

# Type Specimens of Halacarid Mites by Dr. N. G. Makarova Relocated in the Collection of the National Museum of Nature and Science, Tsukuba, Japan

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**Abstract** Russian acarologist Dr. N. G. Makarova, an expert in the taxonomy of halacarid mites, contributed to clarifying the halacarid fauna on the coasts of the Russian Far East. The majority of halacarid specimens used for taxonomic studies by Dr. Makarova are preserved in Russia. This time, nine microscopic glass slides containing type specimens of halacarid mites prepared by Dr. Makarova were relocated to the arachnid collection of the National Museum of Nature and Science in Tsukuba Japan. The visual states of these microscopic glass slides and the condition of each specimen mounted on them are recorded with newly allotted register numbers to help locate the types and check their conditions for future taxonomic studies.

**Key words:** Acari, Dr. Makarova, Halacaridae, marine mites, Russia, type specimen.

## Introduction

Dr. N. G. Makarova was a Russian acarologist affiliated with the Institute of Marine Biology, the Far East Branch of the Russian Academy of Sciences, Vladivostok. She researched the taxonomy of halacarid mites inhabiting the Russian Far East and had valuable achievements related to the halacarid fauna in the Bering Sea (Makarova, 1972a, 1972b, 1974, 1976, 1977, 1978). Recently, Dr. Makarova kindly attempted to donate several halacarid type specimens of valid and invalid [*nomen nudum*] species to the present author, and she asked a Russian courier to take her microscopic glass slides from Russia to Japan. Unfortunately, some of the glass slides were badly damaged in transit, and a courier blithely discarded them at Niigata airport in Japan. Consequently, only nine glass slides were delivered to the author in an inspectable state. Recently, the author deposited these nine glass

slides prepared by Dr. Makarova in the arachnid collection of the National Museum of Nature and Science in Tsukuba Japan. Register numbers were newly allotted for the specimens mounted on these nine glass slides in the museum.

In the present paper, the visual states of the microscopic glass slides and the condition of specimens mounted on each of the nine slides were noted with newly allotted register numbers of specimens in order to help locate the type specimens and check their conditions for future taxonomic studies of halacarid mites.

## Materials and Methods

Mite specimens mounted on nine microscopic slides prepared by Dr. Makarova were examined with a phase-contrast microscope (Olympus BX 51). Photos were taken with a digital camera (Canon EOS 50D) equipped with a microscope. Measurements were made with an ocular micrometer and are given in micrometers ( $\mu\text{m}$ ). The material examined in this study has been

deposited in the arachnid collection of the National Museum of Nature and Science, Tsukuba; 4-1-1, Amakubo, Tsukuba, Ibaraki 305-0005, Japan.

In the results, the specimen number newly assigned at the National Museum of Nature and Science, Tsukuba, is given, followed by "NSMT-Ac." The specimen number written on the glass slide and/or in the original description by Dr. Makarova is shown in parentheses.

## Results

List of the relocated halacarid type specimens of valid and invalid [*nomen nudum*] species prepared by Dr. Makarova

Family Halacaridae Murray, 1877

Subfamily Halacarinae Viets, 1927

Genus *Acanthopalpus* Makarova, 1978

*Acanthopalpus hirsutus* Makarova, 1978

(Figs. 1-2)

*Type series.* Holotype: ♀ NSMT-Ac 14693 (1/8087) and paratype: 1 ♀ NSMT-Ac 14694 (2/8087).

*Condition.* The glass slide is partly broken and missing. Each body part is visible in both type specimens. However, the chaetotaxies of idiosoma, gnathosoma, palps, and legs are only partly recognizable. Holotype ♀: Idiosoma length 540, width 350; gnathosoma length 160, width 145. Paratype ♀: Idiosoma length 475, width 320; gnathosoma length 160, width 145.

*Remarks.* The specimen number given on the glass slide corresponds completely to that in the original description of Makarova (1978). The species was described by Makarova (1978) based on the specimen from the Gulf of Anadyr on the Bering Sea. Bartsch (2006, 2009) mentioned that this species might be synonymous with *Acanthopalpus spinosus* (Bartsch, 1978) as per Article 23 in the International Code of Zoological Nomenclature.

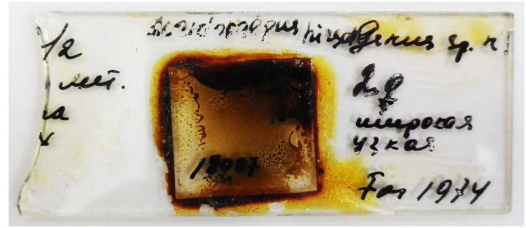


Fig. 1. *Acanthopalpus hirsutus*, glass slide prepared by Dr. Makarova.

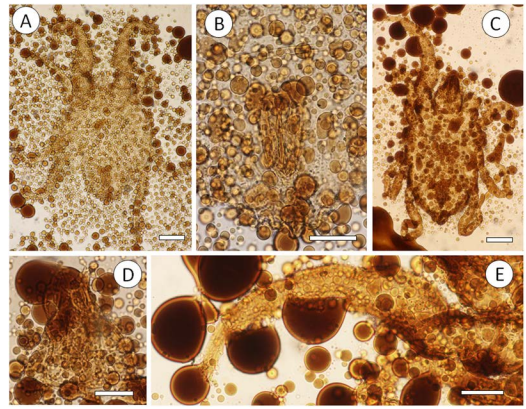


Fig. 2. *Acanthopalpus hirsutus*, holotype ♀ NSMT-Ac 14693 (A, B, D) and paratype ♀ NSMT-Ac 14694 (C, E). Idiosoma (A), genitoanal region (B), body (C), gnathosoma (D), first leg (E). Scale bars for AC = 100  $\mu$ m, BDE = 50  $\mu$ m.

Genus *Thalassarachna* Packard, 1871

*Thalassarachna aculeata* (Makarova, 1978)

(Figs. 3-7)

*Type series.* Holotype: ♂ NSMT-Ac 14695 (2/8110) and paratypes: 1 ♀ NSMT-Ac 14696 (3/8110), 2 deutonymphs NSMT-Ac 14697-14698 (4/8110 and 5/8110).

*Condition.* The body of the female is barely held in the mounting medium. The other specimens (male and two deutonymphs) are preserved in reasonably good condition. Each body part is visible, and the chaetotaxies of idiosoma, gnathosoma, palps, and legs are almost recognizable in all specimens. Holotype ♂: Idiosoma length 860, width 660; gnathosoma length 320, width 180; the right first leg is missing. Paratype ♀: Idiosoma length 750, width 500; gnathosoma

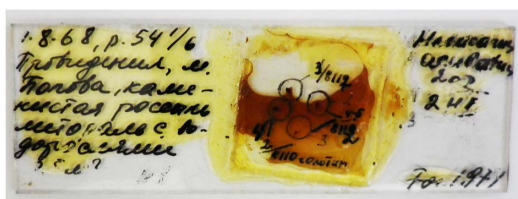


Fig. 3. *Thalassarachna aculeata*, glass slide prepared by Dr. Makarova.

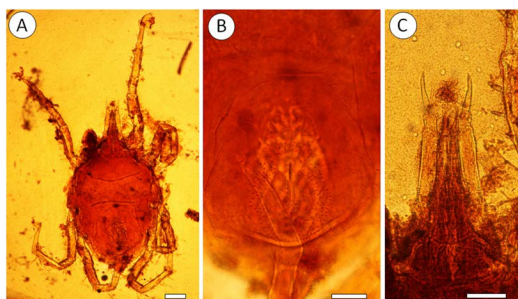


Fig. 4. *Thalassarachna aculeata*, holotype ♂ NSMT-Ac 14695. Body (A), genitoanal region (B), gnathosoma (C). Scale bars for A = 100  $\mu$ m, BC = 50  $\mu$ m.

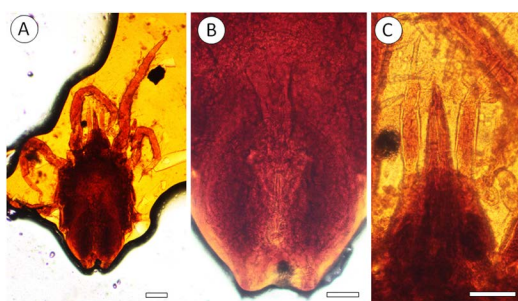


Fig. 5. *Thalassarachna aculeata*, paratype ♀ NSMT-Ac 14696. Body (A), genitoanal region (B), gnathosoma (C). Scale bars for A = 100  $\mu$ m, BC = 50  $\mu$ m.

length 280, width 160. Paratype deutonymphs: NSMT-Ac 14697 (4/8110): Idiosoma length 880, width 640; gnathosoma length 250, width 150; NSMT-Ac 14698 (5/8110): Idiosoma length 650, width 480; gnathosoma length 250, width 150.

**Remarks.** The specimen number of the holotype given on the glass slide corresponds completely to that in the original description of Makarova (1978). On the other hand, the sex and

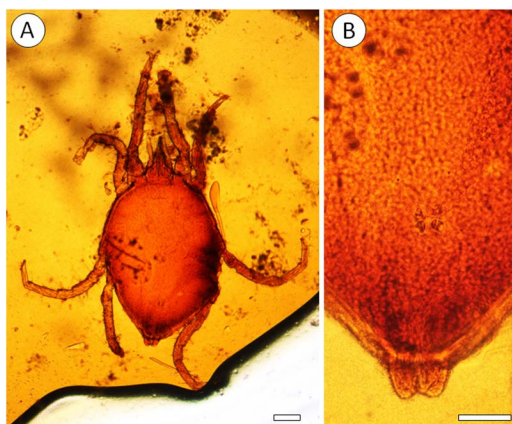


Fig. 6. *Thalassarachna aculeata*, paratype deutonymph NSMT-Ac 14697 (No. 4). Body (A), genitoanal region (B). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.



Fig. 7. *Thalassarachna aculeata*, paratype deutonymph NSMT-Ac 14698 (No. 5). Body (A), genitoanal region (B). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

specimen number of the paratypes given on the slide do not match those in the original description ( $\delta$ ,  $\text{♀}$ , deutonymph: 3–22/8111–8118). Judging from the general features of the specimens on the slide, it is probable that the female and deutonymph specimens on the slides are the paratype of *Thalassarachna aculeata*. The species name on the glass slide is given as *Halacarus aculeatus*. Bartsch (1997) moved this species to the genus *Thalassarachna*. Bartsch (2009) commented that this species might be a synonym

of *T. princeps* (Trouessart, 1902).

Genus *Halacarellus* Viets, 1927

*Halacarellus longus* [nomen nudum]

(Figs. 8–14, 19)

*Type series.* 1 ♀ NSMT-Ac 14699 (1/8076) and 1 ♂ NSMT-Ac 14700 (2/8077) on the slide in Fig. 8; 4 ♀ NSMT-Ac 14706–14709 (Nos. 1, 5–7) on the slide in Fig. 19.

*Condition.* Types on the slide in Fig. 8: Each body part is visible in both specimens. The chaetotaxies of idiosoma, gnathosoma, palps, and legs are partly recognizable. Type ♀: Idiosoma length 475, width 245; gnathosoma length 175, width 105. Type ♂: Idiosoma length 450, width 270; gnathosoma length 150, width 105.

Types on the slide in Fig. 19: Among seven specimens on the slide, type specimens of *Halacarellus longus* are marked numbers 1, 5–7 on the coverslip. Each body part of these specimens is visible, and chaetotaxies of idiosoma, gnathosoma, palps, and legs are roughly recognizable.



Fig. 8. *Halacarellus longus* [nomen nudum], glass slide prepared by Dr. Makarova.

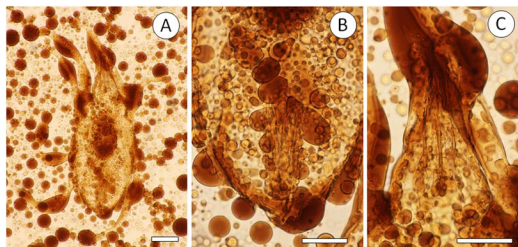


Fig. 9. *Halacarellus longus* [nomen nudum], ♀ NSMT-Ac 14699. Body (A), genitoanal region (B), gnathosoma (C). Scale bars for A = 100  $\mu$ m, BC = 50  $\mu$ m.

Type ♀: NSMT-Ac 14706 (No.1): Idiosoma length 510, width 290; gnathosoma length 170, width 120; NSMT-Ac 14707 (No.5): Idiosoma length 510, width 330; gnathosoma length 160, width 120; NSMT-Ac 14708 (No.6): Idiosoma length 475, width 170; gnathosoma length 140, width 110; NSMT-Ac 14709 (No.7): Idiosoma length 390, width 230; gnathosoma length 120, width 95.

*Remarks.* The specimen number given on the glass slide cannot be found in any publication of halacarid mites by Dr. Makarova. The species name is given as *Halacarus longus* on the glass

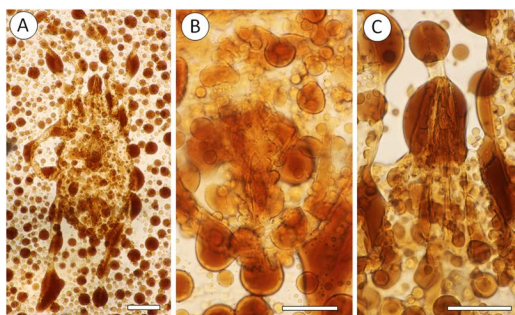


Fig. 10. *Halacarellus longus* [nomen nudum], ♂ NSMT-Ac 14700. Body (A), genitoanal region (B), gnathosoma (C). Scale bars for A = 100  $\mu$ m, BC = 50  $\mu$ m.

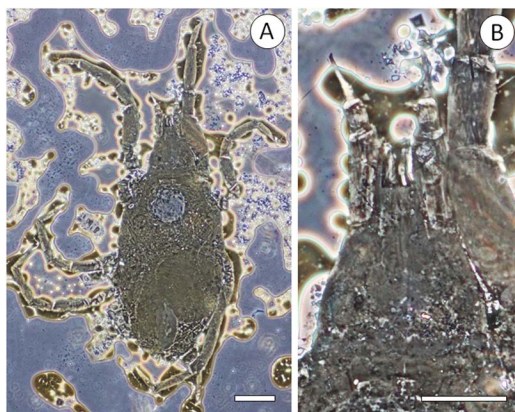


Fig. 11. *Halacarellus longus* [nomen nudum], ♀ NSMT-Ac 14706 (No. 1) mounted on the glass slide of *Copidognathus rombus*. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

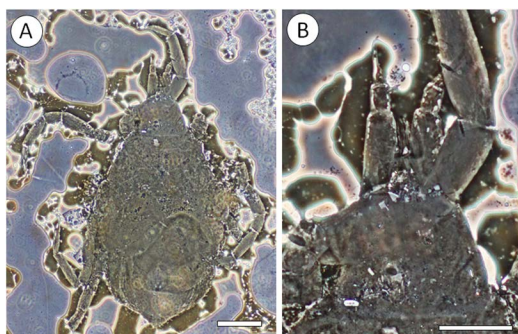


Fig. 12. *Halacarellus longus* [*nomen nudum*], ♀ NSMT-Ac 14707 (No. 5) mounted on the glass slide of *Copidognathus rombus*. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

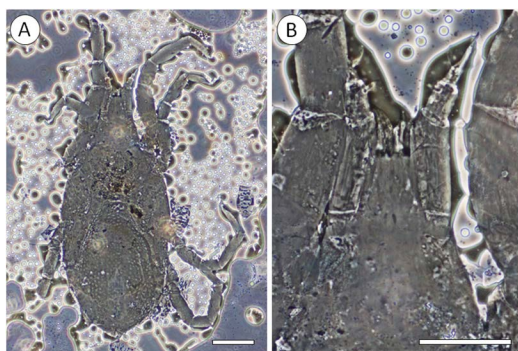


Fig. 13. *Halacarellus longus* [*nomen nudum*], ♀ NSMT-Ac 14708 (No. 6) mounted on the glass slide of *Copidognathus rombus*. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

slide. However, there is no halacarid mite given *longus* as a specific epithet. Dr. Makarova had not described this species. Further, based on the morphological characteristics, the specimens belong not to the genus *Halacarus*, but to *Halacarellus*.



Fig. 14. *Halacarellus longus* [*nomen nudum*], ♀ NSMT-Ac 14709 (No. 7) mounted on the glass slide of *Copidognathus rombus*. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

Subfamily Copidognathinae Bartsch, 1983

Genus *Copidognathus* Trouessart, 1888

*Copidognathus globulosus* Makarova, 1974

(Figs. 15–16)

*Type series.* Holotype: ♂ NSMT-Ac 14701 (8103).

*Condition.* The specimen is mounted on a square cover slip that is partly broken. Each body part is visible, and chaetotaxies of idiosoma, gnathosoma, palps, and legs are almost recognizable. Holotype ♂: Idiosoma length 500, width 410; gnathosoma length 120, width 100.

*Remarks.* The specimen number given on the glass slide (8103) does not match that in the original description (♂: 1/8023) by Makarova (1974). However, the collecting locality shown on the slide is consistent with that given by Makarova (1974). Further, the general features of this type specimen on the slide accord well with those in Fig. 3 in the original description. Therefore, it is certain that this specimen is the type of *Copidognathus globulosus*. The species name on the glass slide is given as *Halacarus globulosus*. However, Makarova (1974) described this species under the name of *Copidognathus globulosus* based on a specimen from Iturup Island.



Fig. 15. *Copidognathus globulosus*, glass slide prepared by Dr. Makarova. A: front side, B: back side.

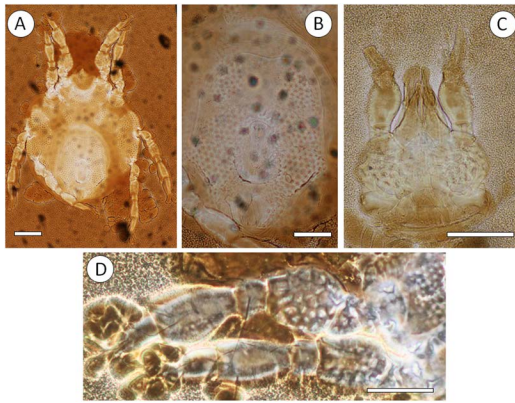


Fig. 16. *Copidognathus globulosus*, holotype ♂ NSMT-Ac 14701. Idiosoma (A), genitoanal region (B), gnathosoma (C), first and second legs (D). Scale bars for A = 100  $\mu$ m, BCD = 50  $\mu$ m.

### *Copidognathus pacificus* Makarova, 1974

(Figs. 17–18)

**Type series.** Holotype: ♂ NSMT-Ac 14702 (1/8031).

**Condition.** The idiosoma and first and second legs are visible, and the chaetotaxies of those body parts are approximately recognizable. On the contrary, the gnathosoma is not found, and the third and fourth legs are missing. Holotype ♂: Idiosoma length 350, width 215.

**Remarks.** The specimen number given on the glass slide partly corresponds to that in the original description (♂:1/31) of Makarova (1974). The general features of this type specimen and

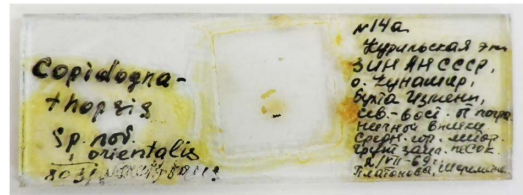


Fig. 17. *Copidognathus pacificus*, glass slide prepared by Dr. Makarova.

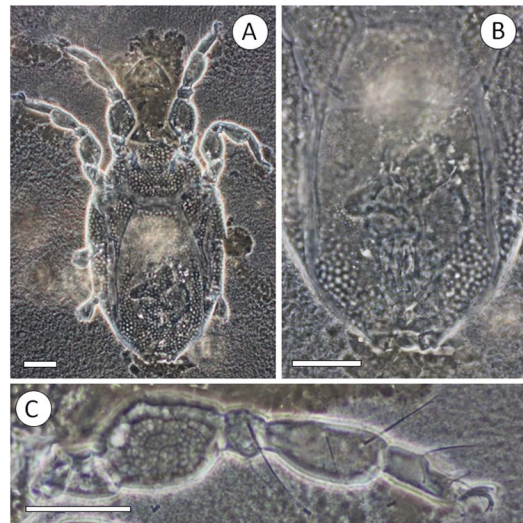


Fig. 18. *Copidognathus pacificus*, holotype ♂ NSMT-Ac 14702. Idiosoma (A), genitoanal region (B), first leg (C) (Phase-contrast micrographs). Scale bars for ABC = 50  $\mu$ m.

collecting locality shown on the slide are consistent with those given in the original description. Therefore, it is most likely that this specimen is the holotype of *Copidognathus pacificus*. The species name on the glass slide is given as *Copidognathopsis orientalis*. On the contrary, the specimen number given on the slide almost corresponds to that in the original description of *C. pacificus*. At that time, *Copidognathopsis* was regarded as one subgenus in the genus *Copidognathus*. *Copidognathus orientalis* was described by Newell (1951) based on a specimen from Attu Island in Alaska. Makarova (1974) described a new species under the name of *Copidognathus (Copidognathopsis) pacificus*, whereas the name of the new species was given as *Copidognathus*

(*Copidognathopsis orientalis*) [sic] in the summary. Makarova (1874) got *pacificus* confused with *orientalis* in writing the manuscript. The sex of the specimen indicated in Fig. 5 in Makarova (1974) is not female (самка), but male (самец).

### *Copidognathus rombus* Makarova, 1978

(Figs. 19–22)

*Type series.* Holotype: ♀ NSMT-Ac 14703 (1/8119), paratypes: 1 ♀ NSMT-Ac 14704 (2/8120) and 1 ♂ NSMT-Ac 14705 (5/8120).

*Condition.* Each body part is visible in type specimens. However, chaetotaxies of idiosoma, gnathosoma, palps, and legs are partly recognizable. Holotype ♀: Idiosoma length 450, width 325; gnathosoma length 105, width 95. Paratype ♀: Idiosoma length 480, width 375; gnathosoma length 110, width 100; second legs are broken. Paratype ♂: Idiosoma length 410, width 300;

gnathosoma length 105, width 95; the distal part of the idiosoma is broken, and the right first and left third and fourth legs are missing.

*Remarks.* The specimen number of the holotype given on the glass slide corresponds to that in the original description in Makarova (1978). However, the specimen number of the paratypes given on the slide does not match those in the original description (♂ and ♀: 3, 4, 5/8120 and 2/8121). Although the general characteristics of the specimen on the slide are barely recognizable, the collecting date and locality given on the slide correspond to those in the original description. Consequently, the female specimen



Fig. 19. *Copidognathus rombus* and *Halacarellus longus* [nomen nudum], glass slide prepared by Dr. Makarova.

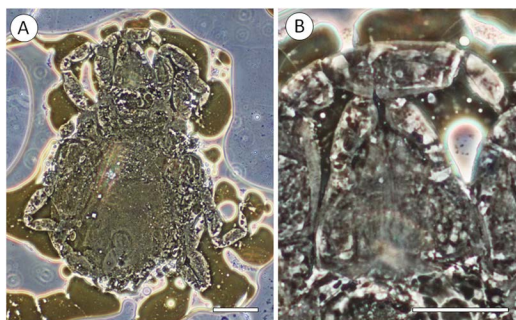


Fig. 20. *Copidognathus rombus*, holotype ♀ NSMT-Ac 14703. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

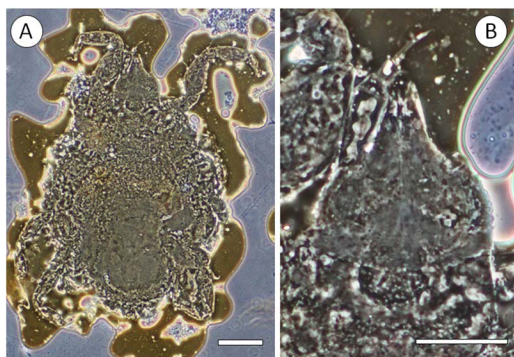


Fig. 21. *Copidognathus rombus*, paratype ♀ NSMT-Ac 14704. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

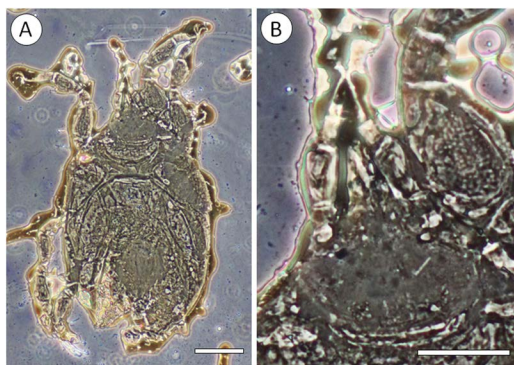


Fig. 22. *Copidognathus rombus*, paratype ♂ NSMT-Ac 14705. Body (A), gnathosoma (B) (Phase-contrast micrographs). Scale bars for A = 100  $\mu$ m, B = 50  $\mu$ m.

(2/8120) on the slide will probably be the paratype (2/8121) in the original description. The species was described by Makarova (1978) based on a specimen from the Gulf of Anadyr in the Bering Sea.

Apart from the types of *Copidognathus rombus*, the present glass slide contains four female specimens with the name shown as *Halacarellus longus* [*nomen nudum*].

***Copidognathus beringiensis* Makarova, 1978**  
[*nomen nudum*]

(Figs. 23–24)

*Type series.* 1 ♀ NSMT-Ac 14710 (1/8091).

*Condition.* Each body part is visible and chaetotaxies of idiosoma, gnathosoma, palps, and legs are almost recognizable. Type ♀: Idiosoma length 570, width 390; gnathosoma length 160, width 110.

*Remarks.* This species has not been properly described. Nevertheless, the species name, *Copidognathus beringiensis*, was given on page 166 in the list of animal species from the intertidal

zone of eastern Kamchatka and the western coast of the Bering Sea (Makarova, 1978). The specimen number given on the glass slide cannot be found in any papers by Dr. Makarova.

***Copidognathus kamchaticus* [*nomen nudum*]**

(Figs. 25–26)

*Type series.* 1 ♀ NSMT-Ac 14711 (1/8093).

*Condition.* The slide is partly broken and missing. Each body part is visible, and chaetotaxies of idiosoma, gnathosoma, palps, and legs are approximately recognizable. Type ♀: Idio-



Fig. 25. *Copidognathus kamchaticus* [*nomen nudum*], glass slide prepared by Dr. Makarova.

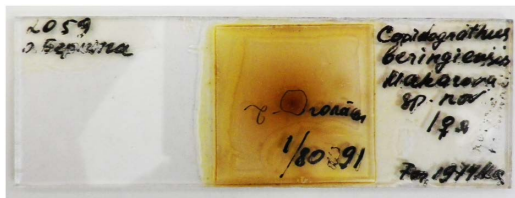


Fig. 23. *Copidognathus beringiensis* [*nomen nudum*], glass slide prepared by Dr. Makarova.

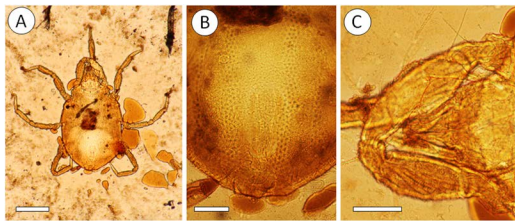


Fig. 24. *Copidognathus beringiensis* [*nomen nudum*], ♀ NSMT-Ac 14710. Body (A), genitoanal region (B), first leg (C). Scale bars for A = 200  $\mu$ m, BC = 50  $\mu$ m.

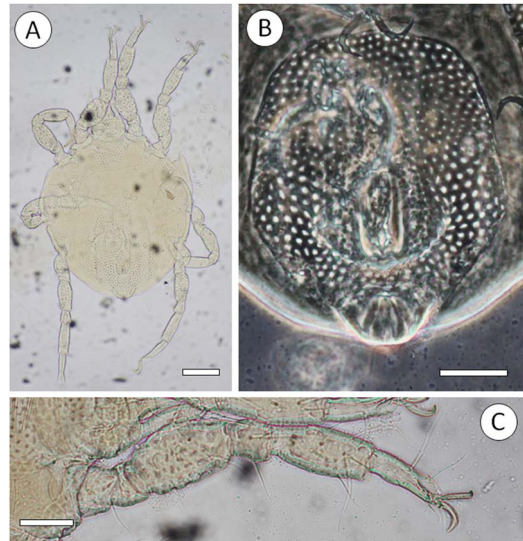


Fig. 26. *Copidognathus kamchaticus* [*nomen nudum*], ♀ NSMT-Ac 14711. Body (A), genitoanal region (B) (Phase-contrast micrograph), first leg (C). Scale bars for A = 100  $\mu$ m, BC = 50  $\mu$ m.



soma length 500, width 430; gnathosoma length 140, width 100.

**Remarks.** The specimen number given on the glass slide cannot be found in any publication by Dr. Makarova. There is no halacarid mite given “*kamchaticus*” as a specific epithet. Dr. Makarova has not described this species.

Subfamily Halixodinae Viets, 1927

Genus *Agaue* Lohmann, 1889

*Agaue kurilensis* Makarova, 1977

(Figs. 27–28)

**Type series.** Holotype: ♀ NSMT-Ac 14712 (1/8052).

**Condition.** Each body part is visible, and chaetotaxies of idiosoma, gnathosoma, palps, and legs are approximately recognizable. Holotype ♀: Idiosoma length 1000, width 650; gnathosoma length 350, width 180. Idiosoma is somewhat broken.

**Remarks.** The specimen number given on the glass slide corresponds exactly to that in the orig-



Fig. 27. *Agaue kurilensis*, glass slide prepared by Dr. Makarova.

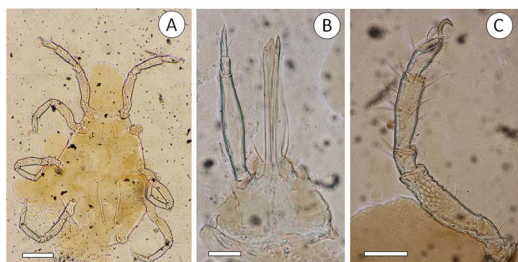


Fig. 28. *Agaue kurilensis*, holotype ♀ NSMT-Ac 14712. Idiosoma (A), gnathosoma (B), first leg (C). Scale bars for A = 200  $\mu\text{m}$ , B = 50  $\mu\text{m}$ , C = 100  $\mu\text{m}$ .

inal description by Makarova (1978). The species name on the slide is given as “*Agaue aff kurilensis*.” Considering that the word “*aff*” is clearly separated from “*kurilensis*” in the species name on the slide (Fig. 27), it is probable that Dr. Makarova initially intended to describe this species as a subspecies of *Agaue affinis* Sokolov, 1962 (= *Agaue parva* (Chilton, 1883)).

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