong and New Territories, southern China. Sandy deposits from various shores were taken to the laboratory, vigorously stirred with fresh water, the supernatant water and scum poured through a 100 µm sieve, and the material retained in the sieve scanned for halacarid mites.

Holotypes and paratypes are deposited in Zoologisches Institut und Zoologisches Museum, Hamburg, FR Germany (ZIMH).

Abbreviations used in the descriptions: AD, anterior dorsal plate; AE, anterior epimeral plate; ds, dorsal setae of idiosoma; ds-1, first pair of dorsal setae, ds-6, adanal setae; GA, genitoanal plate; GO, genital opening; mxs, maxillary setae; OC, ocular plate(s); P, palp, P-2, second palpal segment; pas, parambulacral setae; PD, posterior dorsal plate; PE, posterior epimeral plate; pgs, perigenital setae; sgs, subgenital setae; legs numbered I to IV, leg segments 1 to 6, I-6, tarsus on leg I, II-5, tibia on leg II.

Results

Copidognathinae Bartsch

Copidognathus Trouessart, 1888

DIAGNOSIS. Dorsal plates AD, OC and PD present, separate or fused. Generally, five pairs of dorsal setae plus adanal setae present. AE with epimeral pores. Female GA with three pairs of pgs, genital sclerites with one pair of sgs. Male GA with four to more than 30 pairs of pgs and three or four (rarely two) pairs of sgs. P-2 with one distal seta; P-3 lacks a seta; P-4 with three setae in the basal whorl, one minute seta and two spurs at the tip. Tibiae I and II with three ventral bristles, with the ventromedial ones generally being bipectinate; tibiae III and IV with two ventral bristles. Tarsus I with three dorsal and three ventral setae, a dorsolateral solenidion, a pair of (usually doubled) pas. Tarsus II with three dorsal setae, a dorsolateral solenidion and a pair of single or doubled pas. Tarsi III and IV with three or four dorsal setae and a pair of seta- or spur-like pas. Claws (lateral claws) distinct, median claw small. A single nymphal stage, the protonymph, present during ontogenetic development.

Copidognathus umbonatus sp. n. (Figs 1-9)

MATERIAL. Holotype female (ZIMH) and paratype male (ZIMH), plus three females, three males, two protonymphs (author's collection), New Territories, Tolo Channel, Wu Kwai Sha, coarse sediment in **Zoysia** salt marsh, upper tidal area, 16 April 1989, coll. I. Bartsch.

FEMALE. Idiosoma length 285-317 µm. Specimens rather pale, though small spots of eye pigment usually present beneath OC and AD. Dorsal plates with porose areolae, viz., three large areolae on AD, one ring-like on OC and four longitudinal areolae on PD (Fig 1). Porose areolae with modified rosette pores, i.e., numerous canaliculi arranged in groups (Fig 4). Integument between porose areolae delicately reticulate. AD 78 µm long, 90 µm wide. Gland pores in lateral margin of AD, on a level with insertion of leg I. OC 110 µm long, 45 µm wide, anteriorly large, posteriorly prolonged, tail-like. Anterior cornea present, posterior cornea rather inconspicuous. Gland pore opening in anterior margin of the OC. Rosette pores arranged in a ring which surrounds an area with rather smooth integument. PD 199 µm long, 119 µm wide. All four longitudinal costae on PD fused anteriorly. Two pairs of distinct gland pores present, the proximal pair slightly posterior to level of insertion of leg IV, the distal pair of gland pores close to end of idiosoma. Dorsal setae delicate; ds-1 inserted on AD medial to porose areolae, ds-2 on margin of OC, ds-3, ds-4 and ds-5 on PD.

Marginal portions of ventral plates with modified rosette pores, ventral portions almost uniformly porose. Epimeral processes I and II rather inconspicuous (Fig 2). PE long, extending far beyond insertion of leg IV. GA 148 µm long, 90 µm wide; GO 55 µm long. Distance from anterior pgs to GO equalling 0.5 the GO's length, that from anterior margin of GA to anterior GO slightly more the GO's length.

Gnathosoma 85-87 µm long, 60 µm wide. Integument on gnathosoma base finely punctate. Rostrum triangular, extending beyond end of P-2. Maxillary setae inserted as illustrated, rostral sulcus extending beyond mxs-2 (Fig 6).

Legs with prominent lamellae. All telofemora with large ventrolateral and smaller ventromedial lamellae. Tibiae I and II with large terminal articular lamellae; distolateral lamellae larger than distomedial ones. Tibiae III (Fig 3) and IV (Fig 7) with lateral articular lamellae slightly larger than medial lamellae. Trochanters III and IV (Fig 7) each with a small triangular dorsal lamella. Tibia I with three ventral bristles, the basal one being spine-like, the other bristles long and slender (Fig 8). Tibia II with two bipectinate ventromedial bristles and one slender, smooth bristle (Fig 9), tibiae III and IV both with the ventromedial bristle bipectinate and the ventrolateral bristle slender and smooth. Number of setae on trochanter to tarsus (solenidia and pas excluded): leg I, 1, 2, 5, 4, 7, 6; leg II, 1, 2, 5, 4, 7, 3; leg III, 1, 2, 2, 3, 5, 3; leg IV, 0, 2, 2, 4, 5, 3. Tarsi I and II with fossary setae inserted adjacent; solenidion long, seta-like, dorsolateral in position; lateral membrane of claw fossa distinct, medial membrane narrow. Tip of tarsus I with a pair of doubled pas, tip of tarsus II with a pair of single setae.

Claws on tarsus I smaller than those on posterior tarsi. All claws with accessory process; claw comb on posterior tarsi with rather coarse tines. Median claw very small (Fig 3).

MALE. Idiosoma length 305-322 µm. GA 160 µm long, 104 µm wide; GO 41 µm long, 24 µm wide. GO in posterior GA; distance from anterior margin of GA to that of GO equalling 1.8 the latter's length (Fig 5). With 21-26 pgs arranged around the GO; distance from GO to proximal setae of pgs same as length of GO. Spermatopositor large, extending to anterior pgs. Genital sclerites with four pairs of sgs, the two anterior pairs seta-like, the posterior sgs spur-like.

JUVENILES. Idiosoma length of protonymph 226-229 µm. OC rhombic, without the adult's tail-like posterior portion. PD with two longitudinal porose costae, in general two pores wide and not fused anteriorly. Ventral lamellae on telofemora distinctly smaller than those of adults.

REMARKS. **C. umbonatus** is most similar to **C. ornatus** Bartsch, 1981, a species recorded from off Mozambique (Bartsch 1981). Distinguishing characters are: **C. umbonatus** with three setae on tarsi III and IV (four in **C. ornatus**), tibia IV with the ventromedial seta bipectinate (smooth in **C. ornatus**), porose areola on OC ring-like (elongated and not fused to a ring in **C. ornatus**).

C. umbonatus belongs to the **ornatus** group, together with **C. ornatus** Bartsch, **C. hawaiiensis** Bartsch, 1989 -- records from Hawaiian Islands (Bartsch 1989b) --, and **C. acanthoscelus** sp. n. (see below). Characteristics of the **ornatus** group are: AD with three large porose areolae; OC with garland-like porose areola; PD with four longitudinal porose costae; gnathosoma short; large subcuticular glands with gland pores opening on cones; telofemora with large serrate or spine-like lamellae; genu IV with four setae.

The **ornatus** group is closely related to the **bairdi** group (cf. Bartsch 1984). Representatives of the **ornatus** group are distinguished from those belonging to the **bairdi** group on the basis of porose areolae on the OC (elongated and garland-like in the **ornatus** groups **vs** reduced to a small area in anterior OC in the **bairdi** group) and telofemora (**ornatus** group with large ventral lamellae; **bairdi** group lack conspicuous lamellae). Species belonging to the **ornatus** group are recorded from warm water regions in the Indian and the Pacific Ocean. Representatives of the **bairdi** group are known from all around the globe, they are predominantly spread in warm water regions.

Copidognathus acanthoscelus sp. n. (Figs 10-19)

MATERIAL. Holotype female and paratype male (ZIMH), plus six females, five males, two protonymphs, two larvae (author's collection), New Territories, Mirs May, Hoi Ha Van, sediment, 24 April 1989, coll. I. Bartsch.

FEMALE. Idiosoma length 296-353 µm. Rather pale, with small spots of eye pigment present beneath OC and AD; some few specimens having slightly green gut content. Large porose areolae on dorsal plates with modified rosette pores which have large ostia and numerous canaliculi. Integument outside porose areolae delicately reticulate. AD 100 µm long, 98 µm wide, with three large porose areolae and some few scattered rosette pores along the truncate posterior margin; gland pores large, placed in lateral margin on a level with insertion of leg I. OC 112 µm long, 43 µm wide, with two corneae; rosette pores arranged along medial margin and in lateral edge of the plate; gland pore near anterolateral margin and pore canaliculus in lateral margin of OC. PD 199 µm long, 137 µm wide, with four costae. Lateral and medial costae on either side anteriorly fused (Fig 10). Both medial and lateral costae anteriorly two pores wide; medial costae widened just posterior to level of insertion of leg IV. Two pairs of gland pores present, both placed posteriorly to level of leg IV. Dorsal setae delicate, ds-1 inserted in middle of AD, ds-2 on margin of OC, ds-3 to ds-5 on PD, ds-5 just posterior to anterior pair of gland pores.

Marginal portions of ventral plates with modified rosette pores (large ostia and numerous canaliculi). Ventral portions reticulate. Epimeral processes I and II inconspicuous. GA 147 µm long, 100 µm wide, GO 63 µm long, 33 µm wide. Distance from GO to anterior margin of GA less than the GO's length. Anterior pair of pgs inserted slightly anterior to level of anterior GO. Ovipositor short, hardly surpassing the GO (Fig 11).

Gnathosoma 82-88 µm long, 60-65 µm wide. Tectum truncate. Rostrum short, triangular. Palps rather short, P-4 shorter than P-2. Two pairs of mxs inserted as illustrated (Figs 14, 15).

Legs short, lateral flanks delicately reticulate. Ventrolateral lamella on I-3 transformed into numerous lamellar spines (Fig 17); ventromedial lamella narrow. I-5 with ventrolateral and ventromedial lamellae which distally have the form of pointed articular membranes. Posterior telofemora with narrow ventral lamellae, the ventrolateral lamella being slightly larger than the ventromedial one. Tibiae with short articular

lamellae. Trochanters III and IV each with a small dorsal cuticular spur. Number of setae from trochanter to tarsus (solenidia and parambulacral setae omitted): leg I, 1, 2, 5, 4, 7, 6; leg II, 1, 2, 5, 4, 7, 3; leg III, 1, 2, 2, 3, 5, 3; leg IV, 0, 2, 2, 4, 5, 3. Base of ventral bristles on tibia I flanked by small, pointed cuticular lamellae. Basal bristle on I-5 spine-like, the two other bristles short, slender and smooth (Fig 17). II-5 with two bipectinate and one smooth bristle (Fig 18). Tibiae III and IV (Fig 19) both with one bipectinate and one smooth ventral bristle. Tarsus I with three ventral setae, tarsi I and II both with three dorsal setae (the distal ones inserted adjacent) and a dorsolateral solenidion, tarsus I with a pair of doubled pas, tarsus II with single pas. Tarsi III and IV with three dorsal setae.

All claws with accessory process. Claws on tarsus I smaller than those on posterior tarsi. Claw comb on posterior tarsi with rather few, distinct tines. All tarsi with a small median claw.

MALE. Idiosoma length 290-303 µm. GA 142 µm long, 103 µm wide, GO 38 µm long, 25 µm wide. Spermatopositor extending beyond GO for slightly less than the GO's length (Fig 13). Distance from GO to anterior margin of GA 1.6 the GO's length. With 16-26 pgs widely scattered around the GO. Anterior pgs separated from margin of GA for approximately half the GO's length.

JUVENILES. Idiosoma length of protonymph 210-241 µm. Dorsal plates smaller than in adults; OC rather short, posteriorly rounded. Medial porose costae on PD present, lateral costae absent. Setae ds-2 and ds-3 inserted within striated integument. Ventrolateral lamella on telofemur I with three spine-like protrudings. Tibia I with two short ventral bristles, both flanked by small spine-like lamella. Length of larva 151-182 µm, dorsal plates small; porose areolae present (Fig 16). Femur I (basifemur and telofemur fused) with spine-like ventral lamella (Fig 12).

REMARKS. **Copidognathus acanthoscelus** belongs to the **ornatus** group. Adult and juvenile **C. acanthoscelus** are separated from **C. umbonatus** on the basis of the ventrolateral lamella on telofemur I (**C. acanthoscelus** with lamella transformed into lamellar spines). Further distinguishing characters are length of GO in relation to GA and arrangement of pgs, and extension of porose areolae in anterior PD.

Copidognathus acanthoscelus is rather similar to **C. hawaiiensis**, both have ventrolateral lamella on telofemur I transformed; it is coarsely serrate in **C. acanthoscelus**, but reduced to two spine-like lamellae in **C. hawaiiensis.**

Copidognathus monacanthus sp. n. (Figs 20-28)

MATERIAL. Holotype female (ZIMH) and paratype male (ZIMH), plus one female (author's collection), Hong Kong Island, Cape d'Aguilar, sediment from lower tidal beach, 17 April 1989, coll. I. Bartsch.

FEMALE. Idiosoma length 310 µm. Dorsal plates with raised areolae (Fig 20) and characteristic rosette pores (Fig 24), outside the raised areolae a more or less conspicuous panelling present, with each panel reticulate.

AD 117 µm long, 75 µm wide, with long, stout frontal spine and two small lateral spinelets. Frontal spine with oblong porose areola; moreover, two small, circular porose areolae in the AD's mid. Gland pores rather large, the tube-like porus ending at lateral margin on a level with insertion of leg I. OC 69 µm long, 55 µm wide, with raised porose areolae on either side of the two corneae; gland pore with small tube-like membrane; pore canaliculus in lateral margin, just posterior to lateral porose areola. PD 165 µm long, 129 µm wide, with two medial narow costae, one pore wide (Fig 24); costae posteriorly raised, crest-like and with two pairs of prominent gland pores. No lateral costae in the holotype female, whereas the other female has short lateral costae with three rosette pores. Dorsal setae small. Setae ds-1 on AD, ds-2 at margin of OC, ds-3 to ds-5 on PD, medial to longitudinal costae, ds-6 at anal cone.

Marginal AE and PE with raised areolae, each areola with rosette pores. Ventral PE with 8-13 rosette pores, ventral AE with some few pycnotic rosette pores. GA with two longitudinal porose areolae set off from remainder delicately reticulate integument; porose areolae with rosette pores, GA 140 µm long, 115 µm wide, GO 48 µm long, 30 µm wide. Ovipositor slightly extending beyond GO (Fig 21). Anterior margin of GA separated from GO for 1.3 the latter's length.

Gnathosoma 80 µm long. Gnathosoma base with sharply set off porose areolae. Tectum truncate. Two pairs of maxillary setae present, the basal one inserted at the rostrum's base, the posterior pair of setae in the distal third of the rostrum (Fig 23). Two pairs of rostral setae at the rostral tip.

Telofemur I with very prominent, spine-like ventrolateral lamella (Fig 26). No such lamellae present on posterior telofemora. Number of setae on leg I to IV, from trochanter to tarsus (solenidion and pas excluded): leg I, 1, 2, 5, 4, 7, 6; leg II, 1, 2, 5, 4, 7, 3; leg III, 1, 2, 2, 3, 5, 4; leg IV, 0, 2, 2, 4, 5, 4. Genu I with ventromedial spine. Tibia I with one long ventrolateral and two shorter ventromedial spines. Tibia II (Fig 27) with ventromedial bristles bipectinate, ventral bristle slender and smooth. III-5 (Fig 28) with one bipectinate and one smooth, slender bristle, IV-5 (Fig 25) with both ventral bristles smooth. Tarsus I with three ventral setae. No ventral setae present on posterior tarsi. Tarsi I and II with three dorsal setae of which the two distal ones are inserted at same level, tarsi III and IV with four dorsal setae. Tarsi I and II with dorsolateral seta-like solenidion and a pair of doubled pas. No solenidion on posterior tarsi; a seta-like medial and a spur-like lateral pas on tarsus III; both pas spur-like on tarsus IV.

All claws with an accessory process. Claws on leg I shorter than on posterior tarsi. Claws on posterior legs with claw comb which have numerous long tines (Fig 25).

MALE. Idiosoma length 302 µm. Similar to female except for genital region. PD with medial and short lateral costae. GA 147 µm long, 118 µm wide, GO 38 µm long, 28 µm wide. Spermatopositor extending beyond GO for length of GO (Fig 22). With 30 pgs arranged in a ring around the GO. Distance from anterior margin of GA to that of GO equalling 1.7 the GO's length.

REMARKS. **Copidognathus monacantus** resembles **C. spinula** (Trouessart, 1899), a species known from Vietnam (Trouessart 1899), and **C. unispinosus** Bartsch, 1989, recorded from the Hawaiian Archipelago (Bartsch 1989). Distinguishing characters are discussed below.

Copidognathus spinula (Trouessart, 1899) (Figs 29-32)

= **Halacarus spinula** Trouessart 1899: 222.

= **Copidognathus spinula**, André 1937: 210, fig. 3.

MATERIAL. Holotype female, deposited in the Muséum National d'Histoire Naturelle, Paris (Collection Trouessart), algae (gigartines), Vietnam.

FEMALE. Idiosoma length 320 µm. AD 118 µm long, 74 µm wide, with long anterior spine. Four porose areolae with rosette pores present, an oblong anterior one, a pair of almost circular ones and a few scattered pores along posterior truncate margin of AD (Fig 30). Gland pores in lateral margin of the plate. OC 83 µm long, 47 µm wide, posterior edge pointed; anterior cornea on OC large; porose areolae present on either side of corneae and in posterior plate; large gland pore placed close to anterior margin of plate, pore canaliculus at lateral margin just posterior to laterally raised porose areola. PD 183 µm long, 139 µm wide; with four longitudinal costae, two, rarely three pores wide. Two prominent pairs of gland pores posterior to level of insertion of leg IV.

AE, PE and GA with porose areolae distinctly set off. GA 145 µm long, 127 µm wide, GO 56 µm long. Distance from anterior margin of GA to that of GO same as length of GO (Fig 32).

Gnathosoma 80 µm long, 59 µm wide. Gnathosoma base with coarsely porose areolae. Tectum truncate (Fig 31). Rostrum short, triangular. Maxillary setae inserted as figured.

Telofemur I with ventrolateral, spine-like lamella. Tibia I with long ventrolateral spine (Fig 29) and two shorter spine-like ventromedial bristles. Tibia II with ventromedial bristles bipectinate and ventrolateral one slender and smooth; tibia IV with both ventral bristles smooth. Claws on leg I shorter than those on posterior tarsi. Claws on tarsi II, III and IV with numerous tines along the claw comb.

REMARKS. **Copidognathus spinula** is similar to **C. monacanthus** and **C. unispinosus.** In **C. monacanthus**, the characteristic combination of external features is: AD with prominent frontal spine; PD with narrow porose costae, gland pores large; telofemur I with huge ventrolateral lamella, genu I with ventromedial spine, and tibia I with long ventral spine. **C. spinula** is characterized by the combination of: AD with four porose areolae, an oblong, two circular paired and a transverse areola; OC with rosette pores in posterior OC and with its distal end prolonged and pointed; PD with 4 longitudinal costae; telofemur I with rather truncate lamellar process. **C. unispinosus** is separated from the others in having posterior margin of AD truncate and without rosette pores, 4 longitudinal costae on PD, and ds-4 and ds-5 only slightly separate.

C. gibberipes Viets, 1936, recorded from the Caribbean area (Viets 1936), demonstrates close similarity, e.g., telofemur I with ventral cuticular lamella (but not as prominent as in the above mentioned species), AD with frontal protruding (though rounded and much smaller than in **C. monacanthus** and **C. spinula**), tibia I with two short, spine-like ventrolateral bristles and one smooth ventrolateral bristle (though not as prominent as in the **spinula** group), tibia IV with both ventral bristles smooth, and tarsi III and IV with four dorsal setae.

Discussion

The three species **Copidognathus acanthoscelus, umbonatus** and **monacanthus** were recovered from sandy deposits. They have no interstitial but a epibenthic mode of life. Closely related species occur throughout the tropics and warm temperate regions.

The three species belong to a group within the genus **Copidognathus** which is characterized by the combination of: idiosomal gland pores large; dorsal and ventral plates with porose areolae; ovipositor short, only slightly reaching beyond the GO; spermatopositor large, extending far beyond the GO; genu IV with four setae. Within this group sub-groups can be distinguished, viz.,

the **ornatus** group, characterized by the large lamellae on the telofemora and wide porose areola on AD, OC and PD;
the **spinula** group with the long frontal spine on AD and the long ventrolateral bristle on tibia I;
the **curassiviensis** group with conspicuously stout rostrum (when compared with the palps); and
the **bairdi** group, members of which in general lack large ventral lamellae on the telofemora, their tibiae IV have both ventral bristles smooth, and tarsi III and IV four dorsal setae.

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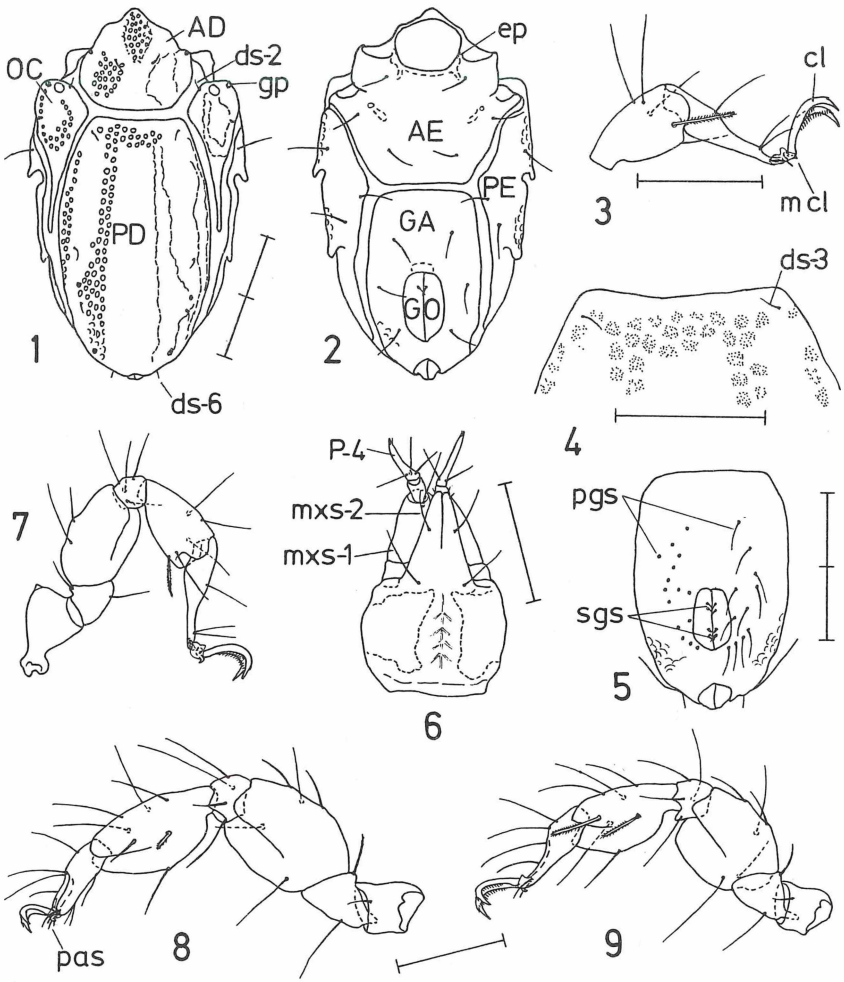
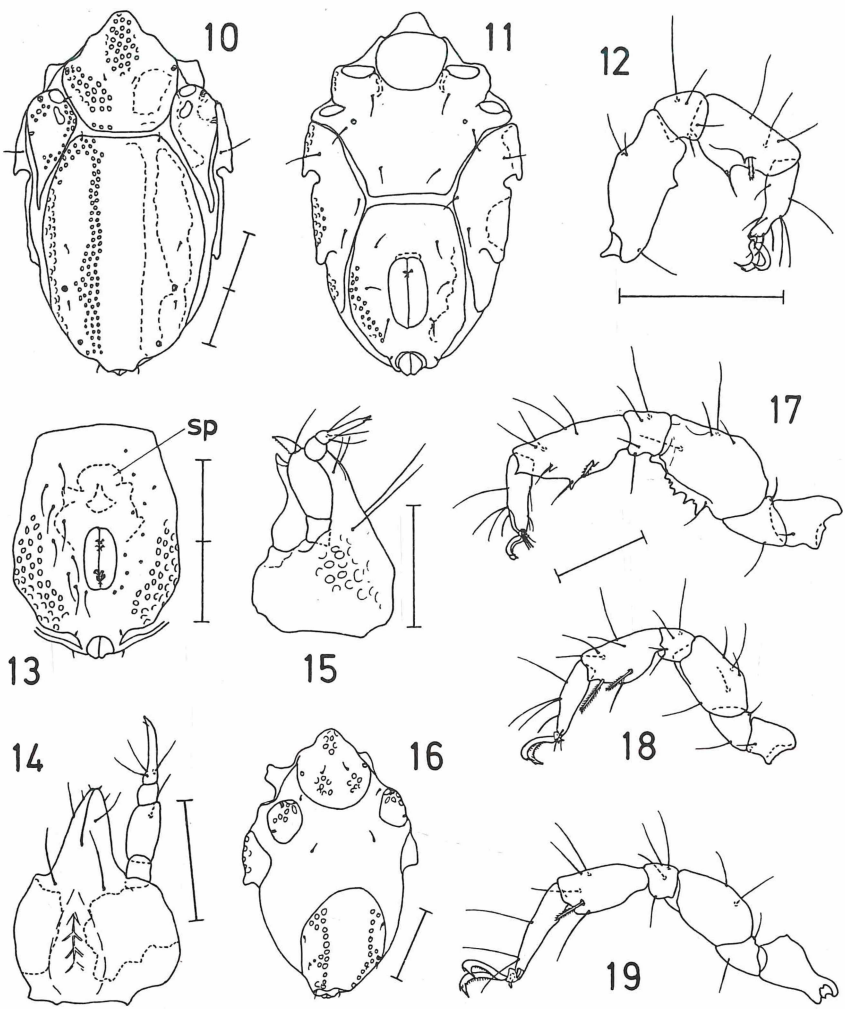
Zusammenfassung

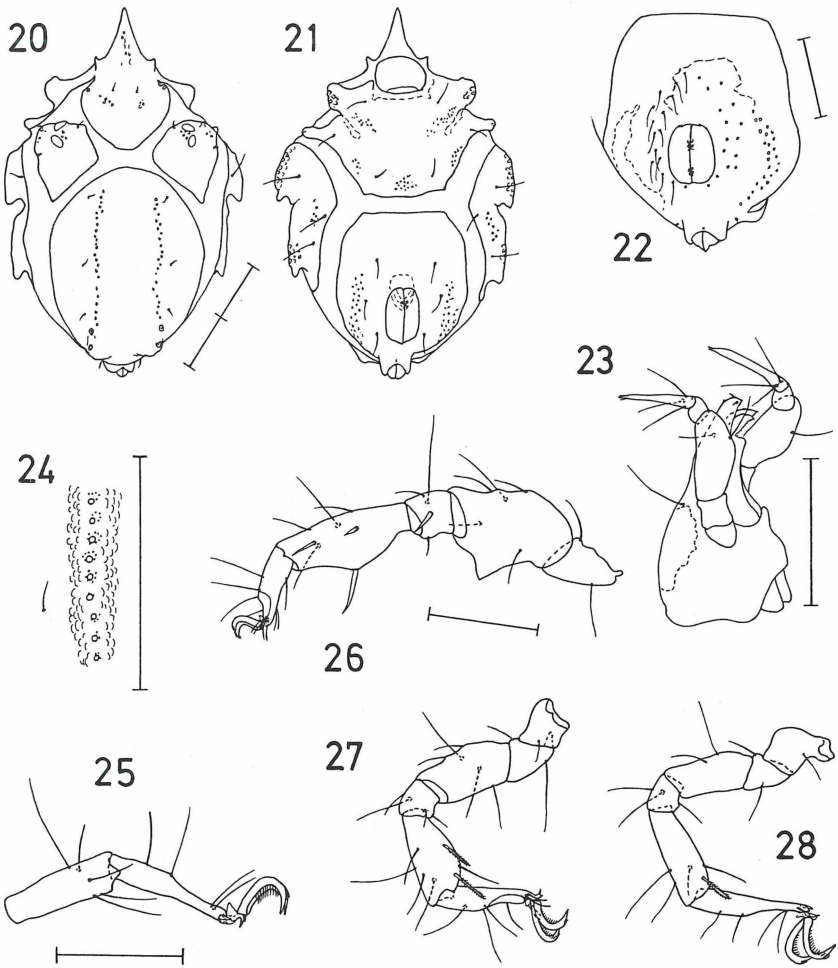
In Proben, gesammelt im Litoral und flachen Sublitoral der Insel Hong Kong und den New Territories, sind bisher 45 Halacariden-Arten registriert worden. Die Gattung **Copidognathus** ist dabei mit 21 Arten vertreten. Drei Arten, **Copidognathus umbonatus** sp. n., **C. acanthoscelus** sp. n., und **C. monacanthus** sp. n. werden beschrieben und abgebildet. Die Beschreibung von **Copidognathus spinula** (Trouessart, 1899), eine **C. monacanthus** ähnliche Art, wird ergänzt.



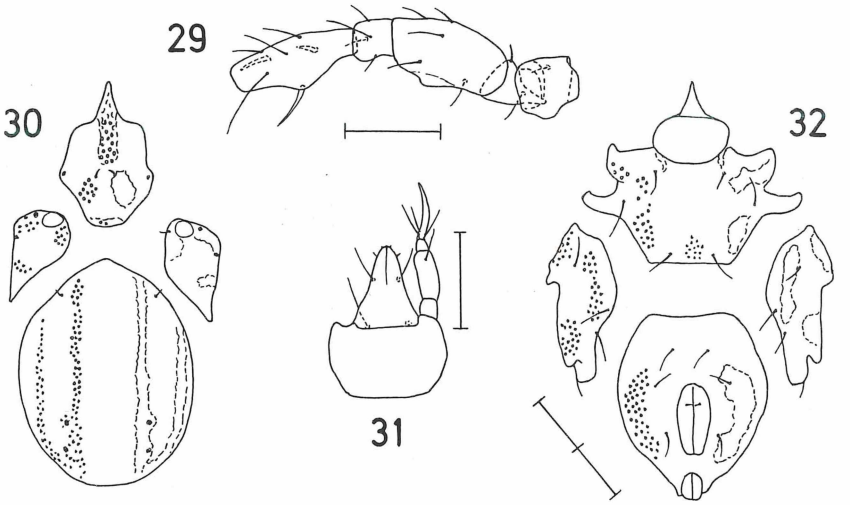
Figs 1-9: **Copidognathus umbonatus** sp. n.: 1. Idiosoma, dorsum, female; 2. idiosoma, venter, female: 3. tibia and tarsus III, medial, male; 4. anterior PD, female; 5. genitoanal plate, male; 6. gnathosoma, ventral, female; 7. leg IV, medial, male; 8. leg I, medial, male; 9. leg II, medial, male. AD, anterior dorsal plate; AE, anterior epimeral plate; cl, claw (lateral claw); ds-2 and ds-3, second and third pair of dorsal setae; ds-6, adanal setae; ep, epimeral process; GA, genitoanal plate; GO, genital opening; gp, gland pore; mcl, median claw; mxs-1 and mxs-2, first and second pair of maxillary setae; OC, ocular plate; P-4, fourth palpal segment; pas, parambulacral setae; PD, posterior dorsal plate; PE, posterior epimeral plate; pgs, perigenital setae; sgs, subgenital setae. Each scale division = 50 µm.



Figs 10-19: **Copidognathus acanthoscelus** sp. n.: 10. Idiosoma, dorsum, female; 11. idiosoma, venter, female; 12. femur to tarsus I, medial, larva; 13. genitoanal plate, male; 14. gnathosoma, ventral, female; 15. gnathosoma, lateral, male; 16. idiosoma, dorsum, larva; 17. leg I, medial, female; 18. leg II, medial, female; 19. leg IV, medial, female. sp, spermatopositor. Each scale division = 50 µm.



Figs 20-28: **Copidognathus monacanthus** sp. n.: 20. Idiosoma, dorsum, female; 21. idiosoma, venter, female; 22. genitoanal plate, male; 23. gnathosoma, lateral, female; 24. portion of left PD at level of ds-4; 25. tibia and tarsus IV, lateral, female; 26. basifemur to tarsus I, medial, female; 27. leg II, medial, female; 28. leg III, medial, female. Each scale division = 50 µm.



Figs 29-32: **Copidognathus spinula** (Trouessart): 29. trochanter to tibia I, dorsolateral; 30. dorsal plates, female; 31. gnathosoma, dorsal, female; 32. ventral plates, female. Each scale division = 50 µm.

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