

Spiders of the Genus *Tricalamus* (Araneae, Filistatidae) from Japan

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(Received 1 November 2012; accepted 19 December 2012)

Abstract Two species of spiders of the genus *Tricalamus* Wang, 1987 (Araneae, Filistatidae) are reported from Japan. The occurrence of a Micronesian spider, *Tricalamus fuscatus* (Nakatsudi, 1943) in Japan is confirmed with specimens obtained from Mukojima Island of the Ogasawara Islands. A new species of the genus is described from Okinawajima Island of the Ryukyus under the name of *Tricalamus ryukyuensis* sp. nov.

Key words: taxonomy, new species, Araneae, Filistatidae, Okinawa, Japan.

Introduction

Crevice weavers of the family Filistatidae are small to medium-sized spiders living in tubular retreats made in crevices of the ground and in caves as well as on walls of buildings in urban areas. The family is composed of more than 100 species of 16 genera, which are distributed in warmer regions of the world (Jocqué and Dippenaar-Schoeman, 2006; Ono, 2009). Having cribellate and haplogyne characteristics, this family is regarded as one of the important groups to discuss phylogenetic relationships within the infraorder Araneomorphae.

Four species of this family were hitherto recorded in Japan: *Filistata marginata* Kishida in Komatsu, 1936 from Okinawajima Island (Kishida, 1959; Yaginuma, 1986; Ono, 2009), *Filistata longiventris* Yaginuma, 1967 from Oita Prefecture, Kyushu (Yaginuma, 1967, 1986; Ono, 2009), “*Filistata*” *fuscata* Nakatsudi, 1943 from Ogasawara Islands (Yaginuma, 1970, 1979; Ono, 2011b) and a “*Filistata*” species from Amami-oshima Island, Kagoshima Prefecture (Kayashima, 1955). Of these, *Filistata longiventris* was described on the basis of one female (holotype) collected from the Furen-do Cave in

Oita Prefecture in 1964, but has never been rediscovered at all. The occurrence of the Taiwanese species *Filistata marginata* in Okinawa is not recognized since its original record made by Kishida (1959). Although Kayashima (1955) noted that an undescribed species of *Filistata* found on Amami-oshima Island was different from *Filistata marginata*, nobody has seen the spider on the island again.

As a result of the study project “Biodiversity Inventory in the Western Pacific Region,” carried out by the National Museum of Nature and Science, Japan, Micronesian “*Filistata*” *fuscata* was revised and re-described with fresh topotypical specimens from Koror Island of the Palau Islands (Ono, 2011a), and transferred to *Tricalamus* Wang, 1987 from the original genus. However, its Japanese records were not confirmed because of a shortage of material.

Recently, I obtained some specimens of the genus *Tricalamus* from Okinawajima Island, the Ryukyu Islands and Mukojima Island of the Ogasawara Islands. The specimens from Okinawa were collected by Mr. Takeru Naka and sent to me by Dr. Akio Tanikawa, while those from Ogasawara were collected and contributed by Mr. Shingo Hatsushiba.

Results of the examination of these specimens are reported in the present paper. The spider from Ogasawara was identified with *Tricalamus fuscatus* (Nakatsudi, 1943) and the records of this species in Japan were confirmed herewith. The other one from Okinawa was also similar to this Micronesian species in general appearance, but was different from it in details of the male palpal organ and female genitalia. After careful examinations, the spider from Okinawa was regarded as a new species to be described.

The abbreviations used are as follows: ALE, anterior lateral eye; AME, anterior median eye; PLE, posterior lateral eye; PME, posterior median eye.

The specimens used for this study including types of the new species are deposited in the arachnid collection (Tsukuba) of the National Museum of Nature and Science, Tokyo (NSMT-Ar 9930–9937).

Family Filistatidae

Genus *Tricalamus* Wang, 1987

[Japanese name: Hime-kayashima-gumo-zoku]

Notes. This genus was established by Wang (1987) and separated from *Pritha* Lehtinen, 1967, by the shape of calamistrum having three rows of hairs, while there are only two rows of hairs in *Pritha*. However, both the genera are very similar in genital morphology, especially in the shape of cymbium of male palp with a deep notch. The relationship of both the genera may be once again discussed on the basis of re-studying the type species, that is, *Pritha nana* (Simon, 1868) from the Mediterranean and *Tricalamus tetragonius* Wang, 1987, from China.

Spiders of *Filistata* Latreille, 1810 are much larger in size, and have male palp with slender segments, long cymbium and a different structure of palpal organ (Lehtinen, 1967). Although there are no data on males of *Filistata marginata*, *F. longiventris* and an undescribed species of *Filistata* from Amami-oshima Island, recorded from Japan, their generic affiliation is questionable.

Two species of the genus occur in Japan.

Tricalamus ryukyuensis sp. nov.

[Japanese name: Ryukyu-kayashima-gumo]

(Figs. 1–13)

Diagnosis. This new species has been regarded as a member of the genus *Tricalamus* Wang, 1987, on the basis of the condition of female calamistrum having three rows of hairs and the structure of male palpal organ with a deep notch at the cymbium. In a dozen known species of the genus, *Tricalamus fuscatus* (Nakatsudi, 1943) seems to be closest to this new species. The embolic division of the male palp of this new species is simple, while that of *T. fuscatus* is thicker and with a wing-like membranous process (cf. Figs. 2–3 and Ono, 2011a, p. 187, figs. 10–11). Female genitalia of this new species consist of spermathecae and glands in almost same size, while the glands of *fuscatus* are much smaller than spermathecae (cf. Fig. 9 and Ono, 2011a, p. 1987, fig. 8).

Type specimens. Holotype (NSMT-Ar 9930): male, allotype (NSMT-Ar 9931): female and 12 females and 6 males paratypes (NSMT-Ar 9932–9935), all from Kamara, Okinawa-shi (about 26°20'N/127°50'E), Okinawa Prefecture (Okinawajima Island), Japan, 22-V-2011, Takeru Naka leg.

Description (based on the holotype and allotype). Measurements: Body length female 5.58 mm, male 2.58 mm; prosoma length female 1.77 mm, male 1.44 mm, width female 1.50 mm, male 1.20 mm; opisthosoma length female 3.78 mm, male 1.74 mm, width female 2.67 mm, male 1.05 mm; lengths of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: female I 7.71 mm (2.07 + 0.56 + 2.10 + 1.85 + 1.13), II 5.58 mm (1.65 + 0.54 + 1.30 + 1.31 + 0.78), III 5.03 mm (1.63 + 0.55 + 1.05 + 1.15 + 0.65), IV 6.17 mm (1.75 + 0.55 + 1.63 + 1.44 + 0.80), male I 6.42 mm (1.81 + 0.49 + 1.79 + 1.50 + 0.83), II 4.93 mm (1.39 + 0.48 + 1.25 + 1.19 + 0.62), III 4.32 mm (1.20 + 0.44 + 1.00 + 1.12 + 0.56), IV 5.84 mm (1.59 + 0.50 + 1.52 + 1.50 + 0.72).

Prosoma: Carapace longer than wide (length/width female 1.18, male 1.20), covered with long, soft hairs, median furrow indistinct (Fig. 4). Eyes compactly set, ocular area wider than long (Fig. 5), $ALE = PLE > AME \geq PME$ (1.6:1.6:1:1 in female, 1.8:1.8:1.3:1 in male), both the eye rows procurved, $AME-AME = AME-ALE$, $ALE-PLE > PME-PLE$ (2:1 in female and male), PME and PLE close to each other, $PMEs$ apart from each other, median ocular area wider than long (length/width 0.66 in female and male), wider behind than in front (anterior width/posterior width 0.60 in female and male), clypeus wide, almost same as the width of the ocular area. Chelicera: Small, with a short fang, fang furrow absent but a large tooth-like process present on the margin, which forms pincers with fang; maxillae convergent and close to each other distally, labium united proximally with sternum, longer than wide, sternum longer than wide (length/width 1.40–1.60), female palp with a claw (Fig. 6). Legs, especially those of

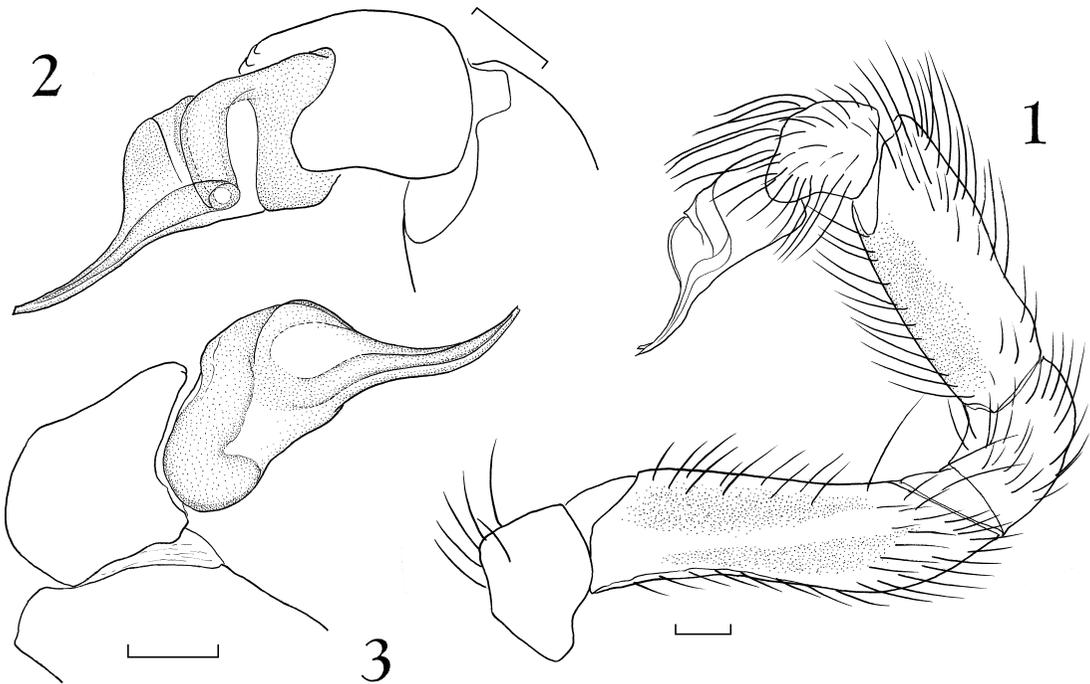
female robust, densely covered with thick hairs, spines not remarkable, leg formula: I-IV-II-III, calamistrum of female situated in the basal part of metatarsi IV with three rows (7/4/9) of hairs.

Male palp (Figs. 1–3): Femur slightly curved, almost as long as patella + tibia, tibia much longer than cymbium, without any apophysis, cymbium short, with a deep notch dorso-retrolaterally, palpal organ simple and long with short embolus, a wing-like embolar process absent.

Opisthosoma: Oval, longer than wide (length/width 1.41 in female, 1.66 in male), densely covered with strong hairs (bald in female), spinnerets compactly set, anterior spinnerets as same as posterior ones in size, median ones small, cribellum paired, small, oval in shape (Fig. 7).

Female genitalia (Figs. 8–9): Genital field wider than long, slightly swollen. Inner organ: very small with two pairs of globular process (spermathecae and their glands) on independent short stems.

Coloration and markings (Figs. 4, 10–11):



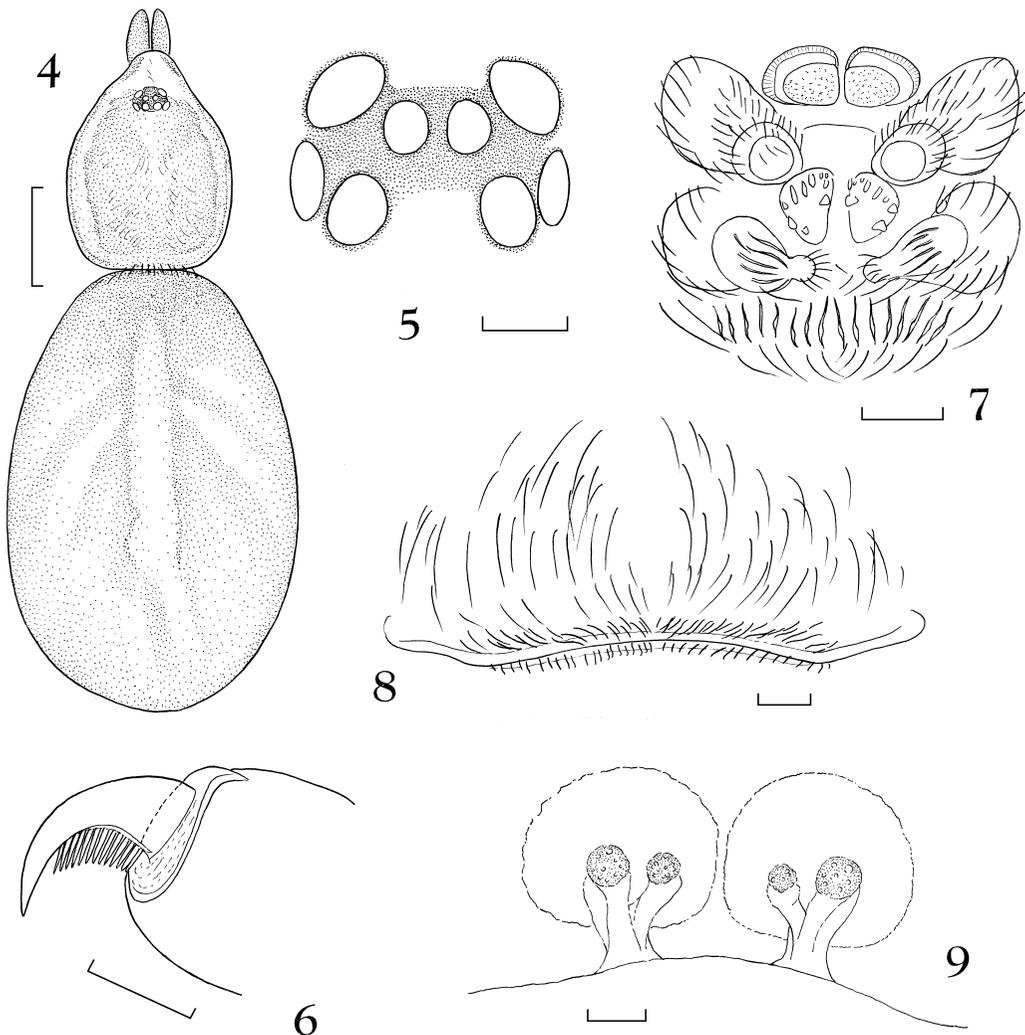
Figs. 1–3. *Tricalamus ryukyuensis* sp. nov., male, holotype (NSMT-Ar 9930). — 1, Palp, retrolateral view; 2, palpal organ, dorso-retrolateral view; 3, palpal organ, prolateral view. Scales 0.1 mm.

Female and male: carapace light brown or brown with indistinct blackish brown markings laterally, ocular area black, chelicerae, maxillae and labium light yellowish brown, sternum white, palps and legs yellowish brown except for coxae and trochanters whitish, and femur much darker. Opisthosoma dorsum of the female gray, lighter at the middle, with light colored patches, that of the male brown with a large marking made of white hairs in the anterior part.

Variation. Body length of females: 4.32–5.58 mm, that of males, 2.52–3.27 mm. Color of the body of some females is very dark, and with several pairs of white bars on the dorsum of opisthosoma.

Distribution. Known only from the type locality on Okinawajima Island, the Ryukyus.

Biology. Field observations by Mr. T. Naka indicate that spiders of the new species were found on the inclined ground along the edge of a



Figs. 4–9. *Tricalamus ryukyuensis* sp. nov., female, allotype (NSMT-Ar 9931). — 4, Body (palps and legs omitted), dorsal view; 5, eyes, dorsal view; 6, palpal claw, retrolateral view; 7, spinnerets, ventral view; 8, genital field, ventral view; 9, inner organ of female genitalia, dorsal view. Scales for Fig. 4, 1.0 mm, for Figs. 5–8, 0.1 mm, for Fig. 9, 0.08 mm.



Figs. 10–13. *Tricalamus ryukyuensis* sp. nov. — 10, Female (one of the paratypes), body length 4.98 mm; 11, female (left) and male (right) at the entrance of the female's retreat, body length of the male, 2.58 mm; 12, web of a female, diameter of the entrance of retreat, ca. 5 mm; 13, egg sac, diameter of the cluster, ca. 3 mm. Photograph: Takeru Naka.

forest. Webs are made of delicate threads with a simple round entrance of tubular retreat at the middle (Fig. 12). An egg sac with about 40 eggs in the retreat was photographed (Fig. 13).

Remarks. The record of *Filistata marginata* Kishida in Komatsu, 1936 from the same island (Kishida, 1959) could not be checked. The Taiwanese spider (type locality: Tainan City) should also be revised, although the depository of type specimens has not been known.

Because the habitat of this new species is isolated in the urban area of Okinawa City it may be protected from further urbanization. However, there is also a possibility that the spider was imported artificially.

Tricalamus fuscatus (Nakatsudi, 1943)

[Japanese name: Tobihiro-kayashima-gumo]

Filistata fuscata Nakatsudi, 1943, p. 148, fig. 1 a–c (type material based on a female described and some immature females collected by Toji Ogata on Koror Island, Palau Islands, VIII-1941; depository unknown, but presumably in the Tokyo University of Agriculture). — Ono, 2011b, p. 444.

Filistata fuscata Kishida, 1947, p. 999, fig. 2839 (based on specimens from Japanese Micronesia as the type area; depository of type specimens unknown). [Regarded by Ono (2011a) as a junior homonym and synonym of *Filistata fuscata* Nakatsudi, 1943.]

Filistata fuscata Kishida in Nakatsudi, 1943: Brignoli, 1983, p. 144.

Filistata fuscata Kishida, 1943: Platnick, 2011.

Tricalamus fuscatus: Ono, 2011a, p. 185, figs. 1–11. — Platnick, 2012.

Specimens examined. One female and one male from Mukojima Island (about 27°40'N/142°08'E), Ogasawara Islands, Tokyo, Japan, 30-VI (female) and 1-VII (male) in 2011, Shingo Hatsushiba leg. (NSMT-Ar 9936–9937).

Notes. *Filistata fuscata* was published for the first time by Nakatsudi (1943) with females from Koror Island, Palau, of the Japanese Micronesia at that time. Having regarded the description and figures as the original publication of Kodi Nakatsudi, I recognized that the name published by Nakatsudi had preceded the same name used by Kishida (1947) (Ono, 1994, 2005, 2009, 2011a; Platnick, 2012). Although this species was recorded in Ogasawara Islands, Japan on the basis of unreliable identifications (Yaginuma, 1970, 1979; Ono, 2011b), the occurrence was confirmed with the specimens newly obtained.

Distribution. Palau (Koror Island) and Japan (Hahajima and Mukojima Islands).

Acknowledgements

I wish to express my sincere thanks to Mr. Takeru Naka, Okinawa, for offering invaluable specimens and the photographs used in this paper. Many thanks are also due to Dr. Peter Jäger, Frankfurt am Main, Dr. Akio Tanikawa and Mr. Shingo Hatsushiba, Tokyo, for their advice and support in collecting specimens or critically reading the manuscript of this paper. This study was partly supported by the Japan Society of Promotion of Science (JSPS No. 21540487).

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