

## Two New Spiders of the Families Anapidae and Clubionidae (Arachnida, Araneae) from Japan

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**Abstract** Two new spiders of the families Anapidae and Clubionidae (Arachnida, Araneae) are described from Okayama Prefecture, Honshu, Japan under the names, *Mysmena nojimai* sp. nov. (Anapidae) and *Anaclubiona minima* sp. nov. (Clubionidae). A new clubionid genus *Anaclubiona* is established and diagnosed, including following three species: *Anaclubiona zilla* (Dönitz et Strand, 1906), comb. nov. (type species) and *A. tanikawai* (Ono, 1989), comb. nov., transferred from the genus *Clubiona*, and *A. minima* sp. nov., described herewith.

**Key words**: Taxonomy, Araneae, Anapidae, Clubionidae, Japan.

### Introduction

Since Koch (1878) published the first report of Japanese spiders, about 1500 species of 64 families have been recorded from this country (Ono, 2009). Although the spider fauna of Japan seems to be well investigated in comparison with those of the other Asian regions, a lot of chance to find new and interesting species is still remaining. Two new species of spiders of Anapidae and Clubionidae are treated in this paper on the basis of materials collected by Mr. Koichi Nojima, a skillful researcher who made discoveries in various families of Japanese spiders.

Because spiders of Anapidae are small in size with body length frequently less than 1 mm, very little is studied on this family in Asia. Only seven species of four genera were hitherto known in Japan (Ono, 2009), but some additional species are estimated, referring to the fact that many new species were recently discovered in China (Lin & Li, 2008; Miller, Griswold & Yin, 2009). The new anapid spider to be described herein is regarded as a member of the well-known genus

*Mysmena*, which is however recorded from Japan for the first time.

The family Clubionidae has also been incompletely studied in Japan (Ono & Hayashi, 2009). The new species to be described in this paper shows remarkably small size with body length only 1.8 mm. It belongs to the peculiar species group of *Clubiona zilla*, which is quite different from the range of species groups within the genus *Clubiona*. After a careful examination the species group is raised to the generic level.

The abbreviations used are as follows: ALE, anterior lateral eye; AME, anterior median eye; PLE, posterior lateral eye; PME, posterior median eye. The type specimens of the new species are deposited in the arachnid collection of the Department of Zoology, National Museum of Nature and Science, Tokyo (NSMT).

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### Taxonomy

Family Anapidae

Subfamily Mysmeninae

Genus *Mysmena* Simon, 1894

[Japanese name: Nami-kotsubugumo-zoku]

*Mysmena nojimai* sp. nov.

[Japanese name: Gomafu-kotsubugumo]

(Figs. 1–8)

**Diagnosis.** This new species resembles *Mysmena changouzi* Miller, Griswold et Yin, 2009, and *Mysmena rostella* Lin et Li, 2008, both from Yunnan Province, China, but differs from these Chinese species by thinner male palpal organ and presence of a long and hard scape of epigynum. The anterior median eyes of this new species are remarkably smaller than the anterior lateral eyes.

**Material examined.** Holotype: male from Uno, altitude around 100 m, Kamo-cho, Tsuyama-shi, Okayama Prefecture, Honshu, Japan, 12-VI-2009, K. Nojima leg. (NSMT-Ar 8515); paratypes: one female from Awai, altitude 100–200 m, Kita-ku, Okayama-shi, Okayama Prefecture, Honshu, Japan, 6-VI-2009, K. Nojima leg. (NSMT-Ar 8516); two females from Mt. Roku-sho-san, altitude around 400 m, Sakaue-cho, Toyota-shi, Aichi Prefecture, Honshu, Japan, 18-X-2009, K. Ogata leg. (NSMT-Ar 8568).

**Description** [based on the male holotype and a female paratype (NSMT-Ar 8516)]. Measurements: Body length female 0.89 mm, male 0.87 mm; prosoma length female 0.45 mm, male 0.42 mm, width female 0.41 mm, male 0.42 mm, height female 0.15 mm, male 0.37 mm; opisthosoma length female 0.60 mm, male 0.50 mm, width female 0.56 mm, male 0.52 mm, height female 0.75 mm, male 0.71 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: female I 1.21 mm (0.38+0.15+0.24+0.24+0.20), II 1.13 mm (0.34+0.15+0.22+0.23+0.19), III 1.04 mm (0.36+0.14+0.22+0.17+0.15), IV 1.21 mm (0.39+0.16+0.27+0.23+0.16), male I 1.23 mm (0.38+0.15+0.28+0.20+0.22), II 1.12 mm (0.35+0.16+0.22+0.20+0.19), III 0.88 mm (0.27+0.13+0.19+

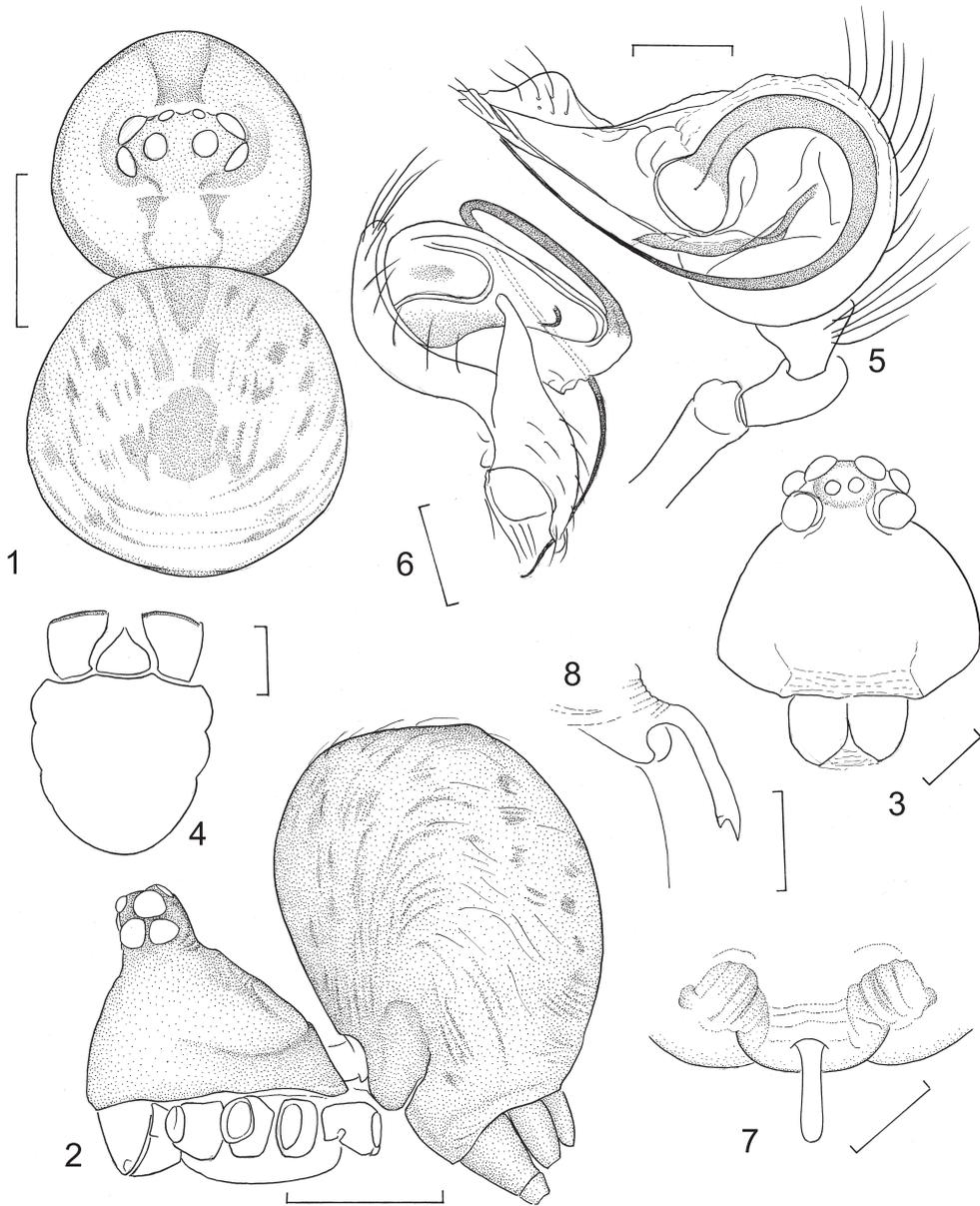
0.14+0.15), IV 1.08 mm (0.35+0.13+0.24+0.17+0.19).

**Prosoma** (Figs. 1–4): Carapace almost as long as wide (length/width female 1.08, male 0.96), high, without setae, median furrow absent. Ocular area raised in male (Fig. 2–3). Eyes: Both eye rows recurved in dorsal view, ALE>PLE=PME>AME (8:7:7:3 in female and male), AME–AME<AME–ALE (AMEs close to each other in female, 1:2 in male), PME–PME>PME–PLE (8:3 in female, 3:1 in male), median ocular area wider than long (length/width female 0.58, male 0.80), narrower in front than behind (anterior width/posterior width female 0.47, male 0.53), clypeus wide, wider than the width of ocular area. Chelicera very short, without strong spines on the dorsal surface, marginal teeth of fang furrow not observed. Labium wider than long (length/width female 0.90, male 0.67), maxilla wider distally, sternum cordate and convex, slightly longer than wide (length/width female 1.11, male 1.09), female palp present, without any claw. Legs relatively short and thick, femoral spot present in female and male, patellae I–IV dorsally with an apical spine, respectively, tibiae I–IV dorso-proximally with a long spine, tibiae I–II retrolaterally with two trichobothria; a strong spine present on the prolateral side of the male metatarsus I; metatarsus and tarsus of legs almost united at the joint. Leg formula: I=IV–II–III (female) or I–IV–II–III (male).

**Male palp** (Figs. 5–6): Femur much longer than patella, dorsally with a short spine, patella simple, tibia short, without apophysis, cymbium deformed, narrow and long, with shoehorn-shaped paracymbium and bent tip, bulb bare and small, embolus large, thick basally, filiform and winding distally, and with curved tip.

**Opisthosoma** (Figs. 1–2): Globular in dorsal view, but very high, almost as long as wide, dorsally less sclerotized, with a small hump at middle. Colulus not observable, anterior lateral spinnerets the largest, thick and short, posterior median spinnerets not developed.

**Female genitalia** (Figs. 7–8): Epigynum large and developed, the scape long and hard, with a



Figs. 1–8. *Mysmena nojimai* Ono, sp. nov., [1–6, holotype, male (NSMT-Ar 8515); 7–8, a paratype, female (NSMT-Ar 8516)].—1, Pro- and opisthosomata (appendages omitted), dorsal view; 2, same, lateral view; 3, prosoma, frontal view; 4, maxillae, labium and sternum, ventral view; 5, male palp, retrolateral view; 6, male palp, dorsal view; 7, epigynum, ventral view; 8, same, lateral view. Scales: 0.25 mm for Figs. 1–2, 0.1 mm for Figs. 3–8.

hollow apically, reniform spermathecae visible through integument.

Coloration and markings (Figs. 1–2): Carapace light greenish white, clypeus, ocular area and

posterior declivity black, chelicerae, maxillae and labium light greenish white, sternum yellowish white with a large black marking, legs light yellowish white, tibiae and metatarsi with some

small black spots ventrally. Opisthosoma light greenish white or light grayish white, dorsally with a large black spot at the middle other than many small black spots, ventrally light green with black lines.

*Variation.* The body length of the paratype females from Aichi Prefecture (NSMT-Ar 8568): 1.04–1.06 mm.

*Distribution.* Japan (Honshu).

*Etymology.* The species is dedicated to Mr. Koichi Nojima, Osaka.

### Family Clubionidae

#### Genus *Anaclubiona* nov.

[Japanese name: Ukon-fukurogumo-zoku]

Species group of *Clubiona zilla*: Mikhailov, 1995b, p.45; Ono & Hayashi, 2009, p. 544.

*Type species.* *Clubiona zilla* Dönitz et Strand, 1906.

*Diagnosis.* The new genus differs from *Clubiona* Latreille, 1804 by the embolic apophysis of male palp, which is developed and occasionally branched, and the presence of a pair of guide pockets near the copulatory openings of female genitalia.

*Description.* Small spiders with body length 1.8–3.3 mm. Male palp: Tibia short, with a simple retrolateral apophysis spatulate or digitiform with dorsal swelling, tegulum small, while subtegulum is well developed, embolic division set in the distal part of tegulum, embolus simple spiniform and curved, embolic apophysis (tegular apophysis) extremely developed and occasionally branched, small membranous conductor present. Femora of legs furnished with three long spines dorsally. Opisthosoma dorsum has usually markings. Epigynum is large, expanded and well sclerotized, with large cavity or openings of guide pockets near the copulatory openings. Intromittent canals are thick and extending in anterior direction, atrium tubular or reniform, larger than or as large as globular spermatheca. The basal segment of posterior spinneret is cylindrical.

cal.

*Species included.* Following three species.

*Etymology.* The generic name is a combination of Greek ana- (similar to, different from) and an existent genus *Clubiona*. The gender is feminine.

#### *Anaclubiona zilla* (Dönitz et Strand, 1906), comb. nov.

[Japanese name: Ukon-fukurogumo]

*Clubiona zilla* Dönitz et Strand, 1906, in Bösenberg & Strand, p. 386 (type depository unknown). – Shinkai & Takano, 1984, p. 163; Yaginuma, 1986, p. 182; Ono, 1986, p.119; Mikhailov, 1995a p.74; Mikhailov1995b, p.38; Shinkai, 2006, p. 283; Ono & Hayashi, 2009, p.544.

#### *Anaclubiona tanikawai* (Ono, 1989), comb. nov.

[Japanese name: Tanikawa-fukurogumo]

*Clubiona tanikawai* Ono, 1989 (holotype: male, allotype: female, paratypes: six females and six males, all from Iriomotejima Island, Japan, NSMT-2056-2068, examined.) – Ono, 1994, p. 83; Song, Zhu & Chen, 1999, p. 427; Deeleman-Reinhold, 2001, p. 96; Tanikawa, 2003, p.69; Shinkai, 2006, p. 283.

#### *Anaclubiona minima* sp. nov.

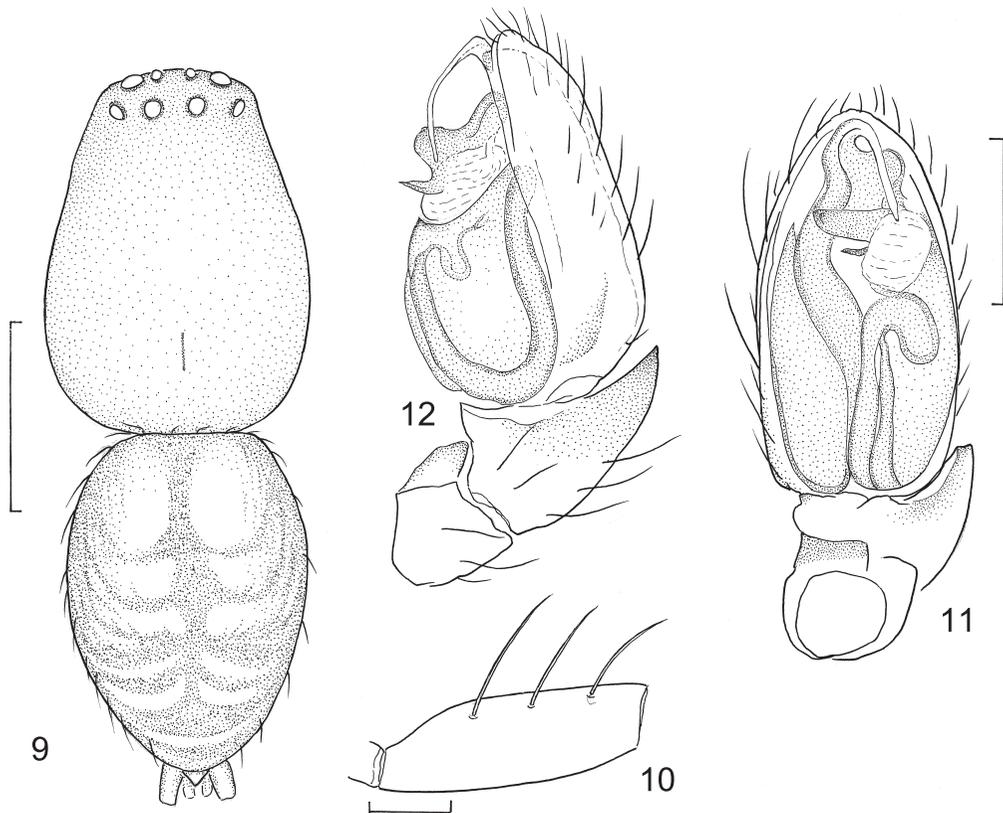
[Japanese name: Bizen-fukurogumo]

(Figs. 9–12)

*Diagnosis.* This species is easily distinguishable from other two congeners by the shape of tegular apophysis and embolus of male palp as well as its smaller size.

*Material examined.* Holotype: male from Mitsubishi, altitude 200–290 m, Bizen-shi, Okayama Prefecture, Honshu, Japan, 23–V–2007, K. Nojima leg. (NSMT-Ar 8514).

*Description* (male holotype; female unknown). Measurements: Body length 1.82 mm; prosoma length 0.94 mm, width 0.66 mm; opisthosoma length 0.84 mm, width 0.60 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: female I 1.56 mm (0.45+0.24+0.36+0.28+0.23), II 1.63 mm (0.47+0.26+0.36+



Figs. 9–12. *Anacubiona minima* Ono, gen. et sp. nov., holotype, male (NSMT-Ar 8514). — 9, Pro- and opisthosomata (appendages omitted), dorsal view; 10, male palp, ventral view; 11, same, retrolateral view; 12, femur of leg I, retrolateral view. Scales: 0.5 mm for Fig. 9, 0.1 mm for Figs. 10–12.

0.33+0.21), III 1.47 mm (0.45+0.21+0.27+0.35+0.19), IV 2.16 mm (0.62+0.28+0.50+0.50+0.26).

Prosoma (Fig. 9): Carapace longer than wide (length/width 1.42 in ratio), head wide and three-fifth the width of carapace, median furrow distinct. Eyes: The anterior eye row slightly recurved and the posterior row straight in dorsal view, all eyes almost same in size, lateral eyes slightly larger than the median eyes, AME–AME > AME+ALE (5:1), PME–PME > PME–PLE (2:1), clypeus narrow, median ocular area wider than long (length/width 0.67), wider behind than in front (anterior width/posterior width 0.67). Labium as long as wide, with a pair of short furrows basally, maxilla with sclerotized frontal edge and inner furrow, sternum longer than wide

(length/width 1.40). Chelicera furnished with one large and two smaller teeth on promargin of fang furrow, and three teeth on retromargin.

Spination of legs: Femora I–IV dorsally 1–1–1 (Fig. 10), IV retrolaterally I–II 0–0–1; patellae I–IV dorsally 1–0–1 (apical); tibiae I ventrally 2, II ventrally 1, III ventrally 1, IV prolaterally 0–1–0, retrolaterally 0–1–1, ventrally 1–0–1 (apical); metatarsi I–II none, III prolaterally 1–0–2 (apical), retrolaterally 0–0–1 (apical), ventrally 0–0–2 (apical), IV prolaterally 1–1–2 (apical), retrolaterally 0–0–2 (apical), ventrally 1–0–1 (apical). Leg formula: IV–II–I–III.

Male palp (Figs. 11–12): Patella ventro-apically sclerotized, tibia short with a simple retrolateral apophysis spatulate. Subtegulum extremely developed, embolus very simple and spiniform,

with oval membranous conductor, embolic apophysis with a large digitiform bulge and a sclerotized tooth.

Opisthosoma (Fig. 9): Oval, longer than wide (length/width 1.40), spinnerets cylindrical, anterior spinneret shorter than posterior one, median spinneret small, colulus indistinct.

Coloration and markings: Carapace light yellowish brown, head darker, chelicerae, maxillae and labium light yellowish brown, sternum yellowish white, palps and legs light yellowish brown. Opisthosoma light purplish brown, with a pair of oval white markings in the anterior part and several pairs of white bars from the middle to the posterior part, ventrally light gray.

*Distribution.* Japan (at present known only from the type locality).

*Etymology.* The specific epithet is Latin adjective meaning minimum, derived from its body size.

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