

Five New Spiders of the Families Dictynidae, Cybaeidae, Coelotidae and Ctenidae (Arachnida, Araneae) from Japan

Hirotsugu Ono

Department of Zoology, National Museum of Nature and Science,
3–23–1, Hyakunin-cho, Shinjuku-ku, Tokyo, 169–0073 Japan
E-mail: ono@kahaku.go.jp

Abstract Five new species of Japanese spiders of the families Dictynidae, Cybaeidae, Coelotidae and Ctenidae (Arachnida, Araneae) are reported. *Adenodictyna kudoae* sp. nov. (Dictynidae) is described from Amami-o-shima Island, Kagoshima Prefecture, and designated as the type species of a monotypic new genus, *Adenodictyna* gen. nov. A cavernicolous spider, *Cybaeus inagakii* sp. nov. (Cybaeidae) is described from Kurotengu-no-ana Cave in Mie Prefecture, Honshu. Two new species of the family Coelotidae (=Coelotinae: Wang, 2002), *Coelotes hachijoensis* sp. nov. (from Hachijo-jima Island, Tokyo) and *Tegecoelotes mizuyamae* sp. nov. (from Ibaraki Prefecture) are described. The former species is regarded to be derived from *Coelotes exitialis* L. Koch, 1878, widely distributed in Honshu, while the latter is a sister species of northern Japanese *Coelotes erraticus* Nishikawa, 1983, which is revived from the synonymy of *Tegecoelotes secundus* (Paik, 1971) recorded from Korea and Russia. An oceanic spider, *Acantheis nipponicus* sp. nov. (Ctenidae), is described from Minami-io-to (=Minami-iwo-jima) Island, Tokyo. The genus *Acantheis* Thorell, 1891, originated in Southeast Asia, is recorded from Japan for the first time.

Key words: Taxonomy, Araneae, Dictynidae, Cybaeidae, Coelotidae, Ctenidae, Japan.

The Izu Islands, administratively belonging to Tokyo-to (Metropolis), are composed of Oshima, To-shima, Nii-jima, Shikine-jima, Kozushima, Miyake-jima, Mikura-jima, Hachijo-jima, Aoga-shima and some smaller islands and occupy a wide latitudinal range between 32° and 35° N in the northwestern Pacific. From these islands, 168 species of spiders were recorded (Ono, 2001). After that report, some spider specimens have been obtained from Oshima and Hachijo-jima Islands during faunal researches under the proceeding project of a study on “Species Diversity of Sagami Sea and Adjacent Coastal Areas: Origins and Influential Factors” started in 2006 by the National Museum of Nature and Science, Tokyo.

An undescribed species of the genus *Coelotes* (Coelotidae) was included in the material collected from Hachijo-jima Island. The spider is similar in genital morphology to the well-known species, *Coelotes exitialis* L. Koch, 1878, widely

distributed in Honshu, but differs from the latter in details of male palpal organ and female genitalia. Although spiders of *Coelotes exitialis* are wholly black in color (Chikuni, 2008) or occasionally with several white spots on their back and occur in dark places in forests, the spiders of Hachijo-jima Island surprisingly build their webs not only in forests but also on the sunny surface of ground in bushes as spiders of *Tegecoelotes* or *Agelena* do. Their coloration was changed into beige or light yellowish brown and markings of carapace and abdomen are distinct and also similar to the spiders of other groups (see Figs. 15–16). This new spider may be regarded as an island species, which uniquely evolved on this volcanic island.

The Ogasawara (=Bonin) Islands, Tokyo, are situated further south from Izu Islands in the northwestern Pacific between 23° and 28°N/141° and 143°E. Being about 1000 km apart from the nearest main island of Japan (Honshu), the is-

lands have a typical oceanic fauna. About 25% of spider species of the islands are endemics, while the rest is composed of widely distributed species and artificially imported ones (Ono, unpublished data). Although Minami-io-to Island, one of these oceanic islands, is a small desert island of about 23 square kilometers, the nature has been well conserved. However, its spider fauna has been poorly investigated and only a dozen of spiders were hitherto known (Nishikawa, 1982). An interesting spider of the family Ctenidae was recently discovered on this island during a zoological research made by the Tokyo Metropolitan University in 2007. The spider is regarded as a peculiar, new species of the Southeast Asian genus *Acantheis*, which has never been recorded from Japan.

Although cybaeid spiders of Japan have been well studied and more than 60 species became known (Uyemura, 1938; Yaginuma, 1941, 1986; Komatsu, 1968; Ihara, 1993; Irie, 1998, 2007; Irie and Ono, 2001, 2003; Kobayashi, 2006; and others), many species are left undescribed, because the distributional range of spiders is frequently narrow. An interesting cybaeid spider was discovered from deep inside (more than 100 m back from the entrance) of a cave in Mie Prefecture, central Honshu. The six eyes of spiders are very small and seem to have lost their function.

Other than the above spiders, a new coelotid and a new dictynid found in the arachnid collection of the National Museum of Nature and Science, Tokyo were taxonomically studied. The former spider collected in Ibaraki Prefecture, Honshu, is a new species of the genus *Tegecoelotes*, and seems to be closely related to *Tegecoelotes erraticus* (Nishikawa, 1983), while the latter is a peculiar species of a new genus collected in Amami-o-shima Island, Kagoshima Prefecture, of the Japanese subtropical region.

Thus, a new genus and five new species of Japanese spiders are described in this paper. Diagnosis and data of examined materials are given at the beginning of each description.

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-Ar).

Taxonomy

Family Dictynidae

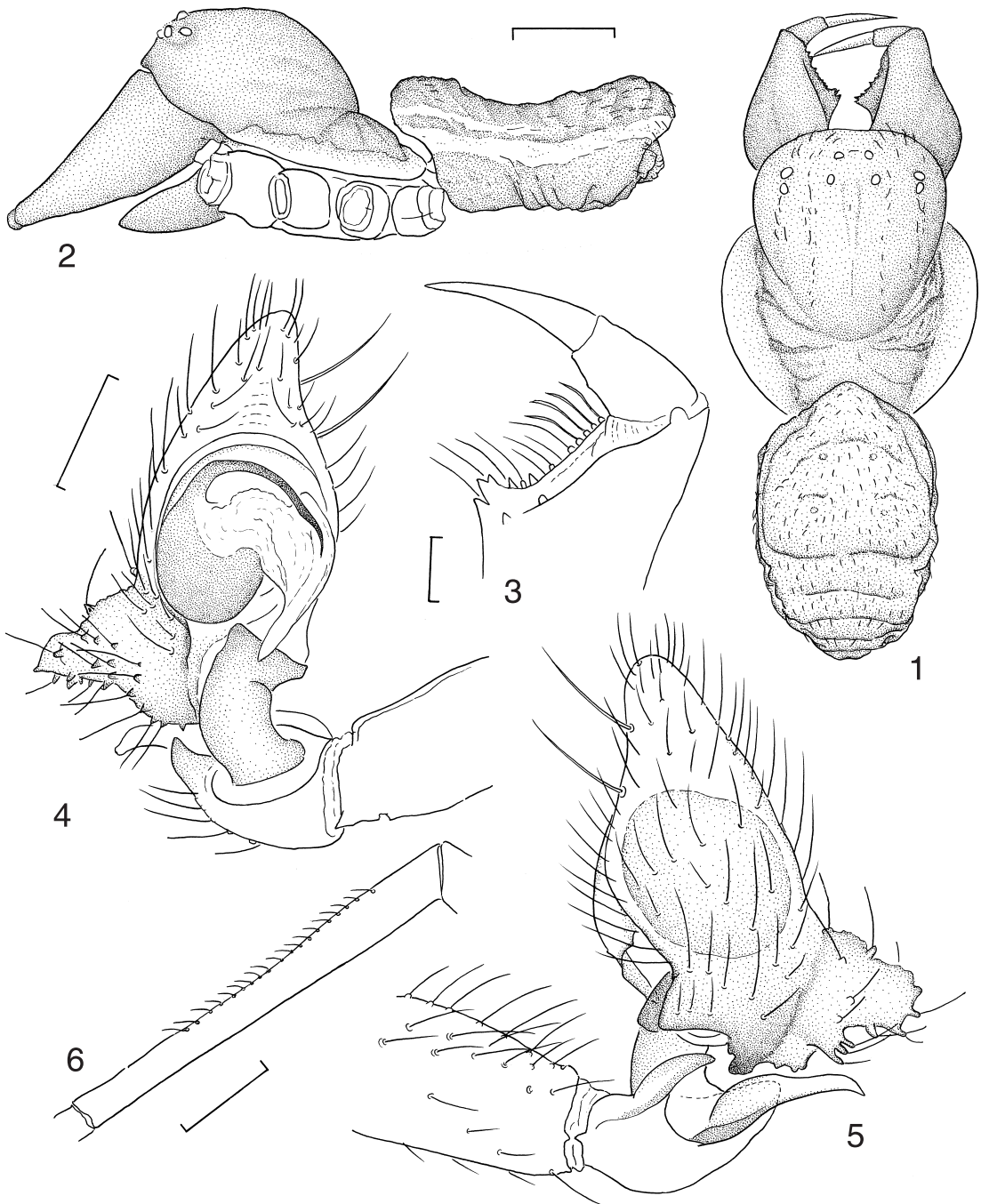
Genus *Adenodictyna* nov.

[Japanese name: Minami-hagumo-zoku]

Type species. *Adenodictyna kudoae* sp. nov., by monotypy.

Diagnosis. The new genus should be included in the family Dictynidae, having normal condition of tarsal claws, uniseriate calamistrum, and similar basic structure of male palp for dictynids, especially of tegulum and embolus, but can be distinguished from known genera of the family by the peculiar shape of cymbium. *Adenodictyna* may be standing close to the huge genus *Dictyna* Sundevall, 1833, by the axially extending conductor on tegulum and well-developed tibial apophyses of male palp as well as in its smaller body size. However, the new genus is recognized as an independent genus by following characteristics: Cephalus extremely expanded with very wide ocular area, calamistrum occupies only two thirds of the metatarsus of leg IV, the distal margin of cymbium of male palp is strongly sclerotized and its prolateral part is forming a large tumor-like process with peculiar hairs respectively on a tubercle.

Etymology. The generic name is connected with the tumor-like process on the cymbium and formed by a combination of a Greek prefix *adeno-* meaning adenoid and the name of the existent genus, *Dictyna*, which is made from Greek *Dictynna* (mythical goddess of chase) and *dic-tyeus* meaning one who fishes with nets. The gender is feminine.



Figs. 1–6. *Adenodictyna kudoae* Ono, gen. et sp. nov., male (holotype; NSMT-Ar 7953).—1, Pro- and opisthosomata (appendages omitted), dorsal view; 2, same, lateral view; 3, chelicera, ventral view; 4, palp, ventral view; 5, palp, retrolateral view; 6, metatarsus of leg IV. Scales: 0.5 mm for Figs. 1–2, 0.2 mm for Figs. 3, 6, 0.1 mm for Figs. 4–5.

Adenodictyna kudoae sp. nov.

[Japanese name: Amami-hagumo]

(Figs. 1–6)

Diagnosis. See the above generic diagnosis.

Material examined. Holotype: male from Kin-sakubaru, 300–350 m alt., Naze-shi, Amami-oshima Island, Kagoshima Prefecture, Japan, 20-IV-2008, Y. Kudo leg. (NSMT-Ar 7953).

Description (holotype; female unknown). Measurements: Body length 2.70 mm; prosoma length 1.56 mm, width 1.26 mm; opisthosoma length 1.46 mm, width 0.84 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: female I 5.41 mm (1.65+0.50+1.50+1.13+0.63), II 4.94 mm (1.58+0.45+1.31+1.04+0.56), III 3.65 mm (1.08+0.41+0.80+0.83+0.53), IV 3.84 mm (1.09+0.38+0.90+0.97+0.50).

Prosoma (Figs. 1–2): Carapace longer than wide (length/width 1.23 in ratio), high, its cephalic part expanded and haired, thoracic part with radial furrows, median furrow indistinct. Eyes not compactly set, occupying most of the width of head (Fig. 1), the anterior and posterior eye rows recurved in dorsal view, PLE=PME=ALE>AME (3:2 in diameter), AME-AME<AME-ALE (5:11), PME-PME<PME-PLE (3:5), median ocular area wider than long (length/width 1.5), wider behind than in front (anterior width/posterior width 0.67), clypeus much shorter than the width of eye area. Chelicera (Fig. 3) developed, with four teeth on promargin of fang furrow and two teeth on retromargin, one of the anterior teeth very large and bifurcated, labium longer than wide (length/width 1.67), sternum longer than wide (length/width 1.18).

Legs: relatively slender, with short and stout hairs, but without spines, calamistrum on single row, not dence (Fig. 6), claws of legs with five or six teeth. Leg formula: I-II-IV-III.

Male palp (Figs. 4–5): Tibia very short, shorter than tarsus, with three strongly sclerotized apophyses: the ventral one huge, widely truncated (Fig. 4), the retrolateral ones digitiform, with

a sharp end (Fig. 5). Cymbium complicated with strongly sclerotized, retrolateral margin, and a large rugged tumor-like process on promargin, furnished with peculiar hairs and their basal tubercles (Fig. 5). Tegular apophysis large and extending to the tip of ventral tibial apophysis, forming a conductor, embolus visible in ventral view, relatively short, spiniform (Fig. 4).

Opisthosoma (Figs. 1–2): Ovate, longer than wide (length/width 1.74), its dorsum wholly covered with short and stout hairs. Anterior spinnerets cylindrical, short, thick, median ones small, posterior ones much slender. Cribellum undivided, small and simple.

Coloration and markings: Carapace light blackish brown, marginated with yellow, with a pair of short black lines behind eye field (Fig. 1). Chelicerae blackish brown with light reddish brown fangs, labium and maxillae blackish brown, sternum light yellowish brown, palps dark gray, coxa, trochanter and distal part of femur of leg I yellowish brown, other parts of leg I and all segments of legs II-IV light greenish gray. Opisthosoma dorsally dark gray, without markings, laterally with white bands (Fig. 2), ventrally light gray, spinnerets light yellowish brown.

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

Etymology. The species is dedicated to the collector of the holotype, Mrs. Yasue Kudo, Chiba.

Family Cybaeidae

Genus *Cybaeus* L. Koch, 1868

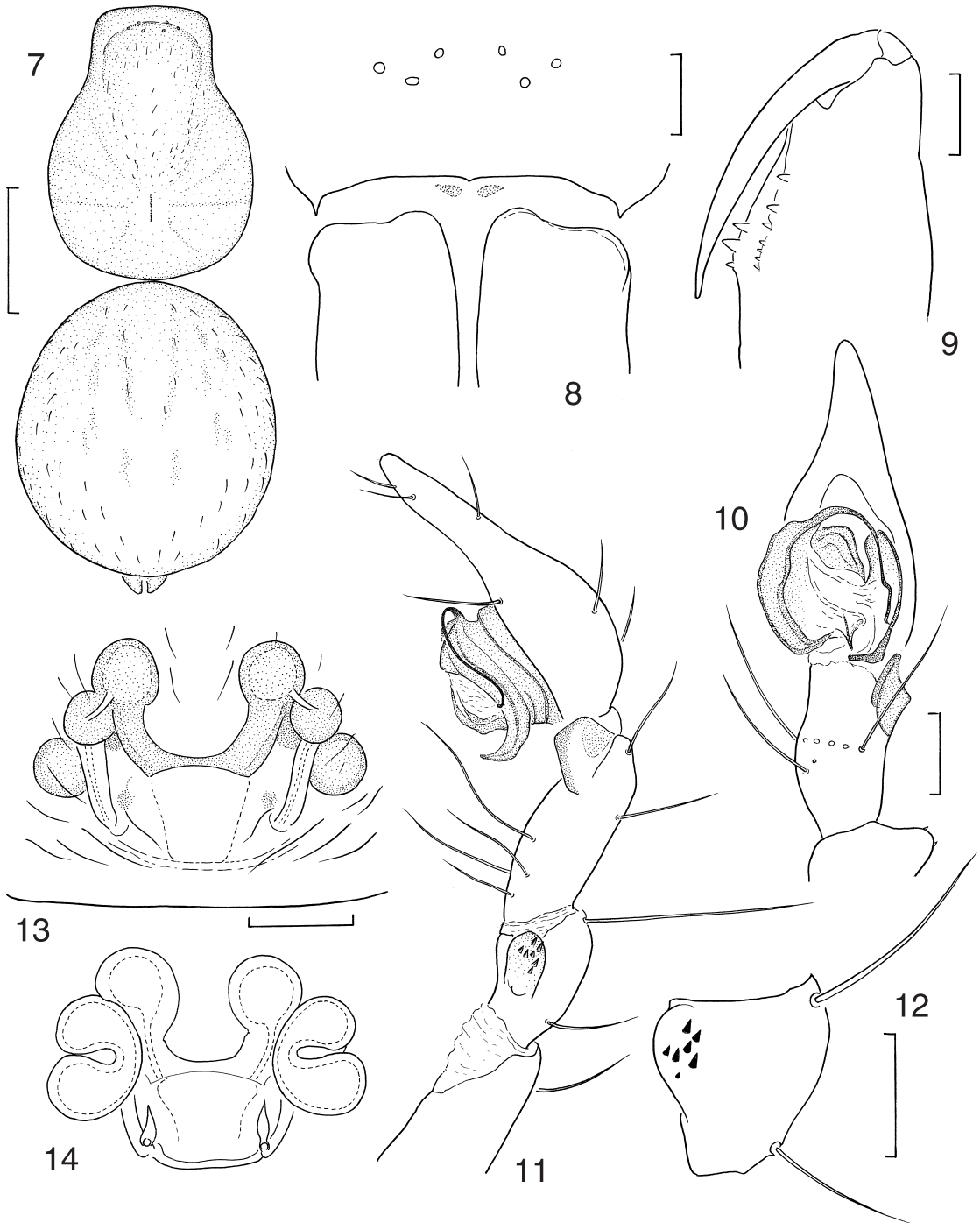
[Japanese name: Namihagumo-zoku]

Cybaeus inagakii sp. nov.

[Japanese name: Oomiya-namihagumo]

(Figs. 7–14)

Diagnosis. The new species is closely related to *Cybaeus kiuchii* Komatsu, 1965, originally described from Zenjo Cave, Tokushima Prefecture, eastern Shikoku and at present known to be widely distributed in Tokushima and Wakayama Prefectures (Ihara, personal communication), but can be distinguished from the latter by the shape



Figs. 7–14. *Cybaeus inagakii* Ono, sp. nov. [7–12, male (holotype; NSMT-Ar 7985), 13–14, female (allotype; NSMT-Ar 7986)]. — 7, Pro- and opisthosomata (appendages omitted), dorsal view; 8, head, frontal view; 9, chelicera, ventral view; 10, palpal organ, ventral view; 11, male palp, retrolateral view; 12, patella of male palp, dorsal view; 13, epigynum (cleared), ventral view; 14, inner organ of female genitalia, dorsal view. Scales: 1.0 mm for Fig. 7, 0.2 mm for Figs. 8–12, 0.1 mm for Figs. 13–14.

of male palp and the structure of female genitalia. The apophysis of male palpal patella of *Cybaeus kiuchii* has only three denticles, while that of the new species has seven or eight denticles. Female genitalia of *Cybaeus inagakii* have smaller opening part and larger spermathecae than those of *C. kiuchii* (cf. Figs. 13–14 and Komatsu, 1968, p. 38, fig. 82).

Material examined. Type series from Kurotengu-no-ana Cave, Fujigano, Taiki-cho (ex. Omiyacho), Watarai-gun, Mie Prefecture, Honshu, Japan, 6-IV-2008, M. Inagaki leg.: holotype: male (NSMT-Ar 7985), allotype: female (NSMT-Ar 7986) and paratypes: two females and one male (NSMT-Ar 7987-7989).

Description (holotype and allotype). Measurements: Body length female 4.38 mm, male 4.13 mm; prosoma length female 1.92 mm, male 2.08 mm, width female 1.47 mm, male 1.44 mm; opisthosoma length female 2.28 mm, male 2.21 mm, width female 1.73, male 2.06 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: female I 6.53 mm (1.87+0.65+1.58+1.50+0.93), II 6.17 mm (1.76+0.65+1.43+1.43+0.90), III 5.20 mm (1.52+0.60+1.12+1.15+0.81), IV 6.93 mm (1.83+0.60+1.72+1.80+0.98), male I 7.79 mm (2.08+0.69+1.89+1.86+1.27), II 7.40 mm (1.92+0.70+1.72+1.83+1.23), III 6.99 mm (1.87+0.66+1.55+1.80+1.11), IV 8.54 mm (2.18+0.66+2.02+2.40+1.28).

Prosoma (Fig. 7): Carapace longer than wide (length/width female 1.31, male 1.44), with some hairs in cephalic part, median furrow distinct. Eyes indistinct, presumably without function, originally six in number (Fig. 8), but the right posterior median eye lacking in female allotype. Chelicerae (Fig. 9) developed, furnished with three teeth on promargin of fang furrow and seven teeth (three large and four small) on retro-margin, labium wider than long (length/width female 0.80, male 0.90), sternum with hairs, slightly longer than wide (length/width 1.12 in female, 1.04 in male).

Legs: Conspicuous trichobothria on metatarsi and tarsi, tarsal claws of legs with four to six

small teeth. Spiniformation of legs: Male (almost same in female): femora I-IV dorsally 0-1-1-1, prolaterally 0-1-1-1 (I-III) or 0-1-0-1 (IV); patellae I-IV dorsally 1-0-1 (apical); tibiae I-IV dorsally 1-0-1, prolaterally 1-1-1 (I, III-IV) or 1-1-1-1 (II), retrolaterally 1-1-1, ventrally 2-2-2-2 (apical) (I-II) or 2-2-2 (apical) (III-IV); metatarsi I-IV prolaterally 1-1-1 (apical) (I, IV) or 1-1-1-1 (apical) (II-III), retrolaterally 0-1-0-1 (apical) (I-II) or 1-1-1-1 (apical) (III-IV), ventrally 2-2-2 (apical). Leg formula: IV-I-II-III.

Male palp (Figs. 10–12): Patella with a retrolateral apophysis digitiform and furnished with seven teeth (Figs. 11–12); tibia long, longer than patella, retrolateral apophysis developed and strongly sclerotized. Cymbium simple without sclerotized margin, palpal organ with relatively compact tegulum, conductor situated on the retrolateral side of tegulum, with long conducting groove, embolus long and filiform, with sharp tip (Fig. 11).

Opisthosoma (Fig. 7): Ovate, longer than wide (length/width female 1.32, male 1.07), its dorsum wholly covered with short black hairs, anterior spinnerets cylindrical, much larger than posterior ones.

Female genitalia (Figs. 13–14): Genital field as long as wide, epigynum (Fig. 13) with relatively small opening part longer than wide, paired genital openings situated at the middle of epigynum. Spermatheca in three parts, globular with short intromittent canal and thick fertilization tube (Fig. 14).

Coloration and markings: Female and male: carapace light yellowish brown, with darker radial lines. Chelicerae yellowish brown, maxillae and labium light yellowish brown, sternum yellow, without any marking, legs yellowish white, tibia, metatarsus and tarsus darker. Opisthosoma beige dorsally, without distinct marking, lighter ventrally.

Variation. Body length of paratypes: females 4.38–5.08 mm, male 5.15. Opisthosoma of a paratype female is wholly white. The digitiform apophysis of palpal patella of paratype male is furnished with eight teeth. Some eyes are lacking

in paratypes: left posterior lateral one in a female, left posterior median one in a male.

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

Etymology. The species is dedicated to Dr. Masashi, Inagaki, Mie, the collector of the type specimens.

Remarks. Although the new spider has been known only in a cave, it could be collected in leaf litter or under rocks outside the cave, as the closest relative, *Cybaeus kiuchii* occurs in quite wide range. On the other hand, same arrangement of eyes with reduction of number and functional degeneration as this new species was observed in *Dolichocybaeus takasawaensis* Komatsu, 1970, known only from Takasawa-do Cave in Kumamoto Prefecture, Kyushu (Figs. 7–8; cf. figs. 1–2 in Komatsu, 1970, p. 14).

Family Coelotidae (=Coelotinae: Wang, 2002)

Genus *Coelotes* Blackwall, 1841

[Japanese name; Yachigumo-zoku]

***Coelotes hachijoensis* sp. nov.**

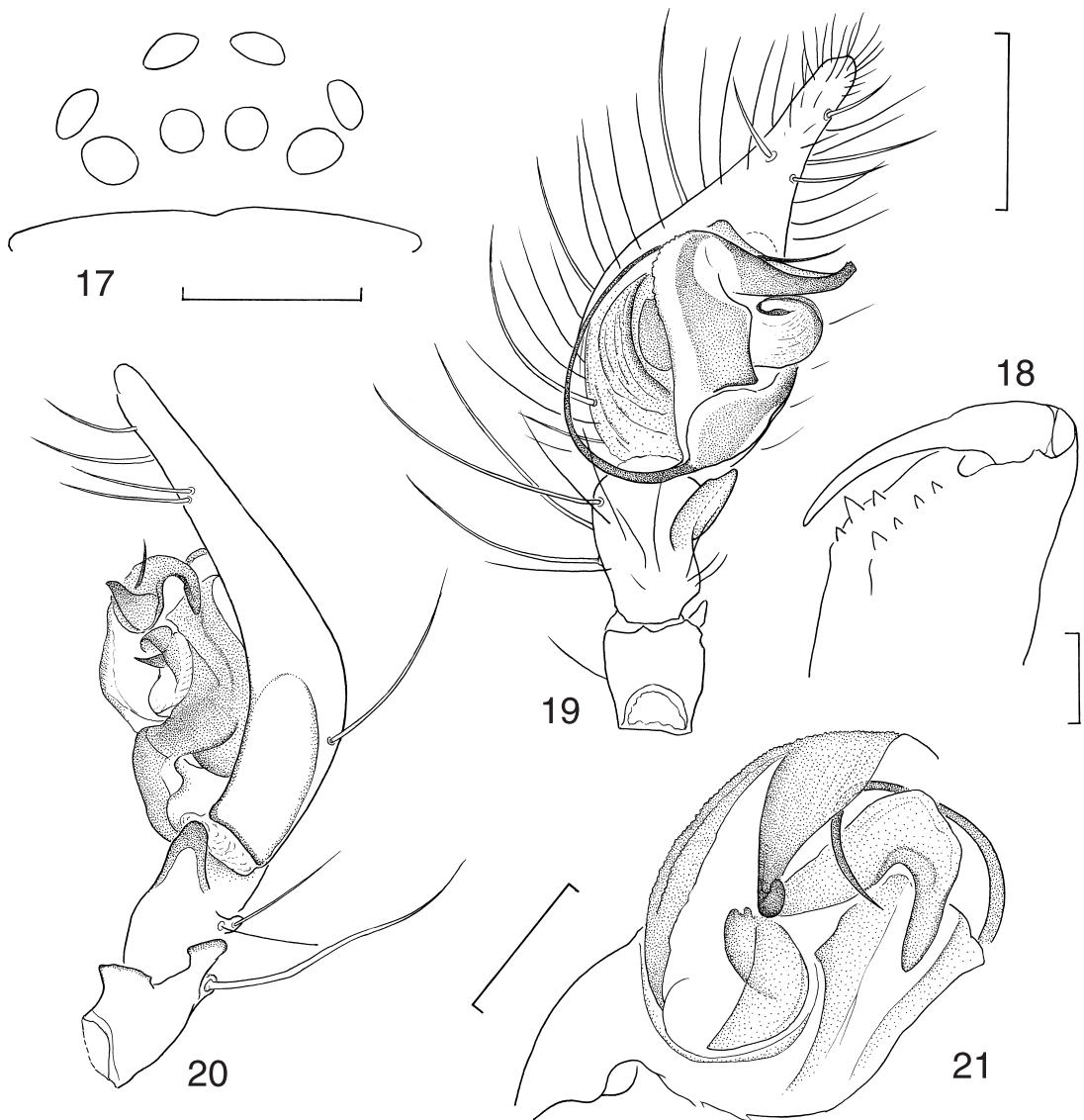
[Japanese name: Hachijou-yachigumo]

(Figs. 15–27)

Diagnosis. This new species is regarded to belong to the species group of *Coelotes exitialis* L. Koch, 1878, defined by Wang (2002), having following characteristics: female genitalia have lateral atrial margins, broad intromittent canals and tubular and convoluted spermathecae; main apophysis of male palpal tibia is well-developed and dorsal apophysis of conductor on tegullum is slender. Including a dozen of species, the group is well represented in Japan. Of these, the new species is closest to *Coelotes exitialis* widely distributed in Honshu, but can be easily distinguished from the latter by smaller epigynal teeth,



Figs. 15–16. *Coelotes hachijoensis* Ono, sp. nov.—15, male (holotype; NSMT-Ar 7976), dorsal view, body length 5.80 mm; 16, female (paratype; NSMT-Ar 7978), dorsal view, body length 12.60 mm.

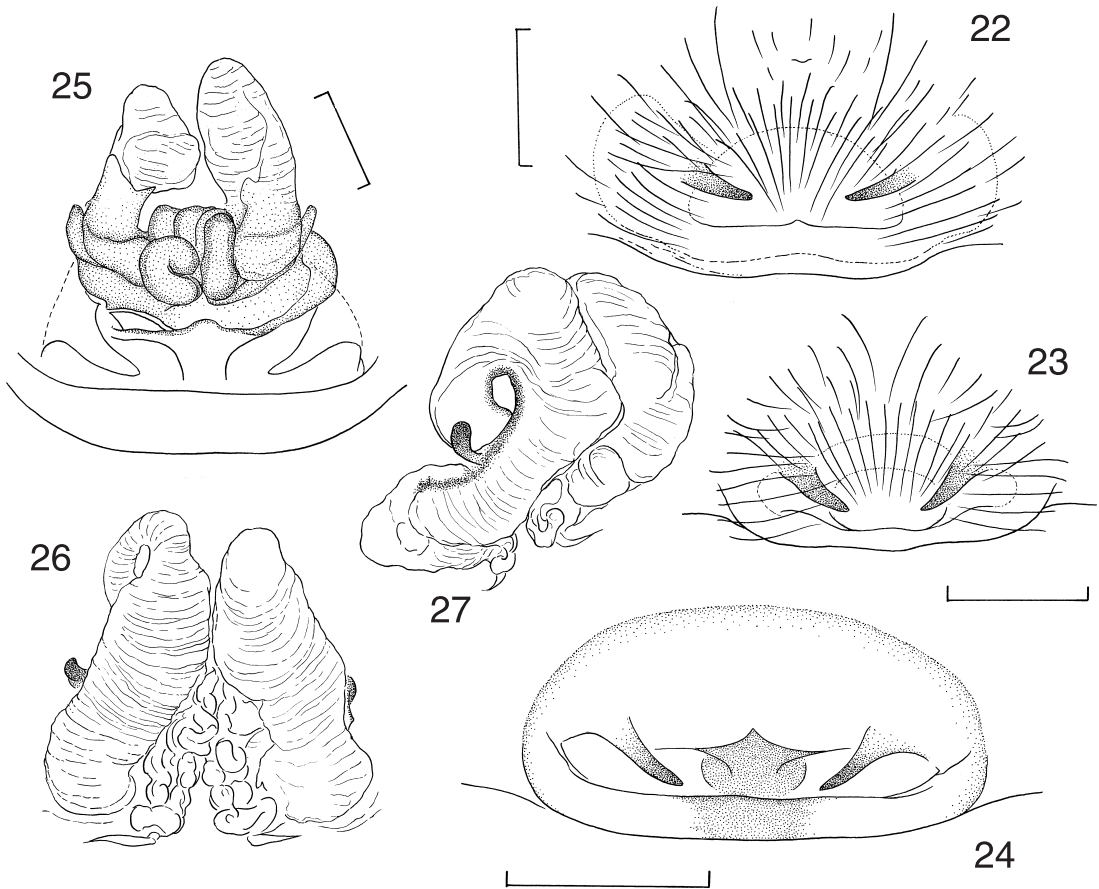


Figs. 17–21. *Coelotes hachijoensis* Ono, sp. nov., male (holotype; NSMT-Ar 7976).—17, Eyes, frontal view; 18, chelicera, ventral view; 19, palpal organ, ventral view; 20, same, retrolateral view; 21, conductor, median apophysis and tip of embolus, axial view. Scales: 0.5 mm for Figs. 17, 19–20, 0.25 mm for Fig. 18, 0.2 mm for Fig. 21.

different position of spermathecal gland and thicker intromittent canals of female genitalia (Figs. 22–27; cf. figs. 101–104 in Wang, 2002, pp. 44–45) and smaller patellar apophysis and different shape of conductor of male palp (Figs. 19–21; cf. figs. 107–109 in Wang, 2002, pp. 45–46).

Material examined. Male holotype from

Sueyoshi, Hachijo-jima Island, Tokyo, Japan, 24-XI-2007, H. Ono leg. (NSMT-Ar 7976); female allotype: Osato, 25-XI-2007 (NSMT-Ar 7977); paratypes: 6 females, Osato, 25-XI-2007 (NSMT-Ar 7980–7981), 1 female, Sueyoshi, 23-XI-2007 (NSMT-Ar 7978), 2 females, Noboryu-toge, 25-XI-2007 (NSMT-Ar 7979, 7982), 6 females, Ogago, 26-XI-2007 (NSMT-Ar 7983–7984), all



Figs. 22–27. *Coelotes hachijoensis* Ono, sp. nov., females [22, paratype from Sueyoshi (NSMT-Ar 7978); 23, paratype from Noboryu-toge (NSMT-Ar 7979), 24–27, allotype from Osato (NSMT-Ar 7977).] — 22–23, epigyna, ventral view; 24, epigynum, hairs removed, ventral view, from posterior angle; 25, inner organ of female genitalia, ventral view; 26, same, dorsal view; 27, same, lateral view. Scales: 0.2 mm for Figs. 22–24, 0.1 mm, for Figs. 13–14.

from Hachijo-jima Island, H. Ono leg.

Description (holotype and allotype). Measurements: Body length female 10.55 mm, male 5.80 mm; prosoma length female 4.49 mm, male 2.82 mm, width female 2.83 mm, male 1.98 mm; opisthosoma length female 5.51 mm, male 3.00 mm, width female 3.36, male 1.50 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: female I 15.53 mm (4.20+1.60+3.72+4.00+2.01), II 13.66 mm (3.95+1.54+3.01+3.33+1.83), III 12.40 mm (3.50+1.40+2.65+3.30+1.55), IV 16.42 mm (4.71+1.53+3.80+4.55+1.83), male I 13.20 mm (3.30+1.38+3.24+3.30+1.98), II 12.57 mm

(3.42+1.44+2.88+3.03+1.80), III 11.24 mm (2.94+1.32+2.40+3.00+1.58), IV 14.95 mm (3.95+1.44+3.44+4.20+1.92).

Prosoma (Figs. 15–16): Carapace much longer than wide (length/width female 1.58, male 1.42), flat, median furrow distinct. Eyes compactly set (Fig. 17), the anterior and posterior eye rows procurved in frontal view, recurved or straight in dorsal view, ALE \geq PLE $>$ PME \geq AME (in diameter 9:8:7.5:7.5 in female, 6:6:5.5:5 in male), AME-AME \geq AME-ALE (1:1 in female, 3:2 in male), PME-PME $<$ PME-PLE (3:5 in female, 3:4 in male), median ocular area longer than wide (length/width female 1.24, male 1.20),

wider behind than in front (anterior width/posterior width female 0.91, male 0.88), clypeus much shorter than the anterior width of median ocular area (2:5 in female, 1:2 in male). Chelicerae (Fig. 18) furnished with three teeth (the middle one larger) on the promargin of fang furrow and four teeth on retromargin, labium longer than wide (length/width female 1.20 male 1.08), sternum longer than wide (length/width 1.27 in female, 1.16 in male).

Legs: Spiniformation (observed on the male holotype; almost same in female): femur I-IV dorsally 1-1-1-1 (I-II) or 1-1-1 (III-IV), prolaterally 0-0-1-1 (I) or 0-0-0-1 (II-IV), retrolaterally 0-0-0-1; patella I-IV dorsally 1-0-1 (apical), III-IV pro- and retrolaterally each 1; tibia I-IV dorsally 1-0-1, prolaterally 1-1 (I, III-IV) or none (II), retrolaterally none (I-II) or 1-1 (III-IV), ventrally 2-2-2 (apical); metatarsus I-IV pro- and retrolaterally none (I-II), 1-1-2 (apical) (III) or 1-2-2 (apical) (IV), respectively, ventrally 2-2-2 (apical) (I-II) or 2-0-2-2 (apical) (III-IV); tarsus III-IV prolaterally 1 (III) or 1-1 (IV), retrolaterally each 1. Leg formula: IV-I-II-III.

Male palp (Figs. 19–21): Patella shorter than tibia, with relatively small retrolateral apophysis distally truncated; tibia with strongly sclerotized retrolateral apophysis. Cymbial furrow short, one third of the length of cymbium; conductor developed and straight, median apophysis spoon-like, with a tooth basally; embolus long, filiform with sharp end.

Opisthosoma: Ovate, longer than wide (length/width female 1.63, male 2.00), its dorsum covered with medium long hairs. Anterior spinnerets cylindrical and short, posterior ones much longer.

Female genitalia (Figs. 22–27): Genital field wider than long, epigynum with a pair of teeth (Figs. 22–24), intromittent canal broad and winding, spermathecae tubular, convoluted, with digitiform gland (head) and winding fertilization tube (Figs. 25–27).

Coloration and markings (Figs. 15–16): Female and male: carapace yellowish brown, with a pair of black bands, head darker. Chelicera reddish brown, maxillae, and labium light yellowish

brown, sternum blackish brown with light median band in female, light yellowish brown with black spots in male, legs light yellowish brown without dark rings. Opisthosoma light beige dorsally with markings and dots in black, ventrally lighter with black flecks, spinnerets light yellowish brown.

Variation. Body length of females: 7.35–12.60 mm. The direction of epigynal teeth is variable (Figs. 22–24).

Distribution. Japan (Hachijo-jima Island).

Etymology. The specific name is derived from the name of the island, on which the spider occurs.

Remarks. *Coelotes exitialis* is a wholly black spider occurring in dark places in forests. This new spider is similar to that in genital morphology and there is no question that both the species are related to each other. However, spiders of the island species build their webs not only in forests but also on the sunny surface of ground as those of spiders of *Tegeocoelotes* or *Agelena*. The coloration of the new spider changed into beige or light yellowish brown and the markings of carapace and abdomen distinct and similar to those of *Agelena* spiders seem to be a result of adaptation to the gained niche on the volcanic island.

Genus *Tegeocoelotes* Ovtchinnikov, 1999

[Japanese name: Yama-yachigumo-zoku]

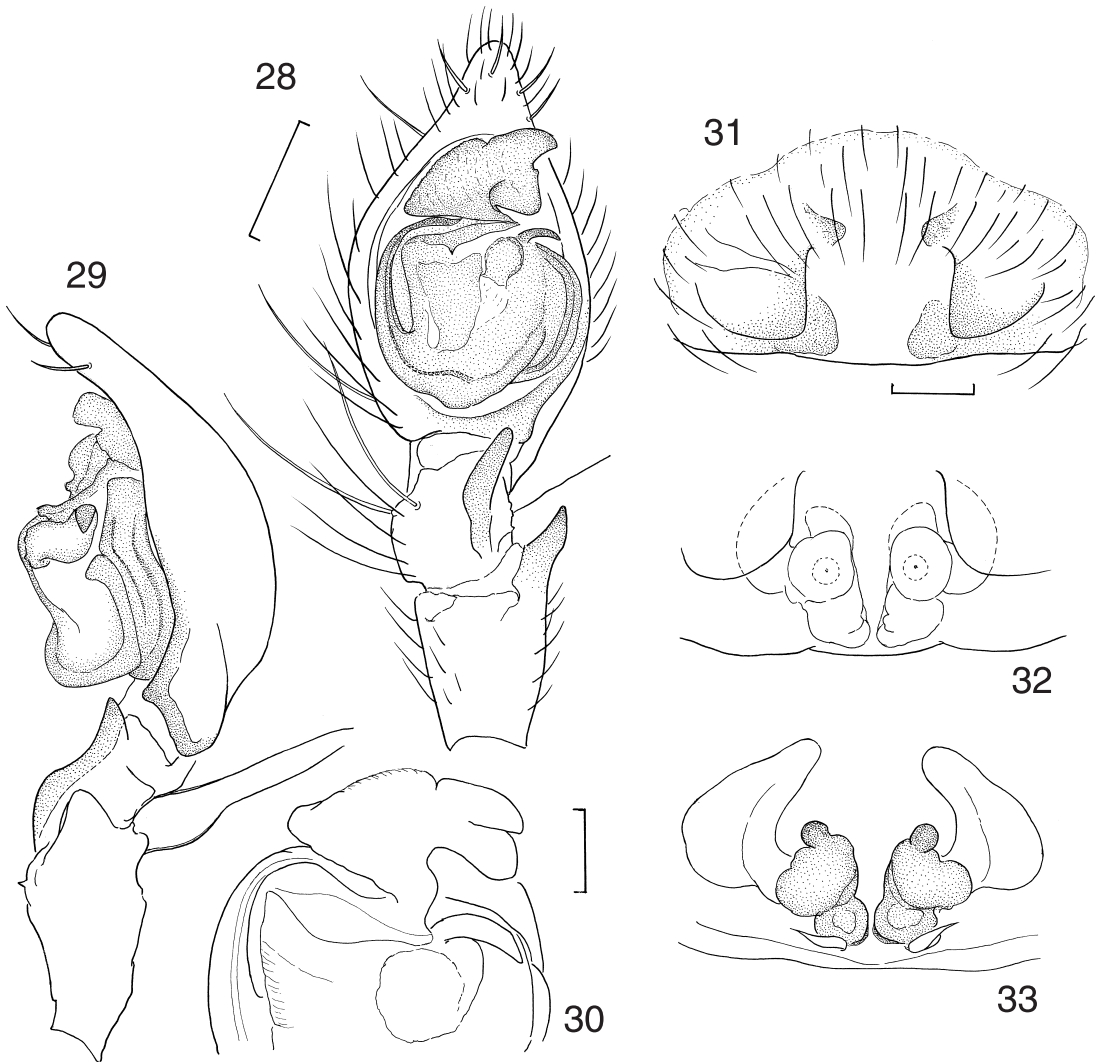
Tegeocoelotes mizuyamae sp. nov.

[Japanese name: Hitachi-yama-yachigumo]

(Figs. 28–33)

Diagnosis. This new species is closely related to *Tegeocoelotes erraticus* (Nishikawa, 1983), sp. reviv. and comb. nov., distributed in Aomori, Akita, Yamagata and Miyagi Prefectures, Tohoku District of Honshu, and in Hokkaido, Japan, but is distinguished from the latter by the shape of dorsal apophysis of conductor on the male palp (Figs. 28, 30; cf. fig. 2 in Nishikawa, 1983, p. 126) and the shape of female genitalia (Figs. 31–33; cf. fig. 6 on the same page).

Material examined. Male holotype from



Figs. 28–33. *Tegecoelotes mizuyamae* Ono, sp. nov., [28–30, male (holotype; NSMT-Ar 7954), 31–33, female (allotype; NSMT-Ar 7955)].—28, palpal organ, ventral view; 29, same, retrolateral view; 30, conductor and median apophysis, ventral view, from different angle; 31, epigynum, ventral view; 32, inner organ of female genitalia, ventral view; 33, same, dorsal view. Scales: 0.5 mm for Figs. 28–29, 0.2 mm for Figs. 30–33.

Shishitsuka-cho, Tsuchiura-shi, Ibaraki Prefecture, Honshu, Japan, 13-II-2008, E. Mizuyama leg. (NSMT-Ar 7954); female allotype: 5-XII-2007 (NSMT-Ar 7955); paratypes: 1 female, 1-VIII-2007, 1 male, 5-XII-2007, all from same locality, E. Mizuyama leg. (NSMT-Ar 7956–7957).

Description (holotype and allotype). Measurements: Body length female 10.82 mm, male 8.50 mm; prosoma length female 4.62 mm, male 4.36 mm, width female 3.00 mm, male 3.04 mm;

opisthosoma length female 6.72 mm, male 4.36 mm, width female 4.20, male 2.63 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: female I 12.82 mm (3.54+1.41+3.12+3.08+1.67), II 11.17 mm (3.18+1.33+2.49+2.70+1.47), III 10.15 mm (2.94+1.33+2.22+2.46+1.20), IV 13.46 mm (3.90+1.53+2.94+3.60+1.49), male I 13.20 mm (3.30+1.38+3.24+3.30+1.98), II 12.57 mm (3.42+1.44+2.88+3.03+1.80), III 11.24 mm

(2.94+1.32+2.40+3.00+1.58), IV 14.95 mm (3.95+1.44+3.44+4.20+1.92).

Prosoma: Carapace much longer than wide (length/width female 1.54, male 1.43), flat, median furrow distinct. Anterior eye row straight, posterior eye row procurved in dorsal view, PLE=ALE>PME=AME (6:5 in diameter), AME-AME \geq AME-ALE (1:1 in female, 2:1 in male), PME-PME<PME-PLE (5:6 in female, 2:3 in male), median ocular area longer than wide (length/width female 1.15, male 1.21), wider behind than in front (anterior width/posterior width female 0.92, male 0.85), clypeus shorter than and about half the anterior width of median ocular area. Chelicera furnished with three teeth on each margin of fang furrow, labium longer than wide (length/width female 1.13, male 1.07), sternum longer than wide (length/width female 1.20, male 1.17).

Legs: Spiniformation (observed on the male holotype; almost same in female): femur I-IV dorsally 1-1-1, prolaterally 0-0-1-1 (I-III) or 0-0-0-1 (IV), retrolaterally 0-0-0-1 (I, IV), or 0-0-1-1 (II-III); patella I-IV dorsally 0-0-1 (apical), III-IV pro- and retrolaterally each 1; tibia I-IV dorsally 1-0-1, prolaterally 1-1-1 (I) or 1-1 (II-IV), retrolaterally none (I-II) or 1-1 (III-IV), ventrally 2-2-2 (apical); metatarsus I-IV prolaterally 0-1-0 (I), 1-0-1 (apical) (II-III) or 1-1-1 (apical) (IV), retrolaterally 0-1-0 (I-II), or 1-1-1 (III-IV), ventrally 2-2-2 (apical) (I-III) or 2-2-2-2 (apical) (IV); tarsus III-IV prolaterally 1 (III) or 1-1 (IV), retrolaterally each 1. Leg formula: IV-I-II-III.

Male palp (Figs. 28–30): Patella longer than tibia, with a large retrolateral apophysis digitiform; tibia with strongly sclerotized ventro-retrolateral apophysis and indistinct dorsal apophysis (Fig. 28). Cymbial furrow short with strongly sclerotized proximal margin (Fig. 29); conductor small and simple, with a large dorsal apophysis cristate, median apophysis spiniform in ventral view, with a soft globular base (Fig. 30), embolus relatively short and spatulate in prolateral view.

Opisthosoma: Ovate, longer than wide (length/width female 1.60, male 1.66), its dorsum covered with medium long hairs. Anterior spin-

nerets short, cylindrical, and posterior ones much longer.

Female genitalia (Figs. 31–33): Genital field wider than long, epigynum with broad teeth, intromittent canal short, spermathecae reniform, with distinct globular gland (head) and large fertilization tube.

Coloration and markings: Female and male: carapace yellowish brown veined with dark brown. Chelicera, maxillae, labium and palps yellowish brown, sternum, light yellowish brown, legs light yellowish brown, metatarsi and tarsi darker. Opisthosoma gray or beige dorsally, with black markings and dots (indistinct in male), ventrally lighter and without markings, spinnerets yellowish brown.

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

Etymology. The new species is dedicated to the collector of the type specimens, Mrs. Eiko Mizuyama, Kanagawa.

Remarks. Although the closest species of this new species, *Coelotes erraticus* Nishikawa, 1983, was regarded as a synonym of *Tegecoelotes secundus* (Paik, 1971) [= *T. bicaudatus* (Paik, 1976)] recorded from Korea and Russian Far East (Ovchinnikov, 1999, Namkung, 2001; Wang, 2002), the Japanese species is herewith revived from the synonymy on the basis of a slight difference of the shape of dorsal apophysis of conductor of male palp.

Family Ctenidae

Genus *Acantheis* Thorell, 1891

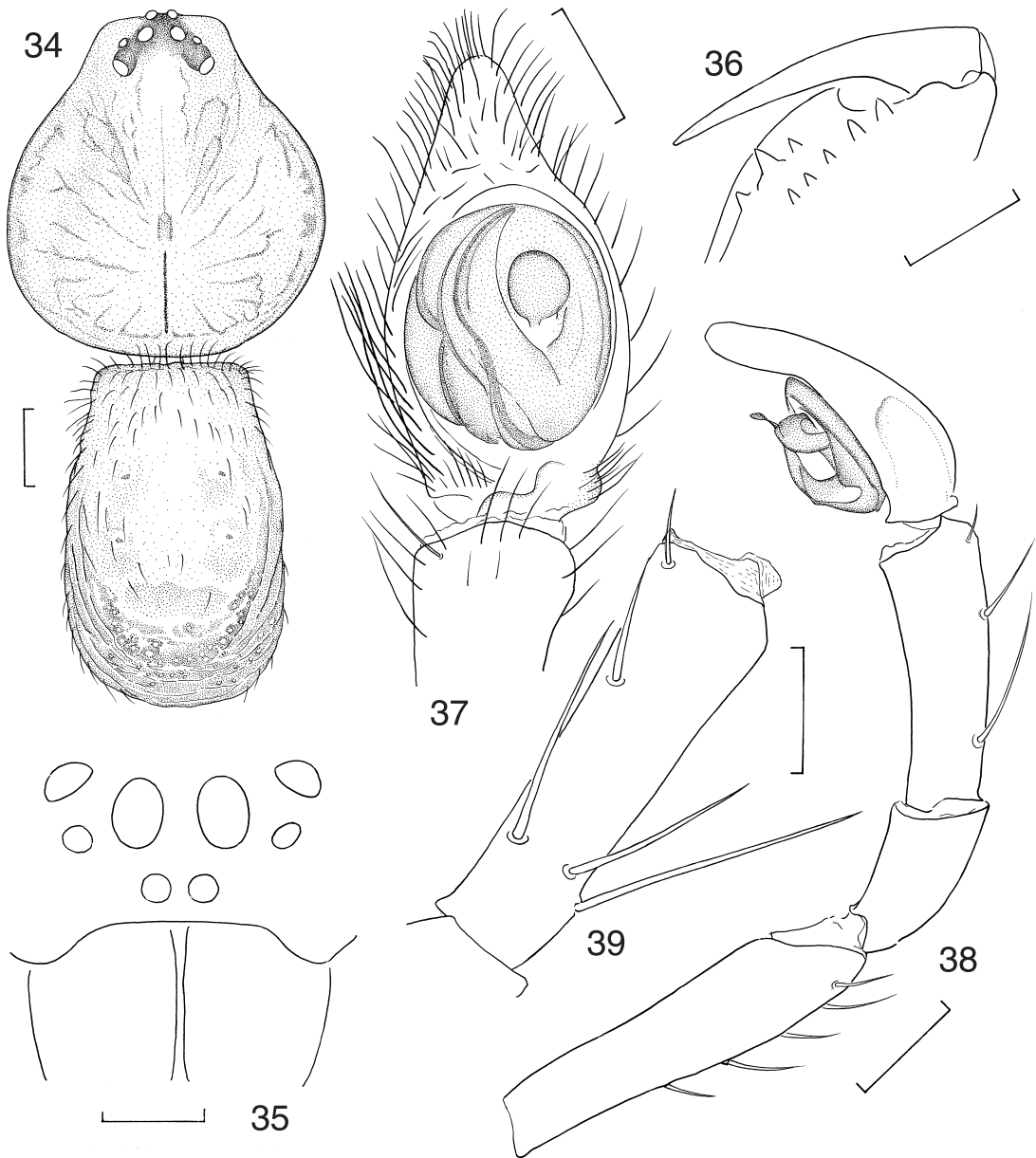
[Japanese name: Ajia-shibogumo-zoku]

Acantheis nipponicus sp. nov.

[Japanese name: Iou-shibogumo]

(Figs. 34–39)

Diagnosis. This new species resembles *Acantheis laetus* (Thorell, 1890) described from Borneo, but is distinguishable from the latter by following characteristics of male palp: the retrolateral tibial apophysis indistinct and the embolic division much wider than that of the latter (Figs.



Figs. 34–39. *Acantheis nipponicus* Ono, sp. nov., male (holotype: NSMT-Ar 7951).—34, Pro- and opisthosoma (appendages omitted), dorsal view; 35, head, frontal view; 36, chelicera, ventral view; 37, palpal organ, ventral view; 38, palp, retrolateral view; 39, tibia of palp, retrolateral view. Scales: 1.0 mm for Fig. 34, 0.5 mm for Figs. 35, 38, 0.4 mm for Figs. 36–37, 39.

37–39; cf. fig. 111 in Simon, 1897, p. 116 and fig. 410 in Lehtinen, 1967, p. 458). Other than these, tibia of leg I of the new species has only five pairs of ventral spines, while that of the Bornean species has some more pairs.

Material examined. Holotype: male from the summit (916 m alt.) of Minami-io-to Island, 24°14'N, 141°27'E, Tokyo, Japan, 25-VI-2007, Haruki Karube leg. (NSMT-Ar 7951); paratype: one male, same data as for the holotype (NSMT-

Ar 7952).

Description (holotype; female unknown). Measurements: Body length 8.56 mm; prosoma length 4.41 mm, width 4.10 mm; opisthosoma length 4.25 mm, width 2.63 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 22.23 mm (5.62+2.02+6.75+5.74+2.10), II 19.51 mm (5.33+2.10+5.44+4.99+1.65), III 16.32 mm (4.61+1.88+4.05+4.50+1.28), IV 21.01 mm (6.45+2.25+6.08+4.65+1.58).

Prosoma (Fig. 34–36): Carapace slightly longer than wide (length/width 1.08), median furrow present and very long, radial lines distinct. Eyes in typical arrangement for Ctenidae, PME>PLE>AME>ALE (8:5:4:3 in diameter), AME-AME<AME-ALE (2:5), PME-PME<PME-PLE (5:6), median ocular area as long as wide, wider behind than in front (anterior width/posterior width 0.55), clypeus extremely short, as same as AME-AME. Chelicera (Fig. 36) with three teeth on promargin of fang furrow, five on retromargin, maxilla much longer than labium, labium wider than long (length/width 0.68), sternum slightly longer than wide (length/width 1.11).

Legs: Very slender, with six or seven long teeth on tarsal claws; spiniformation: femora I-IV dorsally 1-1-1, prolaterally 1-1-1 (I-III) or 1-1-1-1 (IV), retrolaterally 1-1-1; patella I-IV dorsally none, pro- and retrolaterally each 1; tibiae I-IV dorsally 0-1-0 (I), 1-0-1 (II) or 1-1-1 (III-IV), prolaterally 1-1-0 (I), 0-1-0 (II) or 0-1-1 (III-IV), retrolaterally 1-0 (I) or 1-1 (II-IV), ventrally 2-2-2-2-2 (apical) (I-II) or 2-2-2 (apical) (III-IV); metatarsi I-IV prolaterally 1-0-0 (I), 1-1-1 (II-III) or 1-1-0 (IV), retrolaterally 1-1-0 (I), 1-1-1 (II-III) or 1-0-1 (IV), ventrally 2-2-2 (apical). Leg formula: I-IV-II-III.

Male palp (Figs. 37–39): Femur simple, the longest segment, with dorsal spines; patella short, without spine; tibia relatively long, with some long spines (Fig. 39), but without dorsal or retrolateral apophysis. Cymbium marginated proximally, with sclerotized ventral process, retrolateral furrow present, about a half the

length of cymbium, palpal organ compactly set, with a large median apophysis ovate, embolic division thick and short.

Opisthosoma (Fig. 34): longer than wide (length/width 1.61), flat, its anterior margin straight. Anterior spinnerets conical, much larger than the others, colulus not visible.

Coloration and markings: Carapace yellowish brown, with median furrow and some radial markings in black, ocular area black, chelicerae, maxillae, labium, sternum and palps yellowish brown, legs light yellowish brown, tibiae and metatarsi darker. Opisthosoma dark gray dorsally, without any marking, beige ventrally, spinnerets yellowish brown.

Variation. Body length of paratype: 8.24 mm.

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

Etymology. The specific name is derived from the native country of the spider.

Remarks. *Acantheis* is a Southeast Asian genus, which consists of eight species from Malaysia, Indonesia (Borneo, Sulawesi, Java, Sumatra and Nias Island) and India (Murphy, 2000; Silva-Dávila, 2004). Because a member of the genus was found in the place far north from the original range, it is quite possible that further spiders of the genus will be discovered in the Philippines and Indo-China Peninsula.

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