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Taxonomic descriptions of the brackish-water calanoid copepod *Acartia tsuensis* Ito from Japan and the closely related *A. ohnoi* n. sp. from the Philippines

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Abstract: *Acartia (Acanthacartia) tsuensis* Ito, 1956, a predominant planktonic calanoid copepod in the brackish-waters of western Japan, was originally described from Japan. This species has been recorded also from other East and Southeast Asian countries. However, a recent genetic study indicated cryptic speciation in specimens so far identified as *A. tsuensis* from Japan and the Philippines. The present study describes *A. tsuensis* s. str. based on specimens from Japan, including those collected by the original author of the species, and then the specimens from the Philippines as *A. ohnoi* n. sp. Previous descriptions of *A. tsuensis* from Korea and Vietnam somewhat differ from Japanese specimens. The new species is easily distinguishable from the co-occurring related species *A. sinjiensis* by the short caudal ramus in the female and strong spinules on the urosome in the male. *Acartia tsuensis*, *A. ohnoi* n. sp., and *A. bilobata* can be classified into the *A. tsuensis* species group because of close morphological similarity. The most distinctive features of the new species, separating it from the other members of the species group, are thick rostral filaments in the female and strong spinules on the urosome of the male. Their maxillule having a unique process on the praecoxal arthrite and their unique male leg 5 suggest a close relationship with a species of a different subgenus, *Euacartia*.

Key words: *Acartia tsuensis*, brackish water, cryptic species, new species, the Philippines

Introduction

The brackish-water calanoid copepod *Acartia tsuensis* Ito, 1956 was originally described from fishponds in Tsu City, Mie Prefecture, middle Japan (Ito 1956). The second record of *A. tsuensis* appeared 32 years later from outdoor tanks on Momoshima Island in the Seto Inland Sea (Ohno & Okamura 1988). Sakaguchi et al. (2011) investigated planktonic copepod faunas at more than 40 river mouths throughout western Japan, and revealed that *A. tsuensis* was the second most common copepod following *Pseudodiaptomus inopinus* Burckhardt, 1913; the latter species in Japan was subsequently identified as two species, *P. japonicus* Kikuchi, 1928 and *P. yamato* Ueda & Sakaguchi, 2019 (Ueda & Sakaguchi 2019).

Acartia tsuensis has been reported also from the following countries in East and Southeast Asia: the Philippines (Golez et al. 2002), Taiwan (Lo et al. 2004, Hsu et al. 2008), Korea (Lee et al. 2007), and Vietnam (Cho et al. 2012). However, Blanco-Bercial et al. (2014) analyzed DNA barcode data of *A. tsuensis* from Japan and the Philippines, and indicated cryptic speciation in the species. However, it is in general difficult to solve a taxonomic problem of cryptic species due to the morphological similarity between them. In the case of *A. tsuensis*, another problem is that a detailed description of *A. tsuensis* s. str. has not been published.

I fortunately kept specimens so far identifiable as *Acartia tsuensis* in three samples from Japan and one from the Philippines. One of the samples from Japan was collected near the type locality by the original author of the species. Another one was collected from Momoshima Island, the Seto Inland Sea, which was the same locality as that of the specimens analyzed by Blanco-Bercial et al. (2014). The present study provides a full description of *A. tsuensis* s. str. to complement the original description first, and then a comparative description of the cryptic species from the Philippines as a new species.

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Materials and Methods

The present specimens of *Acartia tsuensis* s. str. were collected by the late Dr. Takashi Ito and had been deposited in the Faculty of Fisheries (currently Faculty of Bioresources), Mie University. The sample was labeled "eel farming pond in Matsusaka City on 7 July 1954." Matsusaka City is adjacent to the south of Tsu City, the type locality of *A. tsuensis*. A half portion of the sample was provided for my previous taxonomic study on *Acartia sinjiensis* Mori, 1940 (Ueda & Hiromi 1987). Probably due to long-term preservation in fairly diluted formalin solution, the inner tissues were shrunken and most aesthetascs on the antennule were missing. Therefore, complemental examination was performed on specimens collected by the late Dr. Atushi Ohno on 3 July 1978 from an experimental fishpond of the Momoshima Experimental Station (34.38N, 133.27E), the Japan Sea-farming Association, on Momoshima Island in the Seto Inland Sea (henceforth, Momoshima sample), and those collected from the mouth of Souzu River (32.96N, 132.55E) in Ehime Prefecture on the west coast of Shikoku by Mr. Masahito Oomoto on 23 September 2006 (henceforth, Ehime sample). Specimens from the Philippines were collected by the late Dr. Atsushi Ohno from a brackish-water pond culturing milk fish in Leganes, Iloilo, Panay Island, the Philippines in late July, 1987 (details of the sampling date and the coordinates of the sampling point were not recorded). All specimens in the sample from Leganes were more or less infected with ectoparasites. The type specimens of the new species from the Philippines were deposited in the National Museum of Nature and Science, Tokyo (NSMT).

Morphological examination, drawing, and measurements of specimens were performed in glycerol or lactic acid under a microscope (Nikon Eclipse E600, Nikon, Japan) equipped with a drawing tube and an ocular micrometer. Specimens for detailed examination were stained as needed with a 0.1% chlorazol black E solution. Illustrations for printing were prepared using computer illustration software (Adobe Illustrator®). The morphological terminologies followed Huys & Boxshall (1991) and Boxshall & Halsey (2004).

Systematic account

Family Acartiidae G.O. Sars, 1903
Genus *Acartia* Dana, 1846
Subgenus *Acanthacartia* Steuer, 1915
Acartia tsuensis Ito, 1956 (Figs. 1–3)

Synonymy

Acartia tsuensis Ito, 1956: 470, fig. 2; Ueda (1997): 671, plate 20; Lee et al. (2007): 147, figs. 9–10; Cho et al. (2012), 301, fig. 4.

Material examined

Twelve females and 4 males from Ito's sample; 4 females from Momoshima sample; 5 females and 5 males from Ehime sample.

Female

Body (Fig. 1A, B) length 0.98–1.05 mm (n=5) in Ito's sample, 0.97–1.02 mm (n=3) in Momoshima sample, 1.02–1.03 mm (n=5) in Ehime sample; prosome length 0.74–0.81 mm (n=4) in Ito's sample, 0.74–0.79 mm in Momoshima sample, 0.80–0.82 mm (n=5) in Ehime sample. Rostral filaments (Fig. 1C) thin. Posterior corner of prosome (Fig. 1D) with spinules grouped in 3 loci, each with 1–4, 1–2, 1 spinules from dorsal to ventral.

Genital double somite (Fig. 1A, E–G) with spinules along posterodorsal margin; spinule number varying from 1 to more than 10, grouped in 1–4 loci; spinule size small in specimens with many spinules. Second somite usually with 4 spinules at 4 loci along posterodorsal margin, with variation of 0–2 spinules at single locus. Anal somite devoid of spinules and setules. Caudal ramus 1.4 times width, devoid of setules.

Antennule (Fig. 1H) 21-segmented; segments 4 and 5 fused on dorsal surface; segment 11 with row of small spinules near distoventral margin; setal formula (ancestral segments in Roman numerals): (1) I = 1, (2) II–VII = 6 + aesthetasc (ae), (3) VIII = 1 + ae, (4) IX = 1, (5) X = 1 (spiniform), (6) XI = 1 + ae, (7) XII = 0, (8) XIII = 0, (9) XIV–XV = 2 + ae, (10) XVI = 1 + ae, (11) XVII = 1, (12) XVIII = 1, (13) XIX = 1, (14) XX = 1, (15) XXI = 1+ ae, (16) XXII = 1, (17) XXIII = 1, (18) XXIV = 2, (19) XXV = 2 + ae, (20) XXVI = 2, (21) XXVII–XXVIII = 4 + ae.

Antenna (Fig. 1I), coxa with medial seta; basis and endopodal segment 1 forming allobasis with 9 medial setae, 8 of them at mid length and 1 near distomedial corner; endopodal segment 2 with 8 setae on distal half of medial margin; endopodal segment 3 with 6 setae; exopod 4-segmented, with 1, 2, 2, 3 setae.

Mandible (Fig. 1J), coxa forming gnathobase with cutting blade bearing 7 pointed main teeth; basis medially with spiniform unipinnate seta at 4/5 length and group of setules at mid length; exopod 5-segmented, with 1, 1, 1, 1, 2 setae; endopod 2-segmented, with 2 spiniform unipinnate setae on segment 1 and 9 setae on segment 2.

Maxillule (Fig. 1K, L), praecoxa and coxa fused; praecoxal arthrite proximally with round process covered with small protrusions (Fig. 1L, indicated by white arrow) and with 9 spiniform setae, proximalmost one of them bearing strong setules; coxal epipodite with 9 setae and endite with 1 naked and 2 spiniform setae; basal endite with spiniform seta and exite with short naked seta; 1-segmented exopod medially with row of hairs, several proximal ones of them somewhat thicker than distal ones, and with 7 setae, 2 of them at mid length of lateral margin, 1 at near distal end, and 4 at distal end.

Maxilla (Fig. 2A), syncoxal with 4 endites bearing 3, 2, 2, 3 setae; basal endite with 2 setae; endopod 3-segmented, with 2, 1, 2 setae.

Maxilliped (Fig. 2B), syncoxa with 5 bipinnate setae;

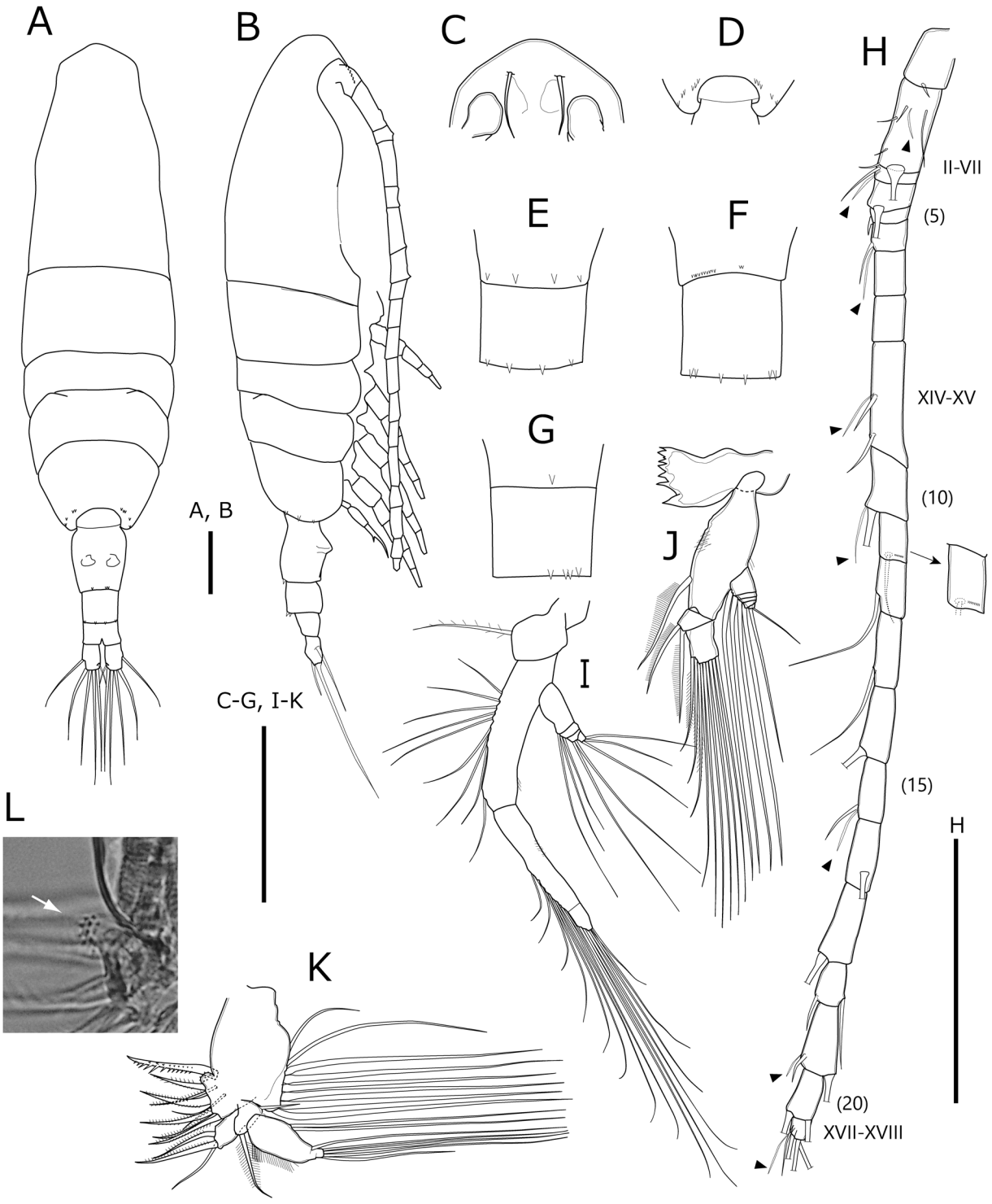

Fig. 1. *Acartia tsuensis*, female (A–G, I, J, from Ito's sample; H, K, L from Ehime sample). A and B, habitus, dorsal and lateral; C, rostral filaments; D, posterior corner of prosome with spinules, dorsal; E–G, genital double somite and second somite, dorsal; H, right antennule, ventral, with segment number in parentheses, ancestral numbers in Roman numerals, and arrowheads indicating aesthetascs; I, antenna; J, mandible; K, left maxillule, posterior; L, process on praecoxal exite of maxillule (same specimen as K, stained). Scale bars, 0.10 mm except for enlarged part of H.

basis proximally with naked spiniform seta; 2-segmented endopod with 3, 2 naked spiniform setae fused to segments.

Legs 1–4 (Fig. 2C–F), setal formula (spine in Roman numeral) as follows:

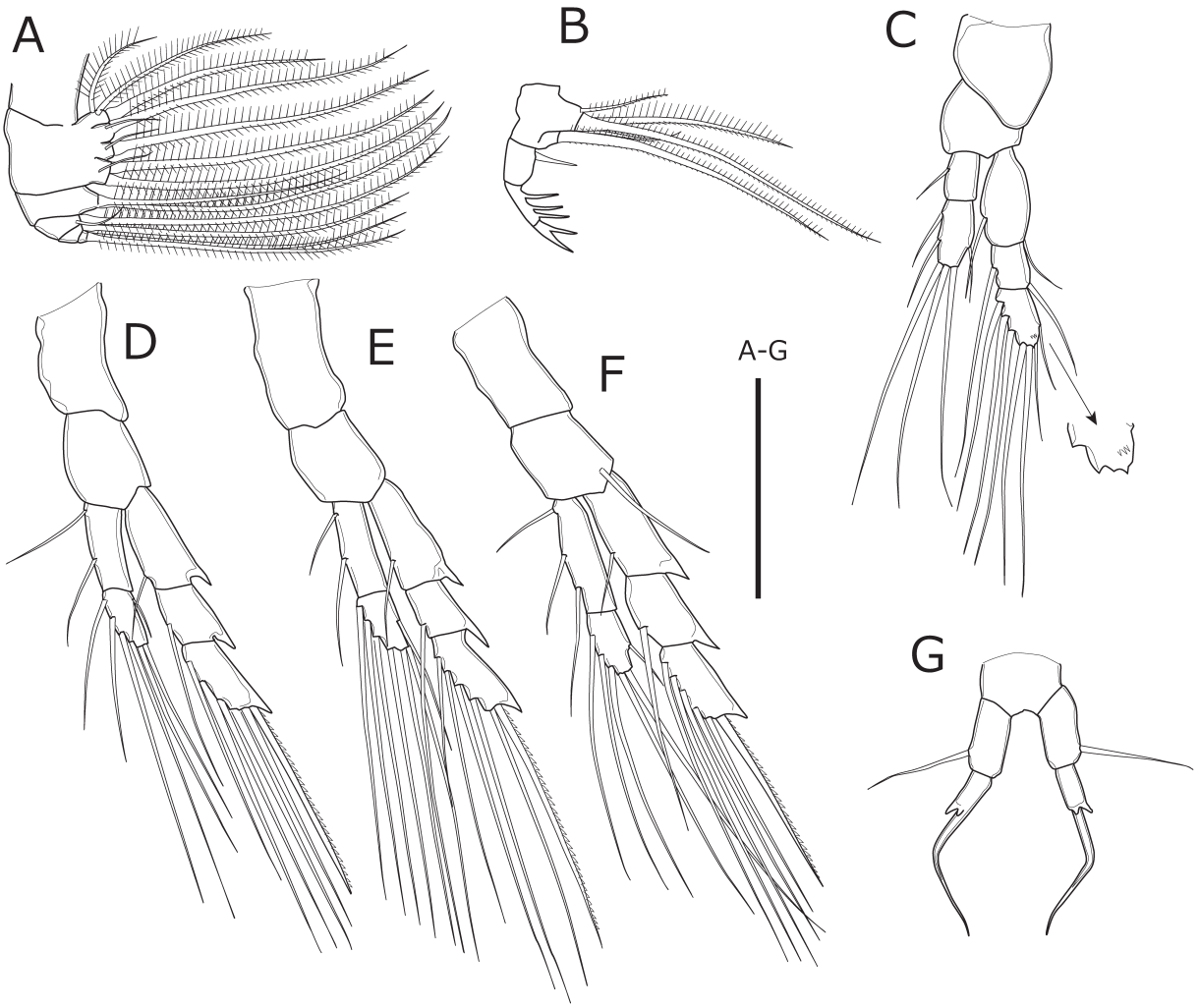

Fig. 2. *Acartia tsuensis*, female (Ito's sample). A, maxilla; B, maxilliped; C–G, legs 1–5, posterior. Scale bar, 0.10 mm except for enlarged part of C.

	Coxa	Basis	Exopodal segment	Endopodal segment
Leg 1	0-0	0-0	1-1; 1-1; 2-1-4	0-1; 1-3-2
Leg 2	0-0	0-0	0-1; 0-1; 0-I-5	0-2; 1-2-4
Leg 3	0-0	0-0	0-1; 0-1; 0-I-5	0-2; 1-2-4
Leg 4	0-0	1-0	0-1; 0-1; 0-I-5	0-3; 1-2-3

Leg 1 (Fig. 2C), exopodal segment 1 devoid of hairs on lateral margin; exopodal segment 3 with row of 2–4 spinules near distolateral corner of posterior surface.

Leg 5 (Fig. 2G), basis about 2 times width, with smooth lateral seta near distolateral corner; exopod (=spiniform terminal segment) bent at around mid length of segment, with prominent basal swelling bearing bilobed process on posterodistal corner; length of swelling about 1/4 of segment length; spiniform distal part devoid of teeth and slightly recurved at tip.

Male

Body (Fig. 3A) length 0.85–0.93 mm (n=4) in Ito's sample, 0.89–0.91 mm (n=3) in Ehime sample; prosome length 0.63–0.69 mm (n=4) in Ito's sample, 0.67–0.69 mm (n=3) in Ehime sample. Armature on posterior corner of prosome (Fig. 3B) as in female. First urosomite laterally concaved at mid length, with a few hairs or naked. Second urosomite with row of small spinules along posterodorsal margin without grouping in 4 loci, and with 2 small spinules on ventral surface of each side (Fig. 3C). Third and fourth urosomites with 1–2 (usually 1) spinules at each of 4 loci, these spinules larger than those on second urosomite. Anal somite without spinule. Caudal ramus slightly longer than wide.

Left antennule (Fig. 3D) 20-segmented; setal formula: (1) I = 0, (2) II–VIII= 8 + 2 ae, (3) IX = 1 + spine, (4) X–XI = 2 + ae, (5) XII = 0, (6) XIII = 0, (7) XIV = 1+ spine, (8) XV = 1, (9) XVI = 1 + ae, (10) XVII = 1, (11) XVIII = 1, (12) XIX = 1, (13) XX = 1, (14) XXI = 1 + ae, (15) XXII = 1, (16) XXIII = 1, (17) XXIV = 2, (18) XXV = 2, (19) XXVI = 2, (20) XXVII–XXVIII = 4 + ae.

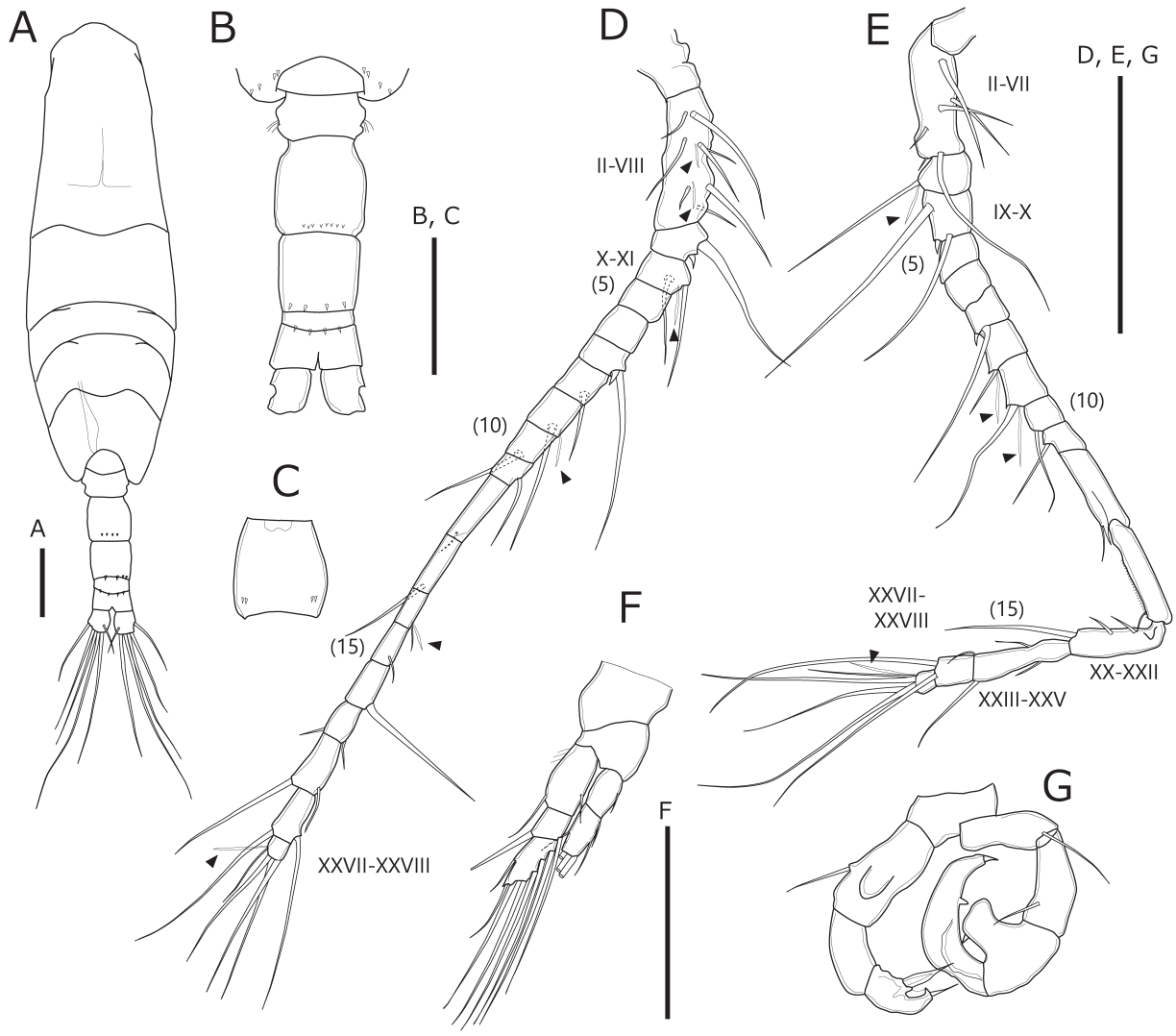

Fig. 3. *Acartia tsuensis*, male (A–C, from Ito's sample; D–G, from Ehime sample). A, habitus, dorsal; B, urosome with posterior corner of prosome, dorsal; C, second urosomite, ventral; D, left antennules, ventral; E, right antennule, ventral; F, leg 1, posterior; G, leg 5, posterior. Scale bars, 0.10 mm.

Right antennule (Fig. 3E) 17-segmented with geniculation between segments 13 and 14; setal formula: (1) I = 0, (2) II–VII = 6, (3) VIII = 1 + ae, (4) IX–X = 2 + spine, (5) XI = 0, (6) XII = 0, (7) XIII = 1+spine, (8) XIV = 1 + ae, (9) XV = 1 + ae, (10) XVI = 1, (11) XVII = 1, (12) XVIII = 1, (13) XIX = 1, (14) XX–XXII= 3, (15) XXIII–XXV = 4, (16) XXVI = 2, (17) XXVII–XXVIII = 4 + ae; segment 12 with spiniform attenuation at distal end.

Leg 1 (Fig. 3F), exopodal segment 1 with several hairs on proximal part of lateral margin; segment 3 without spinules.

Left leg 5 (Fig. 3G), basis with prominent process on posterior surface and naked seta at 2/3 length of lateral margin; exopodal segment 2 (=terminal segment) as long as exopodal segment 1 and about 3/5 times basis length, deeply concaved at distal half of medial margin, with blade-shaped smooth spine at mid length of medial margin, small hook-like process at distomedial corner, and thin apical spine of about 1/2 medial spine length.

Right leg 5, basis with naked seta on posterodistal margin; exopodal segment 1 with naked seta on distomedial part of posterior surface; exopodal segment 2 medially with round-cornered rectangular process bearing small spinule on distal side of segment; exopodal segment 3 (=terminal segment) with small blunt spine medially and acute small spine apically.

Other appendages as in female.

Remarks

The original description of *Acartia tsuensis* (Ito 1956) contains errors or oversights in the following illustrations (those in the present study in brackets): (1) female antennule 17-segmented [21-segmented]: (2) legs 2–3 with 3 setae [2 setae] on segment 1 and 6 setae [7 setae] on segment 2; (3) basal swelling of terminal segment of female leg 5 unilobed [bilobed]; (4) basis of male left leg 5 without

process [with prominent process] on posterior surface. The reasons of these mis-representations are probably due to misplaced segmentation between segments for (1) and (2) and to oversights for (3) and (4).

There were no notable differences in morphological features among the specimens from three different localities in Japan. Individual variations were observed in the number of spinules on the posterior corner of the prosome and the posterodorsal margins of the urosomites. The most frequent variation was in the number of spinules on the genital double somite and the second urosomite of the male. However, these spinules were always present on the specimens examined.

There have been taxonomic descriptions of *Acartia tsuensis* from Korea (Lee et al. 2007) and Vietnam (Cho et al. 2012). However. these descriptions have some differences from those of the Japanese specimens. For example, the spiniform terminal segment of the female leg 5 is bipinnate in the Korean specimen (Lee et al. 2007; fig. 9D) while that of the Japanese specimen is naked. Differences between Korean and Japanese specimens are also seen in fine setules on caudal ramus, leg 1, and so on. As for specimens from Vietnam, posterodorsal spinules on the male urosomite 2 are as large as those on the urosomite 3, while those of Japanese and Korean specimens are much smaller. The relative size of spinules on the urosome is sometimes

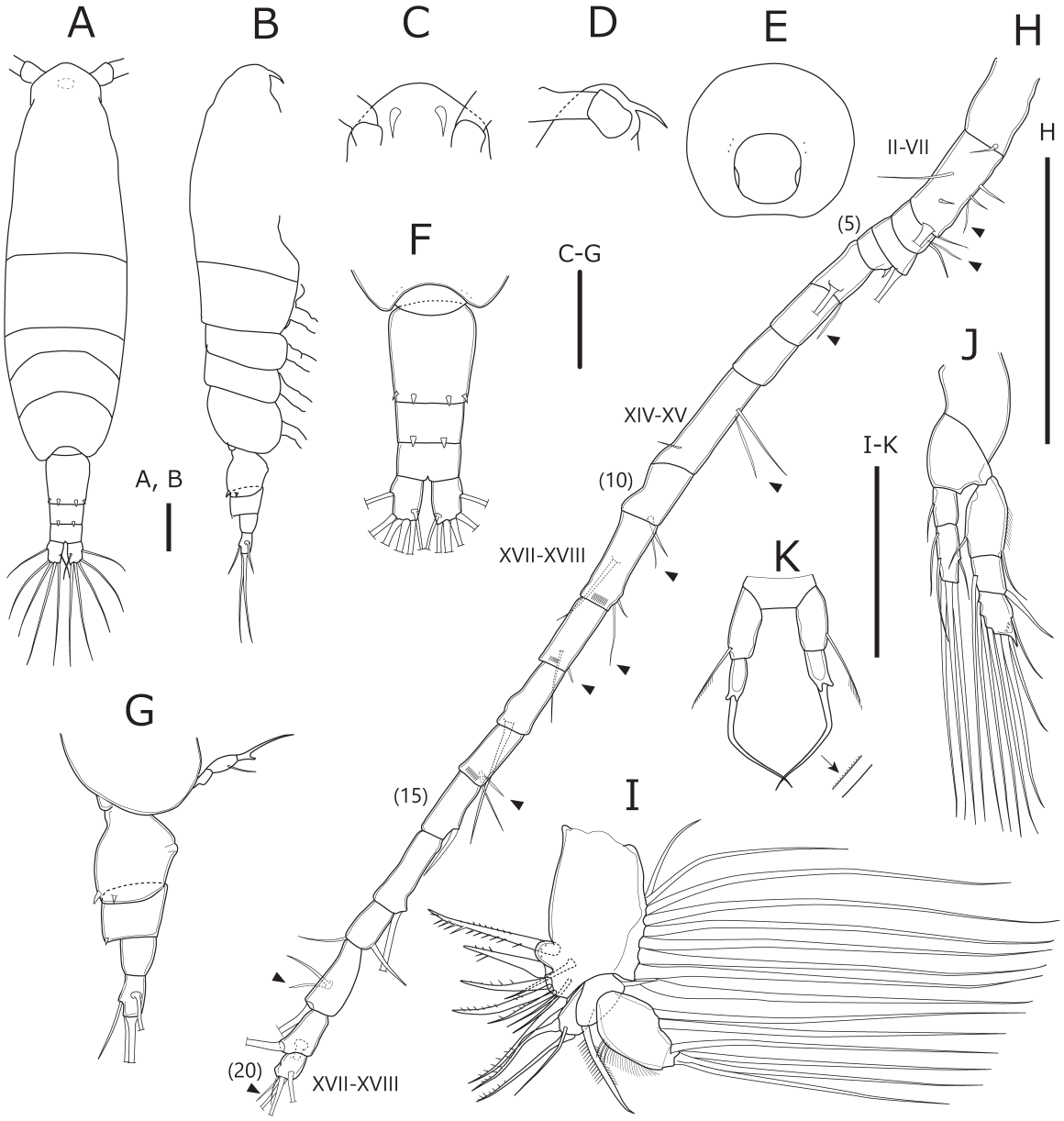

Fig. 4. *Acartia ohnoi* n. sp., female (A–G, holotype). A and B, habitus, dorsal and lateral; C and D, rostral filaments, ventral and lateral; E, posterior corner of prosome, posterior (urosome removed); F and G, urosome with posterior corner of prosome, dorsal and lateral; H, left antennule, ventral; I, left maxillule, posterior; J, leg 1, posterior; K, leg 5, posterior. Scale bars, 0.10 mm except for enlarged part of K.

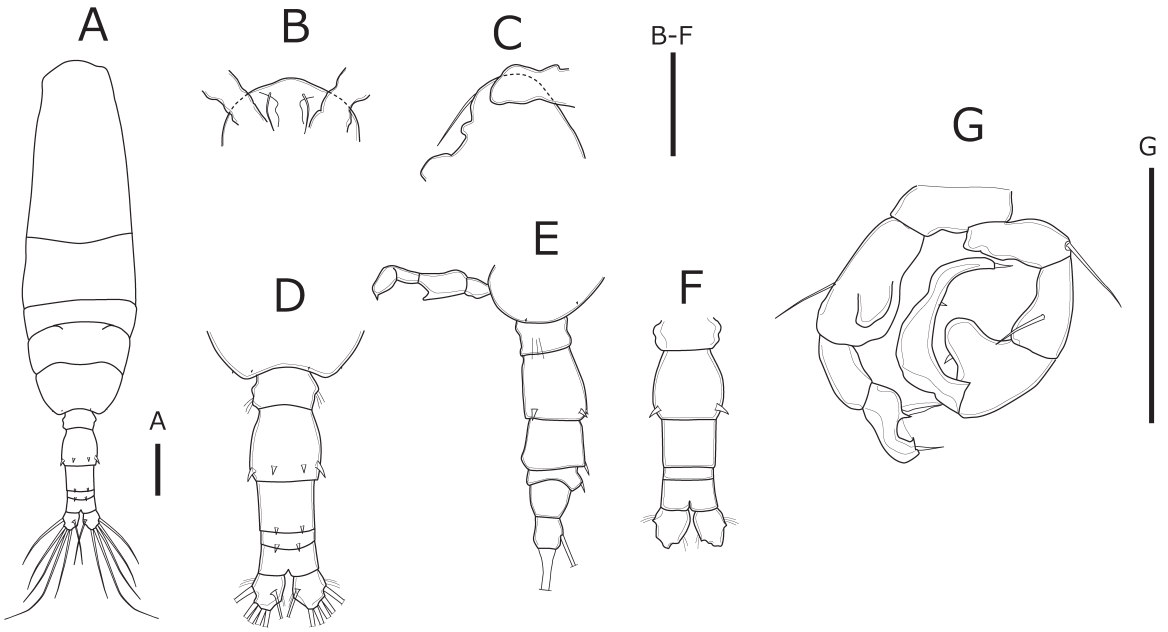

Fig. 5. *Acartia ohnoi* n. sp., male (A–D, allotype). A, habitus, dorsal; B and C, rostral filaments, ventral and lateral; D and E, urosome with posterior corner of prosome, dorsal and lateral; F, urosome, ventral; G, leg 5, posterior. Scale bars, 0.10 mm.

useful as a diagnostic morphological trait in brackish water copepods (Ueda & Hiromi 1987, Ueda & Sakaguchi 2019). By these morphological differences, the possibility that *A. tsuensis* in Korea and Vietnam is a cryptic species cannot be ruled out at this time. Their taxonomic status should be investigated with genetic data.

Acartia ohnoi, new species (Figs. 4 and 5)

Material examined

Female holotype (NSMT Cr 31709), male allotype (NSMT Cr 31710), 9 females and 5 males of paratypes (NSMT Cr 31711) from Leganes, Iloilo, Panay Island, the Philippines.

Female

Body (Fig. 4A, B) length 1.07–1.15 mm (n=4, holotype 1.10 mm); prosome length 0.85–0.95 mm (n=4, holotype 0.88 mm). Rostral filaments (Fig. 4C, D) thick and extending more perpendicular than parallel to body axis in lateral view. Posterior corner of urosome (Fig. 4E, F) with 1–3 tiny spinules on dorsal surface of each side. Genital double somite and next somite (Fig. 4F) with usually 4 and 2 spinules, respectively, along posterodorsal margin.

Antennule (Fig. 4H) 20-segmented; setal formula: (1) I = 1, (2) II–VII = 6 + ae, (3) VIII = 1 + ae, (4) IX = 1, (5) X = 1 (spiniform), (6) XI = 1 + ae, (7) XII = 0, (8) XIII = 0, (9) XIV–XV = 2 + ae, (10) XVI = 1 + ae, (11) XVII–XVIII = 2 + ae, (12) XIX = 1 + ae, (13) XX = 1, (14) XXI = 1 + ae, (15) XXII = 1, (16) XXIII = 1, (17) XXIV = 2, (18) XXV = 2 + ae, (19) XXVI = 2, (20) XXVII–XXVIII = 4 + ae; segments 11, 12, 14 with row of spinules near distoventral margin.

Maxillule (Fig. 4I), praecoxal arthrite proximally with round process bearing weak protrusions; exopod with row of hairs on medial margin, 3–4 of them much thicker than distal ones.

Leg 1 (Fig. 4J), exopodal segment 1 with hairs on lateral margin.

Leg 5 (Fig. 4K), lateral seta on basis plumose distally; exopod with minute teeth along medial margin from bending point to tip.

Other diagnostic features as in *Acartia tsuensis* female.

Male

Body (Fig. 5A) length 0.88–0.95 mm (n=5, allotype 0.91 mm); prosome length 0.65–0.73 mm (n=5, allotype 0.69 mm). Rostrum filaments (Fig. 5B, C) thin, extending at around 45° angle to body axis in lateral view. Second urosomite (Fig. 5D–F) with 6 spinules along posterior margin, 2 of them on centrodorsal, 2 on dorsolateral and 2 on ventral surface; centrodorsal spinules smaller than dorsolateral and ventral ones; dorsolateral spinules extending beyond lateral margin of somite in dorsal view. Third and fourth urosomites each with 2 spinules at posterodorsal margin; in some specimens, third urosomite with small spinule on dorsolateral surface in addition to 2 centrodorsal spinules. Caudal ramus as long as wide, with a few hair-like setules on both lateral and medial margin.

Leg 5 (Fig. 5G), right exopodal segment 2 medially with round-topped process.

Other diagnostic features as in *A. tsuensis* male.

Etymology

The new species is dedicated to the late Dr. Atsushi Ohno, who not only provided specimens of the new species but also contributed to research on fish seedling production

in the Philippines.

Remarks

Spinules on the posterior corner of the prosome are difficult to observe with a low-magnification microscope, because these are very small compared to those of *Acartia tsuensis*. Posterodorsal spinules on the genital double somite are somewhat variable, for example, one of the central two was absent and the size of the four spinules were almost even or the central ones were smaller. However, specimens with multiple spinules at a single locus, which was observed for *A. tsuensis*, were not found.

In the sample from which the present specimens were sorted, *A. ohnoi* n. sp. was the dominant copepod followed by the closely related *A. sinjiensis*. Females of the two species are easily distinguished by the caudal ramus (Fig. 6A, C), which is significantly shorter in *A. ohnoi* n. sp., and males by the spinules on the second and third urosomite (Fig. 6B, D), of which the ventral or dorsolateral spinule of *A. ohnoi* n. sp. can be seen from any angle, while these spinules are absent or hard to be observed in *A. sinjiensis*.

Discussion

The female of *Acartia tsuensis* and *A. ohnoi* n. sp. has the characteristic leg 5 with the basal swelling bearing a bilobed process. The same-shaped female leg 5 is also seen only for *Acartia bilobata* Abraham, 1970, which was described from brackish water in India (Abraham 1970). The male leg 5 of these three species is unique in the subgenus, especially in the terminal segment of the left leg with its deeply depressed medial margin, blade-like medial spine, hook-like distal projection, and relatively long distal spine. Since other macro features such as the shape of the segments are also similar among the three species, they can be classified into the *Acartia tsuensis* species group.

Morphological differences among them are summarized in Table 1. The most critical morphological character of the *A. ohnoi* n. sp. female that distinguishes it from *A. tsuensis* and *A. bilobata* is the thick rostral filaments. If the rostral filaments of *A. bilobata* are thick, the *A. ohnoi* n. sp. female can be identified by the combination of morphologies in Table 1. The critical morphological character for the *A. ohnoi* n. sp. male is conspicuous ventral spinules on the second urosomite, which are absent or very small in the other members of the group.

The present two species have a characteristic maxil-

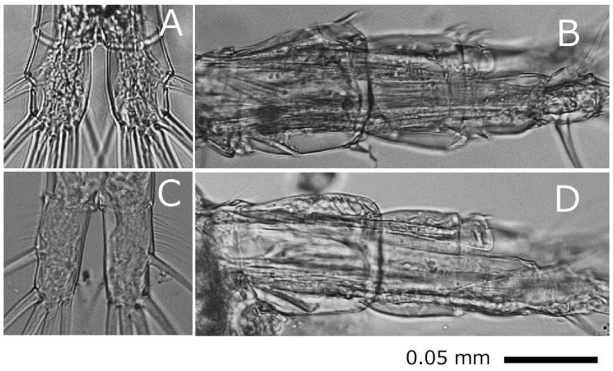

Fig. 6. Easily recognizable morphologies distinguishing *Acartia ohnoi* n. sp. (A, B) from co-occurring *A. sinjiensis* (C, D). A (holotype), C, female caudal ramus, dorsal; B (allotype), D, male urosome, slightly diagonal view.

Table 1. Morphological differences among the three species belonging to the *Acartia tsuensis* species group. Morphologies of *A. bilobata* follow Abraham (1970); asterisk and "—" denote information based on figure and no information, respectively.

	Acartia tsuensis	*Acartia bilobata*	*Acartia ohnoi* n. sp.
Female			
Rostral filaments	thin	—	thick
Spinules on posterior corner of prosome	clearly visible at 3 loci	absent*	small (hardly visible)
Genital double somite, spinule number	1 to >10	4*	usu. 4
Second urosomite, spinule number	usu. 4	4	usu. 2
Anal somite, spinule number	absent	2*	absent
Antennule, segment number	21	17	20
Antennule, segment with spinule row	segment 11	—	segments 11, 12, 14
Leg 5, basal seta	smooth	plumose throughout length*	plumose only distally
Leg 5, terminal segment	bent once at mid-length	bent twice at mid-length*	bent once at mid-length
Male			
Prosome, spinules on posterior corner	clearly visible at 3 loci	absent*	small (hardly visible)
Second ursomite, dorsolateral spinule	small or absent	small, not beyond lateral margin	large, beyond lateral marigin
Second ursomite, ventral spinule	small, 2 on each side	absent*	large, 1 on each side
Caudal ramus, lateral setules	absent	absent*	present
Right leg 5, medial process on exopodal segment 2	round-cornered rectangular	bilobed	round-top

lule bearing a round process on the praecoxal arthrite. The maxillule is not always described in taxonomic descriptions of copepods. Searching the copepod database by Razouls et al. (2005–2024), there are 14 *Acartia* species with figures of the maxillule. Among these 14 species, *A. bilobata* of the *A. tsuensis* species group and *A. forticrusa* Soh et al., 2013 of the different subgenus *Euacartia* (Soh et al. 2013) have a similar process on the maxillule to those of the present two species. The similarity between the *A. tsuensis* species group and *A. forticrusa* is found also in the terminal segment of the male right leg, which is a characteristic common feature of the *A. tsuensis* species group. These morphological similarities between *A. forticrusa* of *Euacartia* and the *A. tsuensis* species group of *Acanthacartia* would suggest a close phylogenetic relationship.

The *Acartia tsuensis* species group is similar to the *A. plumosa* species group (Ueda & Hiromi 1987) from ecological and geographical points of view. Species of both groups inhabit primarily brackish waters and are distributed from Japan to South Asia, with the exception of *A. plumosa* on the Atlantic coast of Africa. Sakaguchi & Ueda (2020) recently created a new species, *Acartia cagayanensis* Sakaguchi & Ueda, 2020, which is closely related to sympatric *A. sinjiensis* of the *A. plumosa* species group and the third member of *Acanthacartia* in the Philippines after *A. sinjiensis* and *A. ohnoi* n. sp. (as *A. tsuensis*). According to Blanco-Bercial et al. (2014), there were three different clades within *A. tsuensis*, of which two were from fish ponds in the Philippines. This indicates the presence of another species of the *A. tsuensis* species group in the Philippines, like the presence of *A. cagayanensis* closely related to the *A. plumosa* species group. However, careful observation of the present sample from a pond in Leganes did not reveal any *Acartia* species other than *A. ohnoi* n. sp. and *A. sinjiensis*. Further morphological research on *Acartia* species in the Philippines is necessary to find the fourth member of the *A. tsuensis* species group.

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