

Two *Copidognathus* Halacarids (Acari: Halacaridae) from Korea

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ABSTRACT

A new species of marine Halacaridae, *Copidognathus laevisetosus* is recorded from Yeongdeok coast, Korea. In morphological aspects, the present new species is closely related to *C. koreanus* Chatterjee and Chang. Morphological similarities and dissimilarities between them are discussed. *Copidognathus cerberoideus* Bartsch is reported here for the first time from Korea and away from its type locality.

Key words: taxonomy, marine Halacaridae, *Copidognathus*, Korea

INTRODUCTION

Halacarid fauna is poorly known in Korea. Once a freshwater halacarid mite *Soldanellonyx chappuisi* Walter, 1917 was reported from the pools in Kosi-gul cave by Imamura (1968). Quite recently, two new marine halacarid species were described by the present authors (Chatterjee and Chang, 2003, 2004): *Copidognathus koreanus* Chatterjee and Chang, 2003 from Yeongdeok coast and Jeju Island, and *Simognathus corensis* Chatterjee and Chang, 2004 from Yeongdeok coast. In this paper, we deal with another new species and a known species belongs to the genus *Copidognathus* from South Korea.

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MATERIALS AND METHODS

Materials examined in the present study were collected from the algal bed mostly of coralline algae at the intertidal rocky shore of Gugye (36° 19'N, 129° 22'E), Yeongdeok, East Sea of South Korea, on April 18, 2001 by J. M. Lee and C. Y. Chang. In the laboratory mites were extracted by the anesthetization (using 7% MgCl₂)-decantation technique. Halacarids were cleared in lactic acid and mounted in glycerine jelly. Drawings were prepared using a camera lucida.

Materials for scanning electron microscopy were prefixed overnight at 4°C in 2.5% glutaraldehyde, then followed by post fixation in 2% cold osmium tetroxide. After dehydration through a graded series of ethanol (50-100% at 10% interval) for 30 minutes each, the material was dried at the critical point dryer, and coated with gold-palladium in high evaporator, and then examined with a scanning electron microscope (Hitachi S-520) operated at 20 KV.

Abbreviations used in the text: AD, anterior dorsal plate; AE, anterior epimeral plate; ds₁₋₆, dorsal setae 1-6 on idiosoma; EP, epimeral process; GA, genitoanal plate; GO, genital opening; OC, ocular plate; PAS, parambulacral setae; PD, posterior dorsal plate; PE, posterior epimeral plate; PGS, perigenital setae; P1-P4, first to fourth palpal segment; SGS, subgenital setae.

SYSTEMATIC ACCOUNTS

Family Halacaridae Murray, 1877

Subfamily Copidognathinae Bartsch, 1983

Genus *Copidognathus* Trouessart, 1888

****Copidognathus laevisetosus* n. sp. (Figs. 1, 2, 3A, 4)**

Material examined. Holotype: one male (DB0020), Apr. 18, 2001 (C. Y. Chang and J. M. Lee). Paratypes: one male and two females (DB0021-0023), collection data same as holotype. One female is kept in the first author's collection, and 2 males and 1 female were used for SEM study.

Description. Male: Idiosoma (Figs. 1A, 4A) 360-384 µm long. All dorsal plates separate. AD with anterior areola consisting about 15-18 modified rosette pores. Posterior areola transversely elongated; two areolae joined together in the middle to form posterior areolae as in Fig. 1A, F. Rest portion of AD panelled. First dorsal seta (ds₁) on AD, situating anterior to posterior areola in panelled area. First pair of gland pore on lateral side of AD near margin.

OC (Fig. 1G) 82 µm long. Areola made up of rosette pores near corneal zone; ds₂ anterior to OC on membranous cuticular area. PD (Figs. 1A, 4B) anteriorly narrowing, with 4 costae (2 middle and 2 paracostae). Middle costa 3-4 rosette pores wide (in a few specimens, some places 5 rosette pores wide posteriorly). Six to eight canaliculi present in each modified rosette pores (Fig 4C). Paracosta 2-3 rosette pores wide. Middle and paracostae joined anteriorly. Area between middle and paracostae 3-4 panels wide.

All ventral plates separate and porose (Fig. 1B). AE with 3 pairs of setae. PE with 3 ventral and 1

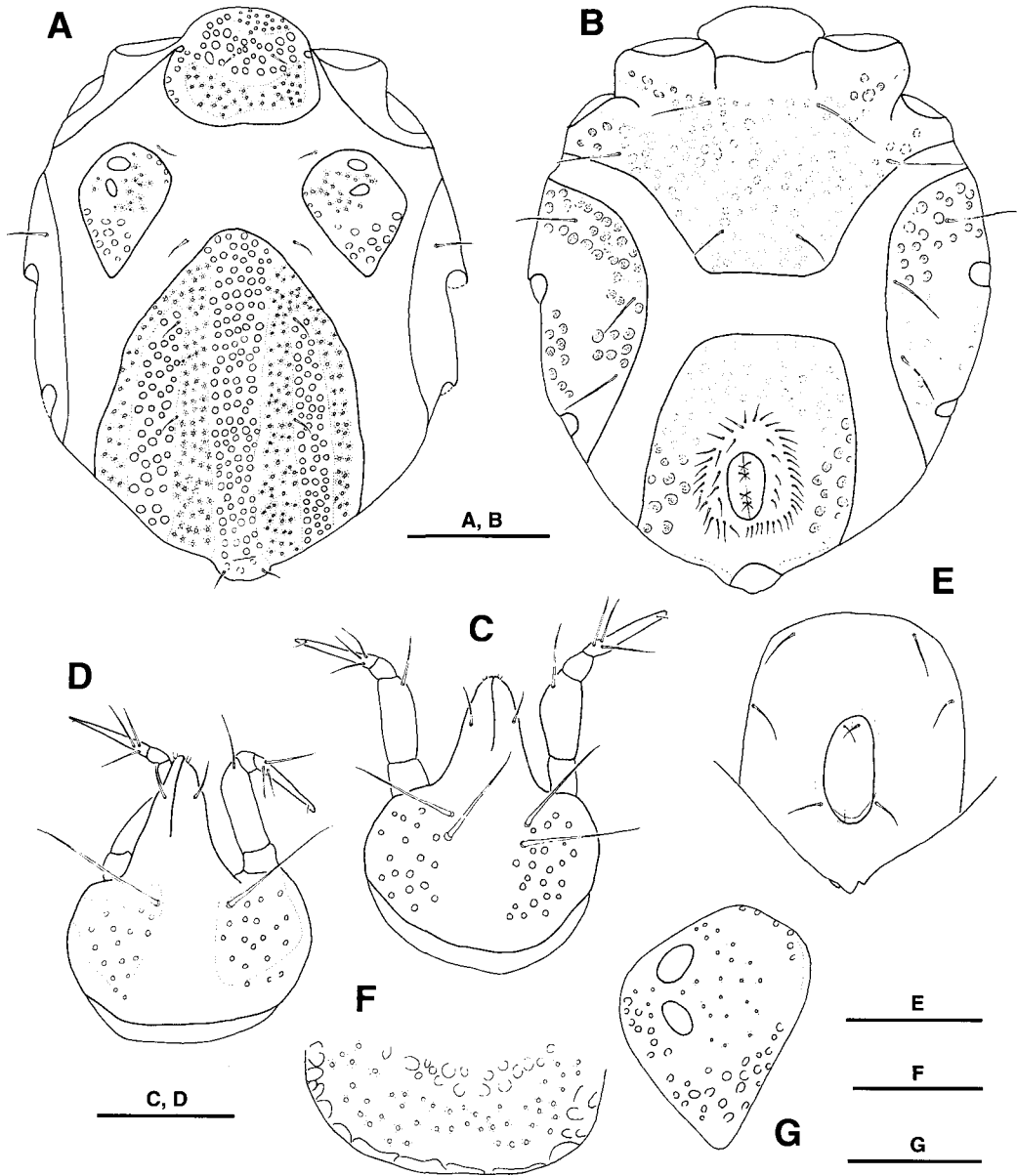


Fig. 1. *Copidognathus laevisetosus* n. sp. A, idiosoma, dorsal (male); B, idiosoma, ventral (male); C, gnathosoma, ventral (male); D, gnathosoma, ventral (female); E, GA (female); F, magnified view of posterior areola of AD; G, OC. Scale bars = 50 μ m.

dorsal setae. Epimeral process not developed. About 50 PGS around GO. Four pairs of SGS; third pairs thick, and spur type. GO 50 μ m long. Distance between anterior end of GO to that of GA 84 μ m long, about 1.7 times GO length. Distance between posterior end of GO and that of GA subequal to GO length. Ventrolateral side of gnathosoma consisting of porose areolae; canaliculi

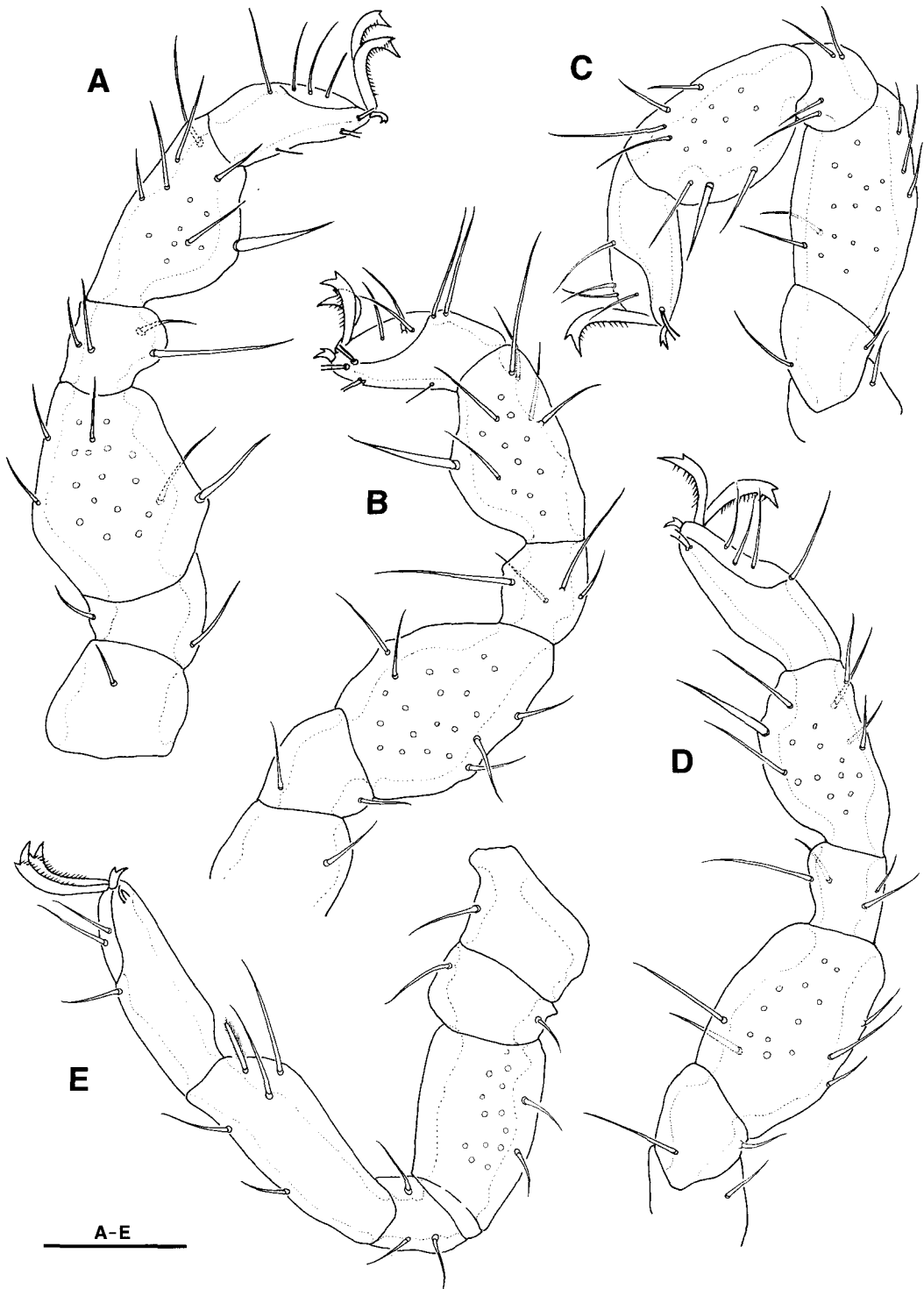
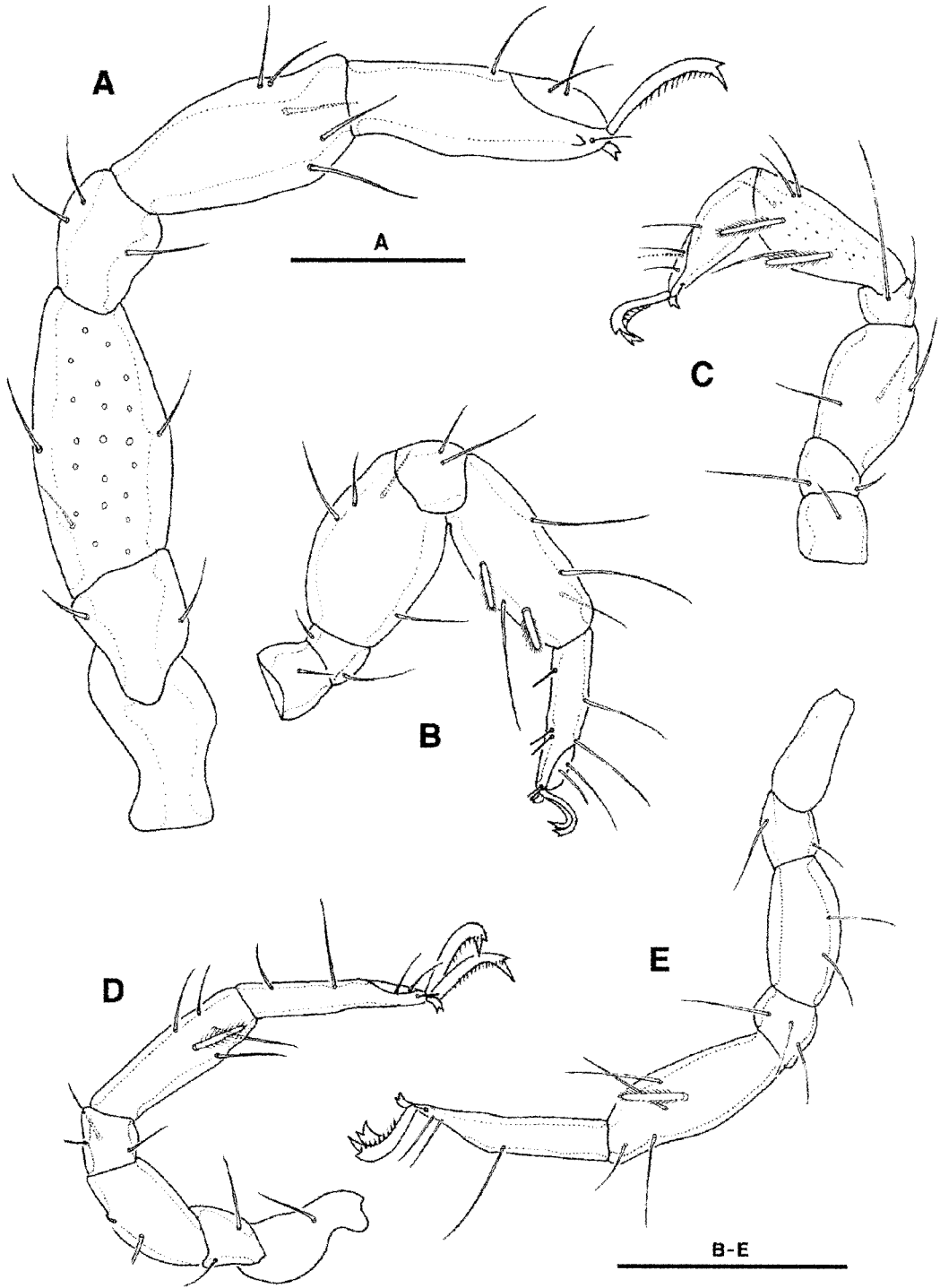


Fig. 2. *Copidognathus laevisetosus* n. sp. A, leg I; B, leg I from other specimen; C-D, leg II; E, leg III. Scale bar = 50 μ m.



Copidognathus laevisetosus n. sp., leg IV. B-E, *Copidognathus cerberoideus* Bartsch, legs I-IV.

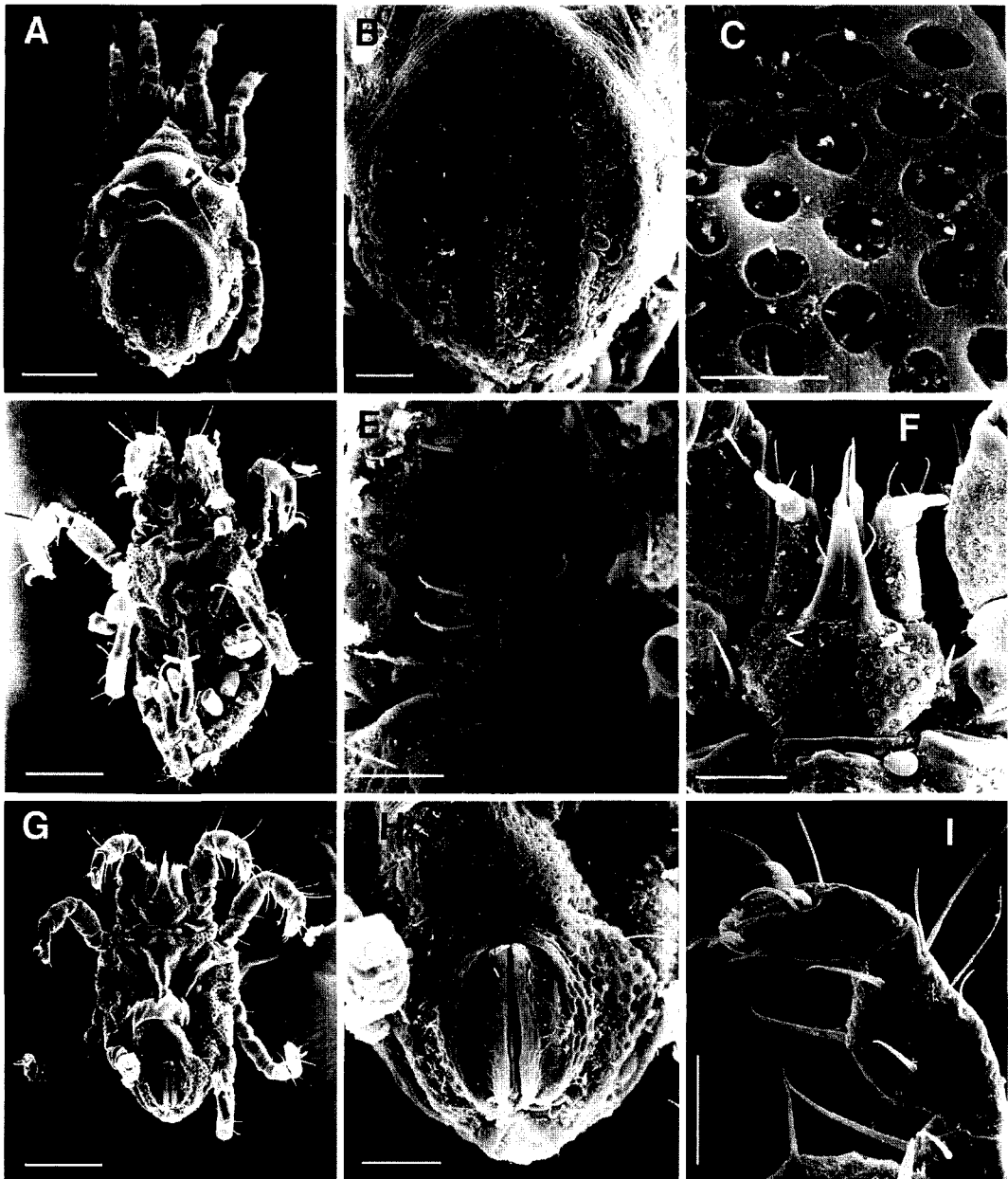


Fig. 4. *Copidognathus laevisetosus* n. sp. A-E, male: A, habitus, dorsal; B, PD; C, magnified view of pores on the costa of PD; D, habitus, ventral; E, gnathosoma, ventral. F-J, female: F, gnathosoma, ventral; G, habitus, ventral; H, GA and GO; I, leg I. Scale bars = 10 μ m (C), 30 μ m (B, E, F, H, I), 100 μ m (A, D, G).

arranged in groups.

Palp (Fig. 1C) consisting of 4 segments. P1 and P3 without any seta; P2 with 1 long dorsal seta anteromedially; P4 with 3 long basal setae and 1 small distal seta. Proto- and, deutorostral setae

situated on tip of rostrum; tritrostral seta located anterior to middle of rostrum (Fig. 1C). Rostral sulcus long, extending about 2/3 of rostrum posteriorly. Two pairs of basirostral setae present (Fig. 1C, 4E).

Chaetotaxy of legs (Figs. 2, 3A) as follows: trochanter 1-1-1-0, basifemur 2-2-2-2, telofemur 5-5-2-3, patella 4-4-3-3, tibia 7-7-5-5, tarsus (PAS excluded) 7-4-3-3. Telofemur III bearing no ventral seta, while telofemur IV with 1 ventral seta. Telofemora of all legs panelled (foveate). Tibiae I and II also containing porose foveae. Tibia I with 3 ventral and 4 dorsal setae; all ventral setae smooth, long and pointed, ventralmost one of which thicker and spiniform (Fig. 2A, B). Tibia II with 3 ventral setae (all smooth and pointed) and 4 dorsal setae. Tibia III with 3 ventral setae (1 small, faintly pectinate, and 2 long pointed, smooth), and 2 dorsal setae. Tibia IV with 5 smooth setae, consisting of 2 ventral, 1 ventromedial, and 2 dorsal setae. Tarsus I with 3 ventral setae (1 filiform seta basally and 2 eupathidia distally), 3 long dorsal setae, 1 solenidion, 1 profamulus distal to solenidion and 4 PAS. Tarsus II with 3 dorsal long setae, 1 solenidion, 1 profamulus distal to solenidion, 4 PAS and devoid of any ventral seta. Tarsi III and IV each with 3 dorsal setae and 2 PAS. All legs with 2 lateral claws, and 1 small bidentate median claw. Lateral claw long, equipped with 1 small dorsal process; ventral side of lateral claw containing long pecten.

Female: Idiosomal length of females examined ranging between 412-437 μm (Fig. 4G). GO (Fig. 4H) 76 μm long. Distance between anterior margin of GO to that of GA a little less than GO length. Distance between posterior portion of GO to that of GA 30 μm long, about 0.4 times GO length. Three pairs of PGS, first pair near anterior margin of GA, second pair near lateral margin of GA. One pair of SGS. One pair of basirostral setae present.

Some specimens infested by suctorians (Fig. 4A, D). About 10-18 suctorians found on idiosoma of infested halacarids.

Etymology. The proposed specific name, *laevisetosus*, is taken from the Latin *laevis* (meaning 'smooth') and *setosus* (meaning 'with seta' or 'bristly'), which refers to the character state that all ventral setae of tibiae I and II are not pectinate but smooth.

Remarks. The new species is closely related to *C. koreanus* Chatterjee and Chang, described from the same locality Gugye, Yeongdeok, South Korea (Chatterjee and Chang, 2003) in many aspects of morphological characteristics. Both species are almost similar in idiosomal length, type of areolation on AD, ds_2 and ds_3 on mc, PD with 4 costae, joining of middle and paracostae anteriorly, all telofemora with areolae, 2 pairs of basirostral setae in male, 1 pair of basirostral setae in female, 0 : 1 ventral seta each on telofemora III and IV, and tarsi III and IV with 3 dorsal setae. However, *C. laevisetosus* n. sp. is clearly distinguished from *C. koreanus* by the following points. Tritrostral setae are located anterior to the middle of rostrum in *C. laevisetosus*, while on the posterior half in *C. koreanus*. On tibia II one ventral seta is pectinate in *C. koreanus*, but all setae are smooth in *C. laevisetosus*. The ventral side of tibia I and II is relatively more swollen in *C. laevisetosus*. One ventral seta each of tibia I, patella I and telofemur I is thickened at its proximal portion and stout in *C. laevisetosus*, while all ventral setae of tibia I, patella I and telofemur I are normal in *C. koreanus*.

The species, *C. laevisetosus*, is also closely related with *C. curtus* (Hall, 1912) from California (Hall, 1912; Newell, 1951a), *C. richardi* (Trouessart, 1902) from the North Atlantic (Trouessart, 1902; Bartsch, 1983), *C. aurorae* Newell, 1951 from Alaska and the Arctic Ocean (Newell, 1951b),

and *C. unalaskensis* Newell, 1951 from Unalaska Island, Alaska (Newell, 1951b). The species presented here differs from all the species above by the position of tritorostral setae, that is, located on the anterior half of rostrum in the present species, but on the posterior half in others. Moreover, the present species is relatively smaller, 360-384 μm long in male, and 412-437 μm long in female, while 558 μm in male of *C. richardi*; 538-551 μm in male and 603 μm in female of *C. aurorae*; 492-536 μm in male and 518-551 μm in female of *C. unalaskensis*. The distance between ds_3 and ds_4 is farther than that between ds_4 and ds_5 in all other species mentioned above, but almost equal in the new species. *Copidognathus aurorae* has two separated posterior areolae, and its tibia II is furnished with one pectinate seta ventrally, while *C. laevisetosus* has smooth ventral setae only. In *C. curtus* and *C. unalaskensis*, the tibia I is equipped with one pectinate seta and tibia II with two pectinate setae ventrally, while in *C. laevisetosus* all ventral setae of the tibiae I and II are smooth and pointed. The porose panels are present in all telofemora in the present species, but absent in *C. aurorae* and *C. richardi*.

Bartsch (1989) found epibiotic suctorians on *C. fabricii* and *C. brifacius* from the North Sea, and Bartsch (2001) also reported the thecate suctorians on *C. magnipalpus* and *C. brachystomus* from the Black Sea. Bartsch (2003) examined the suctorian infestation to an arenicolous halacarid *C. meridianus* from Australia, which was infested by about 4-14 suctorians per one halacarid mite. A review of Halacarids and epibionts was given by Bartsch (2003). *Copidognathus laevisetosus* is the sixth species in the genus, of which the suctorian infestation is reported.

****Copidognathus cerberoides* Bartsch, 1991 (Fig. 3B-E)**

Material examined. One female, Gugye, Yeongdeok, Apr. 18, 2001 (C. Y. Chang and J. M. Lee), from algal sediments.

Diagnosis. Idiosoma 216 μm long; AD with 2 small, rounded, elevated, smooth area; PD with 2 middle and 2 lateral longitudinal smooth elevations; rest of dorsal plates containing delicate pores; leg chaetotaxy: trochanter 1-1-1-0, basifemur 2-2-2-2, telofemur 4-3-2-2, patella 2-2-3-3, tibia 6-6-5-5, tarsus (PAS excluded) 7-4-4-3; tibiae I and II ventrally with 3 setae, of which 2 bipectinate; tibiae III and IV each with 1 bipectinate ventral, 1 smooth ventral and 1 smooth ventromedial setae.

Remarks. This species was described by Bartsch (1991) from the coarse sediments at low tidal mark in the Starfish Bay, the New Territories, Hong Kong. Female specimen collected from Korea is well coincided with the original description. We record this species for the first time away from its type locality in this report.

Distribution. Hong Kong, Korea.

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REFERENCES

- Bartsch, I., 1983. *Copidognathus richardi* (Troussart) (Halacaridae: Acari), eine Wiederbeschreibung. *Acarologia*, **24**(3): 285-288.
- Bartsch, I., 1989. *Copidognathus brifacius* n. sp. (Halacaridae, Acari) und Bemerkungen zu weiteren Bewohnern des Seeigels *Spatangus purpureus* (Echinoidea). *Mitt. Hamb. Zool. Mus. Inst.*, **86**: 315-328.
- Bartsch, I., 1991. Arenicolous Halacaridae (Acari) from Hong Kong. *Asian Mar. Biol.*, **8**: 57-75.
- Bartsch, I., 2001. Black Sea Copidognathinae (Arachnida: Acari: Halacaridae): A review. *Mitteilungen aus dem Museum für Naturkunde in Berlin. Zoologische Reihe*, **77**: 247-275.
- Bartsch, I., 2003. A new arenicolous *Copidognathus* (Halacaridae: Acari) from Dampier, Western Australia. In Wells, F. E., D. I. Walker and D. S. Jones, eds., *The Marine Flora and Fauna of Dampier, Western Australia*. Western Australian Museum, Perth. pp. 281-289.
- Chatterjee, T. and C. Y. Chang, 2003. *Copidognathus koreanus*, a new species of Halacaridae (Acari) from Korea. *Korean J. Syst. Zool.*, **19**(1): 95-102.
- Chatterjee, T. and C. Y. Chang, 2004. *Simognathus coreensis*, a new halacarid mite (Halacaridae: Acari) from Korea. *Hydrobiologia*: in press.
- Hall, H. V., 1912. Some marine and terrestrial Acarina of Laguna Beach. *Ann. Rep. Laguna Marine Lab. Pomona College*, **1**: 977-1086.
- Imamura, T., 1968. Results of the Speleological Survey in South Korea, 1966 IX. Halacaridae (Acari) found in a limestone cave of South Korea. *Bull. Nat. Sci. Mus., Tokyo*, **11**(3): 281-284.
- Newell, I. M., 1951a. *Copidognathus curtus* Hall, 1912, and other species of *Copidognathus* from Western North America (Acari: Halacaridae). *Am. Mus. Novit.*, **1499**: 1-27.
- Newell, I. M., 1951b. Further studies on Alaskan Halacaridae (Acari). *Am. Mus. Novit.*, **1536**: 1-56.
- Trouessart, E. L., 1902. Note préliminaire sur les acariens marins (Halacaridae) recueillis par S. A. S. le prince de Monaco dans les mers arctiques. *Bull. Soc. Zool. Fr.*, **27**: 66-70.

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한국산 뽕족입잔물응애속 (진드기목: 잔물응애과)의 2종

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요 약

영덕 해안에서 채집한 잔물응애과의 1신종과 1한국미기록종을 기록한다. 신종인 매끈털잔물응애 (*Copidognathus laevisetosus*)는 같은 지점에서 출현하였던 뽕족입잔물응애 (*C. koreanus* Chatterjee and Chang, 2003)와 밀접한 형태적 근연성을 보여주고 있다. 두 종간의 형태적 유사점과 상이점들을 고찰하였다. 한국미기록종인 괴물잔물응애 (*C. cerberoideus* Bartsch)는 모식산지 외의 지역에서 최초로 보고된다.