



A survey of the Sumatran Ctenidae (Araneae). 4. A new species of *Acantheis* Thorell, 1891 with unique copulatory organs morphology

ALEXANDER A. FOMICHEV^{1-3,8*}, MIKHAIL M. OMEJKO^{4,5,9} & YURI M. MARUSIK^{6,7,10}

¹Altai State University, Lenina Pr., 61, Barnaul, RF-656049, Russia.

²Tomsk State University, Lenina Pr., 36, Tomsk, RF-634050, Russia.

³Western Caspian University, 31 Istiglaliyyat Street, Baku, Azerbaijan.

⁴Federal Scientific Center of East Asia Terrestrial Biodiversity, Far Eastern Branch, Russian Academy of Sciences, Vladivostok 690022, Russia.

⁵Far Eastern Federal University, Laboratory of ecology and evolutionary biology of aquatic organisms (LEEBAO), Institute of World Ocean, Vladivostok 690091, Russia.

⁶Institute for Biological Problems of the North FEB RAS, Portovaya Str. 18, Magadan 685000, Russia.

⁷Department of Zoology & Entomology, University of the Free State, Bloemfontein 9300, South Africa.

⁸✉ a.fomichev@mail.ru; <https://orcid.org/0000-0001-9268-622X>

⁹✉ omelkom@gmail.com; <https://orcid.org/0000-0002-1556-6248>

¹⁰✉ yurmar@mail.ru; <https://orcid.org/0000-0002-4499-5148>

*Corresponding author

Abstract

A new species, *Acantheis kazantsevae* **sp. nov.**, is described from Sumatra Island (Indonesia) on the basis of both sexes. The male of the new species possesses unusual palp with a twisted tegular apophysis having two arms: a large boomerang-shaped anterior one and a posterior one with a deep cavity. Diagnosis, description and illustrations are provided. Systematic placement of the new species within *Acantheis* Thorell, 1891 is discussed.

Key words: Aranei, Aceh Province, biodiversity, Sunda Islands, tropical wolf spiders

Introduction

Ctenidae Keyserling, 1877, colloquially referred to as tropical wolf spiders or wandering spiders, encompasses a diverse assemblage of spiders. As of 2024, this group comprises 613 extant named species distributed across 49 genera worldwide, as well as one monotypic, extinct genus (Dunlop *et al.* 2023; World Spider Catalog 2024). Notably, ctenids are predominantly found in tropical and subtropical regions, where they engage in a nocturnal, free-ranging hunting strategy without using webs for prey capture.

The diversity of Sumatran ctenids is currently far from being studied in detail. At present, there are 14 known species of ctenids belonging to four genera on this large island: *Acantheis* Thorell, 1891 (three species), *Anahita* Karsch, 1879 (one species), *Bowie* Jäger, 2022 (ten species) and *Amauropelma* Raven, Stumkat & Gray, 2001 (one species) (World Spider Catalog 2024). The majority of these species (11 out of 15) are endemic to the island. There have been no revisions of Sumatran ctenids, and information about them is scattered across several taxonomic works (Thorell 1890; Jäger 2022; Fomichev *et al.* 2023; Omelko & Fomichev 2023; 2024). This work constitutes the fourth installment in a series of articles dedicated to the ctenids of this island. The papers by Jäger, Fomichev *et al.* and Omelko & Fomichev are focused on *Bowie*, *Acantheis* and *Amauropelma*.

Studying the unsorted material stored in the Institute of Systematics and Ecology of Animals SB RAS (Novosibirsk, Russia), we found many vials with spiders collected in Sumatra Island in 1988 by an unknown collector. Among these spiders there were a number of Ctenidae specimens. The study of these specimens has led to the identification of another new species of *Acantheis*. Due to its unique conformation of male palp and epigyne, as well as unusual external morphology, initially we considered it to be a member of an undescribed genus. Because of this the new species was not described in our paper devoted to Sumatran species of *Acantheis* (Fomichev *et al.* 2023). The goals of this paper are to describe a new species and briefly discuss its position among known species of the genus.

Material and methods

The specimens examined were photographed with an Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope at the Altai State University (Barnaul, Russia) and a Hitachi TM-1000 scanning electron microscope at the Institute of Systematics and Ecology of Animals SB RAS (Novosibirsk, Russia). Photographs of the female internal genitalia were taken from slides. Images of the male palp and habitus were taken in a dish with white cotton at the bottom, and filled with ethanol. The female internal genitalia were cleared in KOH/water solution until the soft tissues were dissolved. SEM images were obtained from dissected organs: the male palp, epigyne and legs. The dissected organs were mounted to a special metal stub and slightly dried. No gold coating was applied. Digital images were montaged using Zerene Stacker software (<https://www.zerenestacker.com>). The distribution map was produced using the online mapping application SimpleMapp (Shorthouse 2010). All measurements are in millimeters. Lengths of leg segments were measured from the prolateral side, those of palps from the retrolateral side. Palp and leg spination are based on examination of only one side of the body. The spination pattern is given in the following format: the sum of all spines is listed for the prolateral, dorsal and retrolateral sides; ventral spines are listed in pairs, from proximal to distal. The terminology and description format follow Jäger (2012), with modifications. The examined material is deposited in the Institute of Systematics and Ecology of Animals SB RAS, Novosibirsk, Russia (ISEA; curator G.N. Azarkina).

Abbreviations: *AE*—embolic arm, *ALE*—anterior lateral eye, *AME*—anterior median eye, *AT*—anterior arm of tegular apophysis, *C*—conductor, *CD*—copulatory duct, *CO*—copulatory opening, *d*—dorsal, *E*—embolus, *ES*—embolic spur, *ET*—embolic tip, *Fe*—femur, *LT*—lateral tooth, *MOA*—median ocular area, *Mt*—metatarsus, *p*—prolateral, *Pa*—patella, *PLE*—posterior lateral eye, *PME*—posterior median eye, *PT*—posterior arm of tegular apophysis, *r*—retrolateral, *ReI*—receptacle's chamber I, *ReII*—receptacle's chamber II, *RTA*—retrolateral tibial apophysis, *SB*—septal base, *Sf*—spermophor, *SS*—septal stem, *St*—sebtegulum, *TC*—cavity of tegular apophysis, *T*—tegulum, *TE*—prolateral extension, *Ti*—tibia, *Tr*—tarsus, *v*—ventral, *VB*—ventrad bulge, *VE*—ventral extension, *VTA*—ventral tibial apophysis.

Taxonomy

Family Ctenidae Keyserling, 1877

Genus *Acantheis* Thorell, 1891

Acantheis Thorell, 1891: 61. Simon 1897: 118.

Type species *Acanthoctenus variatus* Thorell, 1890, from Nias Island.

Acantheis kazantsevae sp. nov.

Figs 1–32

Types. INDONESIA: *Sumatra* Island: Aceh Prov.: holotype ♂ (ISEA, 001.9097), Ketambe Vil. [03°41'N, 97°39'E], 400–500 m, under stones in pristine forest, 1988 (precise date unknown), unknown collector. Paratype: 1 ♀ (ISEA, 001.9098), with same data as for holotype.

Etymology. The specific name is a matronym in honor of Yulia G. Kazantseva (Novosibirsk, Russia), talented psychiatrist and friend of the senior author.

Diagnosis. The new species differs from all other species of *Acantheis* by having a twisted tegular apophysis with two arms: a large boomerang-shaped anterior one (*AT*) and a posterior one (*PT*) (*vs.* tegular apophysis not twisted), embolus with long pointed arm (*AE*) (Figs 16–17, 20–21) (*vs.* *AE* absent) and epigyne with short anchor-shaped septal base (*SB*) (Figs 22, 25) (*vs.* high, square, trapezoidal or elliptical *SB*).

Description. *Male* (Figs 1–2, 5–7, 10). Total length 4.25. Carapace: 2.1 long, 1.8 wide. Opisthosoma: 2.1 long, 1.4 wide. Carapace yellow-gray with yellow median band. Clypeus brown-gray. Chelicerae, labium, endites, sternum, and coxae yellow. Palps and legs dirty-yellow. Abdomen yellow-gray, with yellow median band dorsally. Venter of opisthosoma yellow. Spinnerets yellow-gray. Cephalic part with a tuft of long, light setae between *PME*.

Eye sizes and interdistances: AME 0.14, ALE 0.09, PME 0.23, PLE 0.23; AME–AME 0.07, AME–ALE 0.13, PME–PME 0.09, PME–PLE 0.1, AME–PME 0.09, ALE–PLE 0.11. Clypeus height at AME 0.20, at ALE 0.39. Chelicerae with 3 promarginal and 5 retromarginal teeth. Femur I/carapace length ratio 1.57.

For palp and leg measurements see Table 1. For palp and leg spination see Table 2.

TABLE 1. Palp and legs measurements of male of *Acantheis kazantsevae* sp. nov.

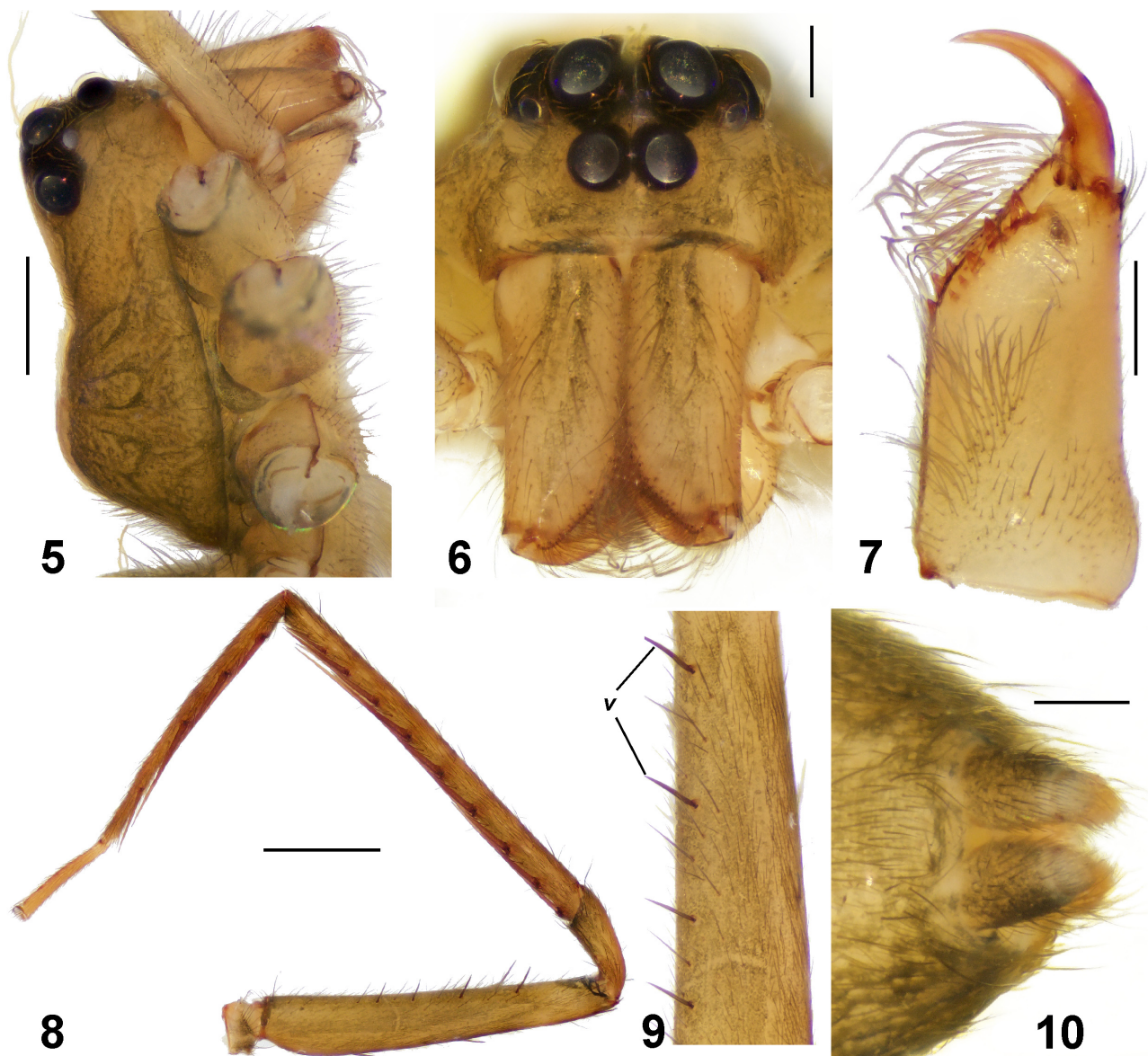
	Fe	Pa	Ti	Mt	Tr	Total
Palp	1.23	0.58	0.78	–	1.08	3.67
Leg I	3.3	0.98	3.98	3.48	1.28	13.02
Leg II	2.88	0.85	3.05	2.85	1.13	10.76
Leg III	2.6	0.7	2.45	2.65	1.1	9.5
Leg IV	3.93	0.83	3.68	4.75	1.38	14.57

TABLE 2. Palp and legs spination of male of *Acantheis kazantsevae* sp. nov.

	Fe	Pa	Ti	Mt
Palp	3d 1p 1r	1p	1d 2p	–
Leg I	3d 3p 1r	-	9 paired v	4 paired v
Leg II	2d 3p 4r	-	1p + 8 paired v	4 paired v
Leg III	4d 5p 4r	1p 1r	1d 2p 2r + 2 paired v	2d 3p 3r + 1 single and 2 paired v
Leg IV	3d 4p 3r	-	1d 2p 2r + 3 paired v	4d 4p 3r + 1 single and 3 paired v

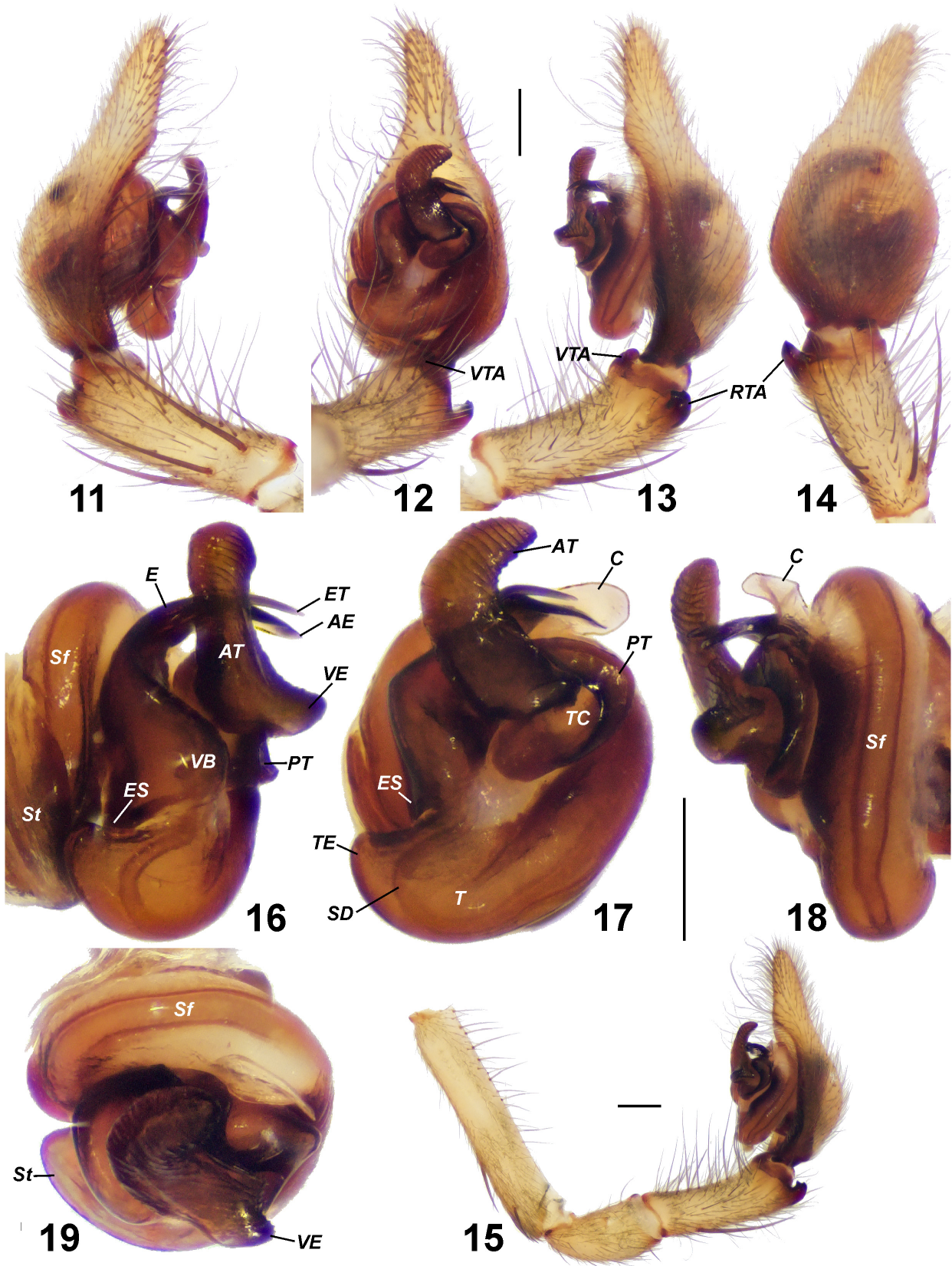


FIGURES 1–4. Habitus of *Acantheis kazantsevae* sp. nov., male (1–2) and female (3–4). 1, 3—dorsal; 2, 4—ventral. Scale: 2 mm.

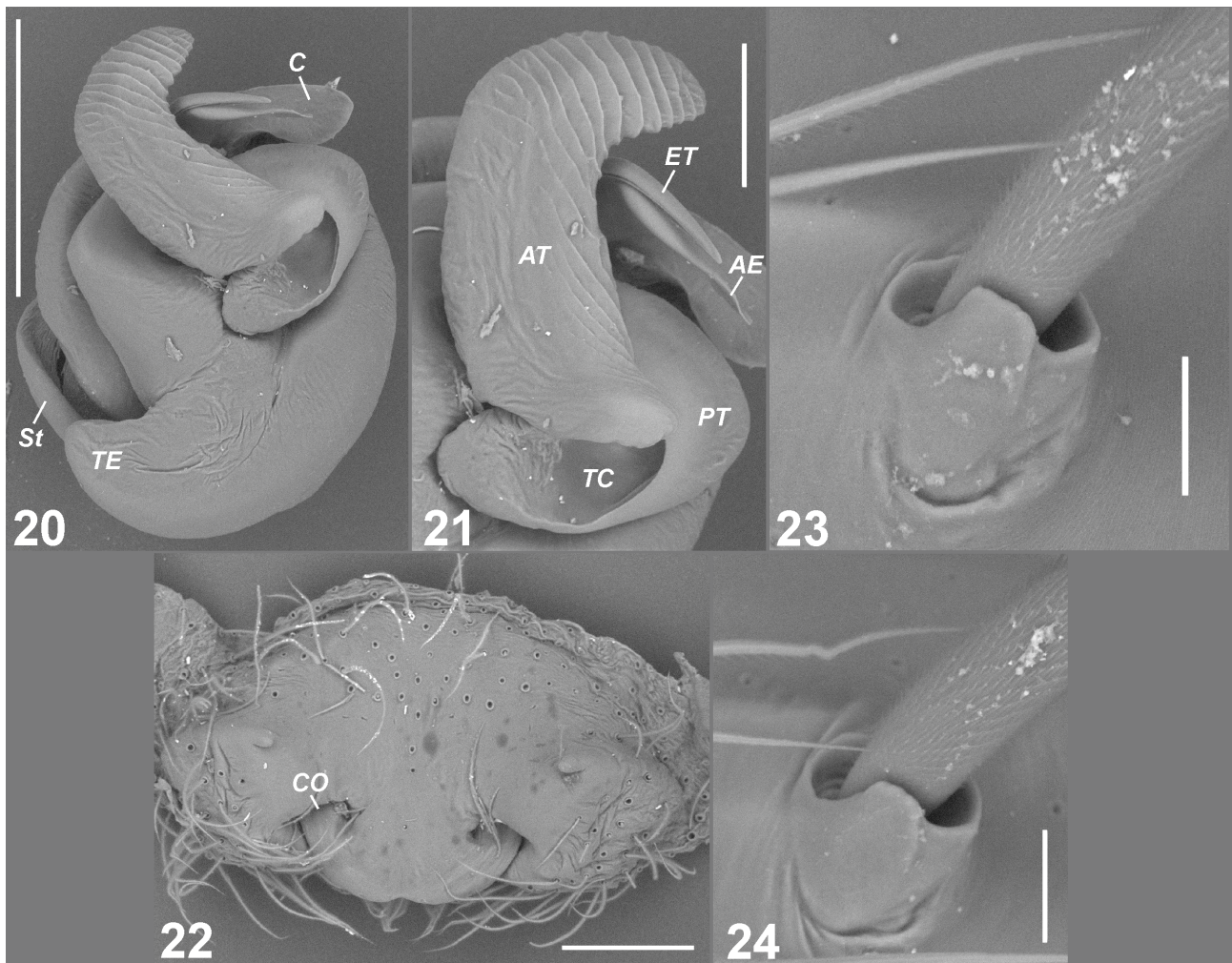


FIGURES 5–10. Prosoma (5), cephalic part (6), chelicera (7), leg I (8), femur I (9) and spinnerets (10) of *Acantheis kazantsevae* sp. nov. 5—male, lateral; 6—ditto, anterior; 7—ditto, posterior; 8, 9—female, retrolateral; 10—male, ventral. Scale: 5=0.5 mm, 8=1 mm; 6–7, 10=0.2 mm. Abbreviation: v—ventral spines.

Male palp as shown in Figs 11–21. Femur 5.3 times longer than wide. Patella 2.0 times longer than wide. Tibia ca. 2.2 longer than wide, with 3 very long spines, longest ca. 0.9 of tibia length. Retrolateral tibial apophysis (*RTA*) shorter than tibia diameter, with rounded anterior part, with 2 small spines. Ventral tibial apophysis (*VTA*) larger than *RTA*. Cymbium spineless, ca. 2.4 times longer than wide. Cymbial tip about 0.42 of cymbial length, slightly shorter than bulb. Subtegulum (*St*) large, oval. Tegulum ca. 1.2 times longer than wide. Tegulum (*T*) with prolateral extension (*TE*). Spermophor (*Sf*) encircling the entire tegulum. Posterior arm of tegular apophysis (*PT*) ear-shaped, with a deep cavity (*TC*) at base of anterior arm (*AT*). *AT* large, boomerang-shaped. Apical part of *AT* retrolaterad and basal part with large, ventral extension (*VE*). Basal part of *AT* bulged and apical one with distinct ridges ventrally. Conductor (*C*) membranous, elliptical. Basal part of embolus (*E*) with ventrad bulge (*VB*) and proximad spur (*ES*). Embolic arm (*AE*) almost straight, longer than embolic tip (*ET*), protruding from retrolateral side of embolus. Embolic tip straight, about 0.7 of embolic arm length.



FIGURES 11–19. Male palp (11–15) and bulb (16–19) of *Acantheis kazantsevae* sp. nov. 11, 16—prolateral; 12, 17—ventral; 13, 15, 18—retrolateral; 14—dorsal; 19—anterior. Scale: 0.2 mm. Abbreviations: AE—embolic arm, AT—anterior arm of tegular apophysis, C—conductor, E—embolus, ES—embolic spur, ET—embolic tip, PT—posterior arm of tegular apophysis, Sf—sperm duct, St—subtegulum, T—tegulum, TC—cavity of tegular apophysis, TE—prolateral extension, VB—ventrad bulge, VE—ventral extension, VTA—ventral tibial apophysis.



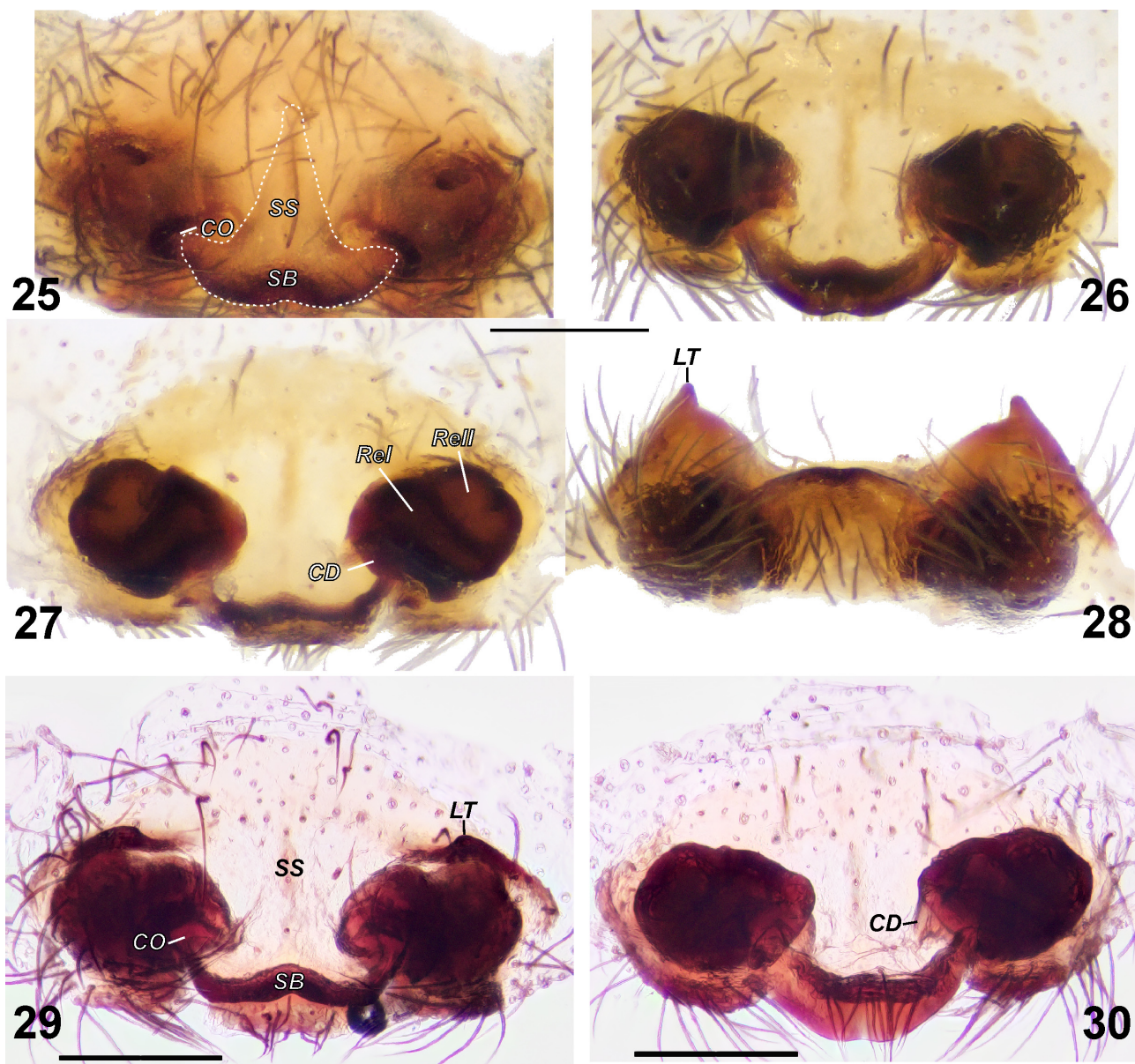
FIGURES 20–24. SEM photographs of bulb (20), tegular apophysis (21), epigyne (22) and ventral spine's locking mechanism in female's femora I (23–24) of *Acantheis kazantsevae* sp. nov. Scale: 20=0.3 mm; 21–22=0.1 mm; 23–24=0.02 mm. Abbreviations: *AE*—embolic arm, *AT*—anterior arm of tegular apophysis, *C*—conductor, *CO*—copulatory opening, *ET*—embolic tip, *PT*—posterior arm of tegular apophysis, *St*—subtegulum, *TA*—tegular apophysis, *TC*—cavity of tegular apophysis, *TE*—prolateral extension.

Female (Figs 3–4, 8–9). Total length 5.35. Carapace: 2.45 long, 2.0 wide. Opisthosoma: 2.8 long, 1.95 wide. Carapace and clypeus as in male. Chelicerae, endites and labium yellow brown. Sternum and coxae as in male. Palps, legs, opisthosoma and spinnerets as in male. Cephalic part with a tuft of long light setae between PME. Eye sizes and interdistances: AME 0.16, ALE 0.11, PME 0.29, PLE 0.23; AME–AME 0.1, AME–ALE 0.17, PME–PME 0.11, PME–PLE 0.14, AME–PME 0.1, ALE–PLE 0.14. Clypeus height at AME 0.19, at ALE 0.39. Chelicerae with 3 promarginal and 5 retromarginal teeth. Femur I/carapace length ratio 1.27. Femur I with one row of flexible ventral spines equipped with locking mechanism (Figs 23–24).

For palp and legs measurements see Table 3. For palp and legs spination see Table 4.

Epigyne and internal genitalia as shown in Figs 22, 25–30. Epigynal plate 1.6 times wider than long. Septal base (*SB*) anchor-shaped. Septal stem (*SS*) 1.5 times shorter than septal base width. Lateral teeth (*LT*) distinct, almost parallel in posterior view. Receptacles (*Re*) circular, subdivided into 2 chambers: flattened chamber I (*ReI*) and elliptical chamber II (*ReII*). Copulatory ducts (*CD*) very short, tightly pressed to *ReI*.

Distribution. Known from the type locality only (Figs 31–32).



FIGURES 25–30. *Acantheis kazanstevae* sp. nov., epigyne, intact (25) and macerated (26–30). 25, 26, 29—ventral, 27, 30—dorsal, 28—posterior. Scale bar: 0.2 mm. Abbreviations: CO—copulatory opening, LT—lateral tooth, SS—septal stem, SB—septal base, CD—copulatory duct, ReI—receptacle’s chamber I, ReII—receptacle’s chamber II.

TABLE 3. Palp and legs measurements of female of *Acantheis kazantsevae* sp. nov.

	Fe	Pa	Ti	Mt	Tr	Total
Palp	1.13	0.5	0.83	–	0.95	3.41
Leg I	3.1	1.03	3.65	2.75	0.95	11.48
Leg II	2.73	0.93	2.7	2.38	0.93	9.67
Leg III	2.6	0.75	2.25	2.5	1.05	9.15
Leg IV	3.78	0.85	3.35	4.4	1.35	13.73



FIGURES 31–32. Collecting locality of *Acantheis kazanstevae* sp. nov. The frame on Fig. 31 refers to the content of Fig. 32.

TABLE 4. Palp and legs spination of female of *Acantheis kazantsevae* sp. nov.

	Fe	Pa	Ti	Mt
Palp	3d 1p 1r	1p	2p	–
Leg I	3d 4p 2r 4v	-	1 single + 10 paired v	4 paired v
Leg II	3d 2p 3r	-	1p + 1 single and 8 paired v	4 paired v
Leg III	3d 4p 4r	1p 1r	1d 2p 2r + 3 paired v	3p 3r + 3 paired v
Leg IV	3d 4p 2r	1p 1r	1d 2p 2r + 2 single and 2 paired v	3p 5r + 1 single and 4 paired v

Discussion

Initially we believed that our specimens belonged to an undescribed genus of Ctenidae. We assumed that because of the unique morphology of male palp with twisted tegular apophysis, a character unknown from other ctenids. However, all other morphological features indicate that the newly described species belongs to *Acantheis*. This is evidenced by both external morphology and structure of copulatory organs. The new species belongs to *Acantheis* based on the following features: 1) prosoma divided into *pars cephalica* and *pars thoracica* by a V-shaped depression, 2) cephalic part with a tuft of long light setae between PME, 3) elongated spines in tibia and metatarsus of leg I, 4) small *RTA*, 5) the proximal part of the cymbium with no modifications, 6) elongated cymbial tip as long as the bulb, 7) embolus starting from prolateral side of the bulb, 8) bifurcated distal part of embolus, 9) receptacles subdivided into two chambers (Fomichev *et al.* 2023). Based on all of the above characters, we decided to abandon the description of a new monotypic genus and describe a new species within *Acantheis*. Five *Acantheis* species are known from Sumatra, nearby Nias Island, and Siberut Island (World Spider Catalog 2024). Three of these species—*A. andreimishenini* Fomichev, Omelko & Marusik, 2023, *A. dimidiatus* (Thorell, 1890) and *A. sergeimishenini* Fomichev, Omelko & Marusik, 2023—were recently (re)described (Fomichev *et al.* 2023). Two other species, *A. longiventris* Simon, 1897 (Siberut Island) and *A. variatus* (Thorell, 1890) (Nias Island), have not been illustrated. The last species was described from a juvenile specimen, which is probably lost (Lehtinen 1967). Although there

are no illustrations of the copulatory organs of these two species, their somatic descriptions allow comparison with *A. kazantsevae* **sp. nov.** Both sexes of *A. kazantsevae* **sp. nov.** have 4 pairs of ventral spines in metatarsus I (see Tables II, IV). While *A. longiventris* and *A. variatus* possess 5 pairs of spines (Simon 1897a; 1897b). Additionally, the female of *A. longiventris* is more than twice as large as *A. kazantsevae* **sp. nov.** (12 mm vs. 5.35 mm). Moreover, the type locality of the new species is significantly distant from Nias Island and Siberut Island (ca. 250 and 500 km, respectively). Thus, *A. kazantsevae* **sp. nov.** cannot be a junior synonym of *A. longiventris* or *A. variatus*.

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