

New discoveries in Oriental Trogaspidiini (Hymenoptera: Mutillidae): a new genus and the female sex of *Arkaditilla* Okayasu, 2021

Новые находки в ориентальной трибе Trogaspidini (Hymenoptera: Mutillidae): новый род и описание неизвестной самки в *Arkaditilla* Okayasu, 2021

К.А. Williams*, J. Okayasu**, ***

К.А. Вильямс*, Д. Окаясу**, ***

* Plant Pest Diagnostics Center, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento California 95832 USA.
E-mail: kevin.williams@cdfa.ca.gov

* Центр диагностики вредителей растений, Департамент продовольствия и сельского хозяйства Калифорнии, 3294 Мидоувью, Сакраменто Калифорния 95832 США.

** Systematic Entomology, Research Faculty of Agriculture, Hokkaido University, North 9 West 9, Kita-ku, Sapporo, Hokkaido, 060-8589 Japan. E-mail: mutiphiidae@gmail.com

** Систематическая энтомология, исследовательский факультет сельского хозяйства, Университет Хоккайдо, Север 9 Запад 9, Кита-ку, Саппоро, Хоккайдо 060-8589 Япония.

*** Institute for Integrated Innovations, Hokkaido University, North 12 West 7, Kita-ku, Sapporo Hokkaido 060-0812 Japan.

*** Институт интегрированных инноваций, Университет Хоккайдо, Север 12 Запад 7, Кита-ку, Саппоро, Хоккайдо 060-0812 Япония.

Abstract. A new genus, *Lelejidia* **gen.n.**, is described to house the enigmatic species, *Mutilla jacobsoni* André, 1907. Females are described for two species in the genus *Arkaditilla* Okayasu, 2021: *Arkaditilla gibba* Okayasu, 2021 and *Arkaditilla tokek*, **sp.n.**

Резюме. Описан новый род *Lelejidia* **gen.n.**, в который включен загадочный вид *Mutilla jacobsoni* André, 1907. Описаны самки двух видов рода *Arkaditilla* Окаясу, 2021: *Arkaditilla gibba* Окаясу, 2021 и *Arkaditilla tokek* **sp.n.**

Introduction

Trogaspidiini is the only cosmopolitan tribe of velvet ants (Mutillidae) in the World; they reach their highest diversity in the Afrotropical and Oriental realms [Lelej, 2007; Williams, 2025]. In the Oriental realm, Trogaspidiini includes over 300 species in 19 genera, 15 of these genera were described by Arkady S. Lelej [Pagliano et al., 2020]. The most recently described genus in the region was named after him, *Arkaditilla* Okayasu, 2021. In honor of Dr. Lelej's 80th birthday, we here describe the unknown females of *Arkaditilla* and name another new genus after him, *Lelejidia* **gen.n.**

Material and methods

The following codens are used for material discussed in this study:

CBGC — Centre for Biodiversity Genomics, University of Guelph, Ontario, Canada;

CSCA — California State Collection of Arthropods, Sacramento, California, USA;

EUMJ — Ehime University Museum, Matsuyama, Japan;

EMUS — Department of Biology Insect Collection, Utah State University, Logan, Utah, USA;

RMNH — Naturalis Biodiversity Center, Leiden, South Holland, the Netherlands;

TKPM — Tokushima Prefectural Museum, Tokushima, Japan.

Specimens were examined with various stereomicroscopes in multiple labs. Photographs were taken using a Leica MC170 HD camera through a Leica M165C stereomicroscope and lit using a ring light under an opaque dome.

We use the abbreviations T2, T3, etc., to denote the second, third, etc., metasomal terga while S2, S3, etc., denote the second, third, etc., metasomal sterna and F2, F3, etc., denote the antennal flagellomeres. DLO is an abbreviation for the diameter of a lateral ocellus. OOD is an abbreviation for ocellular distance, the minimal distance between a lateral ocellus and the inner eye margin. IOD is an abbreviation for inter-ocellar distance, the minimal distance between a lateral ocellus and the median ocellus.

For holotype and allotype specimens, labels are transcribed directly with each line separated by a slash “/”. For paratypes and other material examined, label data are summarized in a consistent format.

The present work is registered in ZooBank (www.zoobank.org) under urn:lsid:zoobank.org:pub:45863601-9E71-421E-B507-21A6FF3DBD1B

How to cite this article: Williams K.A., Okayasu J. 2026. New discoveries in Oriental Trogaspidiini (Hymenoptera: Mutillidae): a new genus and the female sex of *Arkaditilla* Okayasu, 2021 // Euroasian Entomological Journal. Vol.25. Suppl.1. P.137–145. doi 10.15298/euroasentj.25.S01.22 **Published:** 05.x.2026.

Results

Mutillidae: Mutillinae: Trogaspidiini

Arkaditilla Okayasu, 2021

<http://zoobank.org/A07954E6-26EB-4494-860C-51F96F27D2C1>

Arkaditilla Okayasu, 2021: 147, ♂.

Type species: *Arkaditilla leleji* Okayasu, 2021.

Diagnosis. Female. Females can be recognized by the following combination of characters: genal carina distinct; pronotum with distinct carina or flattened tooth separating dorsal and lateral surfaces; mesosoma elongate rectangular with pronotum wider than propodeum; T2 disc with two spots of dense white setae; T2 fringe with black setae; T3 completely covered with dense whitish setae; pygidial plate smooth and defined by lateral carinae. MALE. See Okayasu [2021].

Description. Female (Hitherto unknown). Color and setae: Cuticle generally orange and blackish, without metallic tint. Body with simple setae only.

Head: Rounded behind eyes, coarsely areolate-punctate. Occipital carina present dorsally. Eye ovate, not strongly protruding, surface generally dull, ommatidia distinct. Antennal scrobe broad, subcircular, with dorsal and lateral carinae present. Antennal tubercle convex, faintly sculptured. Clypeus with slender baso-mesal lobe; transverse carina not downcurving laterally; antero-ventral area concave and smooth. Malar space shorter than eye diameter. Hypostomal carina strong, angular near genal carina. Genal and postgenal carinae present and usually distinct. Scape simple. Pedicel about as long as wide, shorter than F1; F1 longer than wide and longer than F2. Mandible weakly curved, slender, tapering, bidentate apically, no ventral basal tooth but small tapered narrow flange. Maxillary palp 6-segmented; labial palp 4-segmented; covered with short setae. Prementum smooth, flat with longitudinal mesal carina.

Mesosoma: Longer than wide, rectangular, widest at mid-point of pronotum; propodeum dorsal and posterior surfaces rounded, areolate with intervals largely obliterated posteriorly. Pronotal dorsal face (excluding anterior collar) with anterior margin straight, epaulet placed on tubercle, humeral angle sharp, dorsal and lateral surfaces separated by transverse lamella or flat widened tooth. Scutellar scale slender. Pronotal-mesopleural suture distinct. Mesopleuron mostly smooth; vertical mesopleural ridge mostly obliterated. Mesopleural-metapleural suture indistinct dorsally. Metapleuron smooth. Metapleural-propodeal suture distinct; endophragmal pit distinct. Lateral surface of propodeum perpendicular with dorsal surface, defined by row of teeth, without macro-sculpture. Mesosternum with dense setal patch between mesocoxae. Metasternal process triangular, often rounded posteriorly.

Legs: Tibial spur formula 1-2-2. Foreleg with tarsal comb. Mid and hind tibiae each with numerous dorsal spines, apical spines not inserted on a short process; each subapically with inconspicuous circular secretory pore near base of inner apical spur; apical spurs serrate laterally, outer spur shortened. Inner metacoxal carina present.

Metasoma: Surface mostly finely and densely punctate, except sparser and coarser on T1 and S2, and sparser with densely setose intervals on T2 disc. T1 shape narrowly sessile, about $0.5 \times$ width of T2, evenly expanded from base, anterior face weakly convex; anterior auricle prominent, sub-rectangular laterally. T2 disc mesally flattened. T2 lateral felt line moderately long and mesally situated. T6 with pygidial plate, defined by lateral carina, surface entirely smooth; shape elongate ovate. S1 longitudinal carina lamellate, entire. S2

shallowly convex without transverse depression posteriorly, without felt line. S6 with apex bidentate.

Remarks. Only two of the six species are now known from both sexes, so some characters mentioned in the diagnosis might not prove to be consistent, particularly the color pattern. The diagnoses and descriptions provided here, however, should aid in future association of additional *Arkaditilla* females. The females of this genus are particularly similar to *Petersenidia* by having the T2 fringe with black setae and pygidial plate smooth, laterally delimited by carinae. It is difficult to make adequate comparison due to the large number of unrevised species included in *Petersenidia*. At least, this genus is distinguished from the type species, *P. fukudai* (Tsuneki, 1972), by the genal carina sharp, distinct.

KEY TO SPECIES OF *ARKADITILLA*

(UPDATED FROM OKAYASU [2021])

1. Male 2
- Female 8
- 2(1). Scape ventral carinae subparallel (Okayasu, 2021: fig. 25), mostly smooth between them; flagellum at most with F1 apical 1/3 and F2 basal 1/2 yellow; F1 cylindrical (Okayasu, 2021: fig. 26); paracuspis stick-like [Okayasu, 2021: fig. 67] 3
- Scape ventral carinae divergent apically (Okayasu, 2021: figs 27, 29, 31, 33, 35), densely punctate between them; flagellum at least with F1 apical 1/3 and F2 entirely whitish yellow ventrally; F1 depressed (Okayasu, 2021: figs 28, 30, 32, 34, 36); paracuspis absent or slightly tuberculate [Okayasu, 2021: figs 68–72] 4
- 3(2). Clypeal ventro-medial rectangular part wider [Okayasu, 2021: fig. 13]; mandibular apex abruptly converging [Okayasu, 2021: fig. 13]; paracuspis slightly oriented dorsally; digitus slender, nearly parallel-sided, and broadest at distal 1/3. Borneo, Peninsular Malaysia *A. bagrada* (Cameron)
- Clypeal ventro-medial rectangular part slender (Fig. 15); mandibular apex consistently converging (Fig. 15); paracuspis strongly oriented dorsally; digitus triangular, broadest at base. Java, Sumatra *A. tokek* sp.n.
- 4(2). Mandible ventrally slightly excised with small basal tooth [Okayasu, 2021: fig. 23]; mandible inner margin lamellately expanded near apex [Okayasu, 2021: fig. 17]; F1 weakly depressed, F1 height subequal to pedicel diameter [Okayasu, 2021: fig. 34]; T3 black; penis valve strongly expanded ventrally on posterior half [Okayasu, 2021: figs 62, 63]. Borneo *A. leleji* Okayasu
- Mandible ventrally deeply excised with large basal tooth [Okayasu, 2021: figs 20, 21, 23, 24]; mandible inner margin expanded subbasally [Okayasu, 2021: figs 14–16, 18]; F1 strongly depressed, F1 height $\sim 0.8 \times$ pedicel diameter [Okayasu, 2021: figs 28, 30, 32, 36]; T3 orange; penis valve weakly expanded ventrally [Okayasu, 2021: figs 53, 54, 56, 57, 59, 60, 65, 66] 5
- 5(4). Digitus posteriorly slender stick-like [Okayasu, 2021: fig. 39]; paracuspis absent [Okayasu, 2021: fig. 68]. Borneo, Peninsular Malaysia *A. depressicornis* (Mickel)
- Digitus posteriorly expanded, forming triangular projection [Okayasu, 2021: figs 41, 43, 47]; paracuspis slightly tuberculate [Okayasu, 2021: figs 69–72] 6

- 6(5). Clypeus medially strongly elevated even ventrally; cuspis widened near apex, forming oblique posterior margin [Okayasu, 2021: figs 58, 70]. Java .. *A. gibba* Okayasu
- Clypeus dorsally elevated, sloping ventrally; cuspis widened on posterior 1/3 with rounded apex [Okayasu, 2021: figs 55, 64, 69, 72] 7
- 7(6). Mandible with weak subapical and subbasal teeth (Okayasu, 2021: fig. 15); cuspis weakly widened on posterior 1/3 [Okayasu, 2021: figs 55, 69]. Peninsular Malaysia *A. frim* Okayasu
- Mandible with sharp subapical tooth and large inner subbasal tooth [Okayasu, 2021: fig. 18]; cuspis strongly widened on posterior 1/3 [Okayasu, 2021: figs 64, 72]. Bali, Java *A. nallinia* (Zavattari)
- 8(1). Mesosomal dorsum length $1.2 \times$ its width; pronotum particularly widened with humeral angles about as wide as lateral pronotal lamella (Fig. 5). Java *A. gibba* Okayasu
- Mesosomal dorsum length $1.1 \times$ its width; pronotum not particularly widened with humeral angles narrower than lateral pronotal lamella (Fig. 16). Java, Sumatra *A. tokek* sp. n.

Arkaditilla gibba Okayasu, 2021

Figs 1–9.

<http://zoobank.org/25D8F0E2-795C-4BC7-BDAB-461B910EE8A9>

Arkaditilla gibba Okayasu, 2021: 157, ♂, holotype ♂ (Mt. Argopuro, East Java, Indonesia) [TKPM].

Material. Holotype, ♂, **Indonesia, Java:** “[INDONESIA] / Mt. Argopuro / East Java / 31.July 1995” (TKPM). Paratypes: **Indonesia, Java:** same data as holotype (TKPM). Other material: **Indonesia, Java:** Blawan, 800m, XII.1940, H. Lucht (1♀, RMNH); Buitzenorg, Djasanga, 25.XII.1940, M.A. Liefstinck (1♀, 1♂, in copula, RMNH); Djampantengah, Gng. Patat, X.1938, M.E. Walsh (1♂, RMNH); Drenger, G. Tangkoeban Prahoe, 4000–5000 ft., E.C. Drescher: II.1.1933 (1♀, RMNH); V.1934 (3♀, RMNH); III.1936 (1♀, RMNH); VII.1934 (3♀, RMNH); XI.1934 (1♀, RMNH); IV.1936 (4♀, RMNH); X.1936 (1♀, RMNH); III.1937 (2♀, RMNH); IX.1937 (1♂, RMNH); X.1937 (4♀, RMNH); XI.1937 (2♀ 1♂, RMNH); XII.1937 (5♀, RMNH); I.1938 (2♀, RMNH); II.1938 (2♀, RMNH); V.1938 (3♀, RMNH); VI.1938 (1♀, RMNH); Gn. Bintang, Soekanegara, 20.VIII.1941 (2♂, RMNH); Idjen Plateau, 900–1500m, R.C. Drescher (1♀, RMNH); Kaligosa, 1500m, II.1937, E.C. Drescher (1♀, RMNH); Mt. Gedeh, Puntjak: 1400m, II.1.1953, J.v.d. Vecht (4♂, RMNH); 1450m, 5.VI.1948, J.v.d. Vecht (1♂, RMNH); 1450m, 22.I.1950, J.v.d. Vecht (1♂, RMNH); 11.I.1953, J.v.d. Vecht (1♀, RMNH); Mt. Gedeh, Tjibodas: 1700m, 28.II.1932, M.A. Liefstinck (2♀, RMNH); 1450m, V.1937, E.C. Drescher (1♀, RMNH); 1400–1700m, various dates and collectors (25♂); Petanan, west coast, Wildhoot-Bosch, II.1936, Walsch (1♀, RMNH); Preanger: Soekaboemi: 2000 ft., V.1941, J.M.A. van Groenendael (1♂, RMNH); no further data (1♂, RMNH); III.1933, J.v.d. Vecht (3♂, RMNH); IV.1933, J.v.d. Vecht (2♂, RMNH); Tjigoea, 3500 ft., 29.XI.1939, J.M.A. van Groenendael (1♂, RMNH); 3800 ft., 16.VI.1939, J.M.A. van Groenendael (1♂, RMNH); 4–12.XI.1941, J.M.A. van Groenendael (2♂, RMNH); 29.XI.1939, J.M.A. van Groenendael (1♂, RMNH); Priangan, 1933–1939, J.M.A. van Groenendael (6♂, RMNH); Tasir Nego, Rangkas Betoomy, IV.1938, E.C. Drescher (1♀, RMNH); Telagawarna: 1450m, 12.V.1953, A.M.B. Wegner (1♀, RMNH); 1450m, 12.V.1953, M.A. Liefstinck (5♂, RMNH); various dates and collectors (7♂, RMNH); Tjimeroean, VI.1919 (1♀, RMNH); Jawa Barat, Ciburum, Mt. Gede, 1600 m alt., 16.VII.1977, S. Nagai (1♀ EUMJ); various handwritten localities in Java with various dates and collectors (37♂, RMNH).

Diagnosis. *Female* (Hitherto unknown). This species can be separated from *A. tokek* sp. n., by mesosoma shape, the pronotum is particularly widened with the humeral angles about

as wide as the pronotal spiracles and the mesosomal dorsum length is $1.2 \times$ its width; additionally, legs are usually mostly black. *Male*. See Okayasu [2021]. Body length 10.0–16.5 mm.

Description. *Female* (Hitherto unknown). Body length 6.5–10.5 mm.

Color and setae. Cuticle of head, and metasoma black; mesosoma reddish-orange; antenna brown; legs reddish-orange basally and brown apically. Tibial spurs whitish. Frons and vertex with sparse erect blackish setae; mesosomal dorsum with sparse erect and appressed orange setae; mesosomal pleura with dense whitish microsetae; remainder of head and mesosoma with sparse whitish or pale yellow setae. Discs of T1, T2 anteriorly and laterally, and S1–6 with sparse erect white or pale yellowish setae; fringes of S2–5 whitish or pale yellow; disc of T2 with small circular patch of dense appressed whitish or pale yellow setae laterally; T3 with band of dense appressed whitish setae; T6 with moderately dense pale yellow setae; T2 disc (except for spots), T2 fringe and T4–5 with dense black setae. Felt line setae golden.

Head. Maximum head width $1.2 \times$ maximal pronotal width; vertex width $1.05 \times$ maximal pronotal width. Longitudinal eye diameter $0.95 \times$ frons width. Frons, vertex, and gena areolate-punctate with many intervals reduced to carinae. Mandible apically bidentate, without ventral tooth. Clypeus basal lobe a narrow sharp tubercle; mesal ridge cariniform, not down-curving into ventral area laterally, in dorsal view terminating in sharp angle laterally; ventral area bare and concave. Genal carina and postgenal carina both well-developed, posteriorly reaching occipital carina, anteriorly nearly reaching hypostomal carina. Hypostomal carina distinct, forming tooth-like angle near junction with genal and postgenal carinae. F1 $2.6 \times$ pedicel length, F2 $1.7 \times$ pedicel length.

Mesosoma. Length of mesosomal dorsum $1.2 \times$ pronotal width. Humeral angle distinct, humeral carina ending in dorsal tooth; epaulet placed on tubercle. Dorsum of mesosoma areolate-punctate; interrupted carina separating dorsal and lateral faces of pronotum and mesonotum, particularly strong on pronotum. Pleural surface of mesosoma without punctures, microsetose and micropunctate throughout. Ratio of width of humeral angle, anterior spiracle, mesonotum anteriorly, mesonotum posteriorly, propodeal spiracle, and propodeum posteriorly 101:100:96:90:87:92. Scutellar scale slender, spinose, ~ 1 puncture wide, surrounded by tubercles laterally and posteriorly. Posterior propodeal surface areolate with many intervals obliterated leaving separated tubercles. Lateral and posterior propodeal surfaces separated by row of short teeth.

Metasoma. T1 width $0.5 \times$ T2 width; T2 length $0.9 \times$ T2 width. T1 anterior face with sparse punctures, posterior with confluent punctures. T2 disc with dense punctures, intervals micropunctate and setose dorsally, intervals bare anterolaterally; surface flattened dorso-mesally. T3–5 and S3–5 with small dense punctures. S1 longitudinal lamella raised into blunt teeth anteriorly and posteriorly. S2 with coarse punctures, intervals smooth. Pygidial plate elongate ovate, basal width similar to mesal width; surface entirely smooth; lateral carinae obliterated anteriorly. S6 posterior margin bidentate.

Variation. The legs are variably reddened, particularly the coxae and femora basally can be reddish-orange. The scutellar scale can be posteriorly rounded or truncate, sometimes up to 2 punctures wide.

Distribution. Indonesia: Java.

Remarks. The sex association is based on a pair collected in copula and overall similarities in body size, distribution, and relative abundance in Java. Most females have the legs almost entirely black (Fig. 2), but the specimen collected in copula with a male has the femora more extensively reddened



Figs 1–9. *Arkaditilla gibba* Okayasu, 2021. 1, 3, 4, 5, 6 — female from mating pair; 2 — female color variant; 7, 8, 9 — male. 1, 2, 9 — habitus, dorsal view; 3, 8 — habitus, lateral view; 4, 7 — head, anterior view; 5 — mesosoma, dorsal view; 6 — pygidium, posterior view.

Рис. 1–9. *Arkaditilla gibba* Okayasu, 2021. 1, 3, 4, 5, 6 — самка из копулирующей пары; 2 — цветовой вариант самки; 7, 8, 9 — самец. 1, 2, 9 — внешний вид сверху; 3, 8 — внешний вид сбоку; 4, 7 — голова, вид спереди; 5 — мезосома, вид сверху; 6 — пигидий, вид сзади.

(Figs 1, 3). No structural features were found to separate these female forms.

Arkaditilla tokek Williams et Okayasu, sp.n.

Figs 10–18.

Material. Holotype, ♂, **Indonesia, Java:** “k ♂”; “W. Java / Djampantengah / Gng. Patat / Oct.1938 / M.E. Walsh” (RMNH). Allotype, ♀, **Indonesia, Java:** “k ♀”; “W. Java / Djampantengah / Gng. Patat / Oct.1938 / M.E. Walsh” (RMNH). Paratypes: **Indonesia, Java:** Batoerraden, G. Siamet, V.1930, F.C. Drescher (1♂, RMNH); Djampang Tengah, 1800 ft., X.1941, J.M.A. van Groenendaal (1♂, RMNH); G. Karang, 27.V.1931, Luffrich (1♀, RMNH); G. Megamendoeng, 700m, IV–VI.1936, M.A. Liefink (1♀, RMNH); G. Tjangkoedang, Djampang Wetan, Xi.1938, J.v.d. Vecht (1♂, RMNH); Gng. Tjisoveroe, X.1938 (1♂, RMNH); Goenoeng Plantan, I.1937, D.E. Franssen (1♂, RMNH); Mt. Beser, 1300m: 30.IX.1934, M.A. Lupnick (1♂, RMNH); 10.III.1940, J.v.d. Vecht (1♂, RMNH); Mt. Gedeh: Sitoegoenoeng, 16–20.IX.1930, J.v.d. Vecht (1♂, RMNH); Tapos, 700m, V.1933, J.v.d. Vecht

(1♂, RMNH); Tjiajoenan Soekanegara, 1800 — 2400 ft., X.1941, (1♂, RMNH); **Sumatra:** Mara Sako, X.1915 (1♂, RMNH); S.W. Lampons, Mt. Tanggamorea Giesting, 29.XII.1934, Liefinck & Toxopeus (1♂, RMNH).

Diagnosis. Female. This species can be separated from *A. gibba* by mesosoma shape, the pronotum is not particularly widened and the humerus is narrower than the lateral pronotal lamella and the mesosomal length is $1.1 \times$ its width; additionally, legs are usually mostly reddish-orange. **Male.** This species can be recognized by the following combination of characters: flagellomeres cylindrical and usually entirely black; clypeus with slender rounded or truncate lobe antero-mesally; and digitus triangular.

Description. Female. Body length 5.5–7.0 mm.

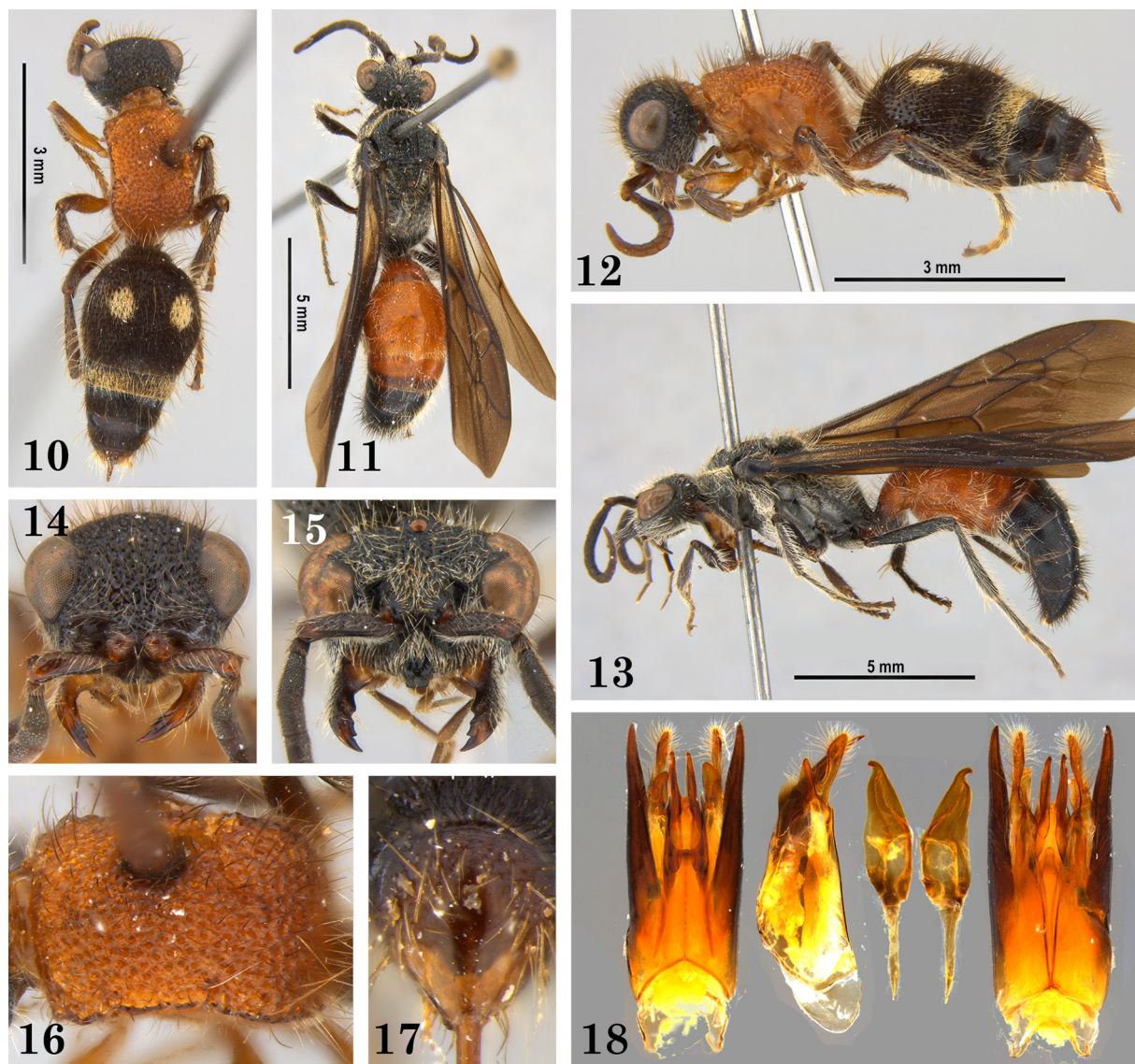
Color and setae. Cuticle of head, and metasoma black; mesosoma reddish-orange; antenna mostly brown; legs reddish-orange basally and dark brown apically. Tibial spurs whitish.

Frons and vertex with sparse erect blackish setae; mesosomal dorsum with sparse erect and appressed orange setae; mesosomal pleura with dense whitish microsetae; remainder of head and mesosoma with sparse whitish or pale yellow setae. Discs of T1, T2 anteriorly and laterally, and S1-6 with sparse erect white or pale yellowish setae; fringes of S2-5 whitish or pale yellow; disc of T2 with small circular patch of dense appressed whitish or pale yellow setae laterally; T3 with band of dense appressed whitish setae; T6 with moderately dense pale yellow setae; T2 disc (except for spots), T2 fringe and T4-5 with dense black setae. Felt line setae golden.

Head. Maximum head width $1.2 \times$ maximal pronotal width; vertex width $1.05 \times$ maximal pronotal width. Longitudinal eye diameter $0.85 \times$ frons width. Frons, vertex, and gena areolate-punctate with many intervals reduced to carinae. Mandible apically bidentate, without ventral tooth. Clypeus basal lobe

a narrow tubercle; mesal ridge cariniform, not downcurving into ventral area laterally, in dorsal view terminating in blunt angle laterally; ventral area bare and concave. Genal carina well-developed, posteriorly reaching occipital carina, anteriorly nearly reaching hypostomal carina. Postgenal carina only present posteriorly. Hypostomal carina distinct, forming blunt angle near junction with genal carina. F1 $2.7 \times$ pedicel length, F2 $1.3 \times$ pedicel length.

Mesosoma. Length of mesosomal dorsum $1.1 \times$ pronotal width. Dorsum of mesosoma areolate-punctate; interrupted carina separating dorsal and lateral faces of pronotum and mesonotum, particularly strong on pronotum. Pleural surface of mesosoma without punctures, microsetose and micropunctate throughout. Ratio of width of humeral angle, anterior spiracle, mesonotum anteriorly, mesonotum posteriorly, propodeal spiracle, and propodeum posteriorly 95:100:99:91:94:96. Scu-



Figs 10–18. 2. *Arkaditilla tokek* sp.n. 10, 12, 14, 16, 17 — female, allotype; 11, 13, 15, 18 — male, holotype. 10, 11 — habitus, dorsal view; 12, 13 — habitus, lateral view; 14, 15 — head, anterior view; 16 — mesosoma, dorsal view; 17 — pygidium, posterior view; 18 — genitalia (from left to right): entire in dorsal view, right half minus penis valve in sagittal view, penis valves in lateral view, entire in ventral view.

Рис. 10–18. 2. *Arkaditilla tokek* sp.n. 10, 12, 14, 16, 17 — самка, аллотип; 11, 13, 15, 18 — самец, голотип. 10, 11 — внешний вид, вид сверху; 12, 13 — внешний вид, вид сбоку; 14, 15 — голова, вид спереди; 16 — мезосома, вид сверху; 17 — пигидий, вид сзади; 18 — гениталии (слева направо): целиком в виде сверху, правая половина без пениса в сагиттальном виде, пенис в боковом виде, целиком в виде снизу.

tellar scale slender, triangular, ~1 puncture wide, surrounded by tubercles laterally and posteriorly. Posterior propodeal surface areolate with many intervals obliterated leaving separated tubercles. Lateral and posterior propodeal surfaces separated by row of short teeth.

Metasoma. T1 width $0.45 \times$ T2 width; T2 length $0.9 \times$ T2 width. T1 anterior face with sparse punctures, posterior with confluent punctures. T2 disc with dense punctures, intervals micropunctate and setose dorsally, intervals bare anterolaterally; surface flattened dorso-mesally. T3–5 and S3–5 with small dense punctures. S1 longitudinal lamella not raised into distinct teeth anteriorly or posteriorly. S2 with coarse punctures, intervals smooth. Pygidial plate elongate ovate, basal width similar to mesal width; surface entirely smooth; lateral carinae obliterated anteriorly. S6 posterior margin bidentate.

Male. Body length 10.0–15.5 mm.

Color and setae. Cuticle blackish except metasomal segments 1–3 orange and mandible, flagellum, and legs partly brown. Tibial spurs white. Head and mesosoma with dense appressed silvery setae, except vertex, legs, and mesoscutum with setae sparser. Metasomal setae sparse silvery, except T6–7 and hypopygium with sparse blackish setae. Felt lines with pale golden setae.

Head. Head transverse, post-ocular distance $0.6 \times$ dorsal eye length at notch. Head sculpture densely punctate. Ocelli moderately small; OOD $3.5 \times$ DLO, IOD $1.5 \times$ DLO. Scape bicarinate; all flagellomeres cylindrical, F1 length $3.3 \times$ pedicel length; F2 length $3.0 \times$ pedicel length; F2 length $0.9 \times$ F1 length; antennal scrobe dorsally carinate. Mandible apically tridentate and dilated, pre-apically with swollen rounded tooth along inner margin, deeply excised beneath with large rounded ventral tooth; dorsal carina complete, terminating at inner apical tooth. Clypeus laterally and dorsally with dense whitish setae; mesally with elongate shallowly concave sparsely setose sub-rectangular lobe projecting above and beyond antero-ventral margin.

Mesosoma. Pronotum, mesoscutum, mesoscutellum, and mesopleuron areolate-punctate, lateral pronotal surface and metapleuron densely micropunctate, pronotum with incomplete macro-punctures. Humeral angle rounded, humeral carina indistinct. Notaulus distinct, incomplete; parapsids indistinct, incomplete. Tegula sub-ovate, extending posteriorly nearly to plane of anterior mesoscutellar margin; convex and shallowly recurved posteriorly; densely micropunctate with sparse punctures and setae along inner margin and anteriorly. Mesoscutellum convex and evenly sculptured. Mesopleuron beneath without smooth swollen area. Pro- and mesocoxae unarmed; metacoxa beneath shallowly convex, inner margin defined by carina. Propodeum areolate dorsally and posteriorly, with enclosed area about four areolations long; lateral surface areolate along dorsal and posterior margins, micropunctate anteriorly, scarcely differentiated from dorsal surface. Wings dark brown with blackish veins.

Metasoma. Punctures small and dense throughout, sparser on T2 disc mesally, sparser and coarser on S2 disc. S1 with simple longitudinal carina. S2 disc raised and swollen anteromedially, without felt line. T7 evenly punctate, margined by carina postero-laterally and posteriorly; with indistinct short narrow smooth midline. S7 and S8 unarmed.

Genitalia. In dorsal view, ratio of apical distance of genitalic structures from anterior margin of parapenial lobe: free length of paramere, cuspis, paracuspis, digitus, right penis valve, left penis valve, parapenial lobe apex, parapenial lobe midline: 100:97:81:83:90:90:74:55. Basal ring shorter than cuspis. Paramere down-curved posteriorly with acuminate

apex, inner and outer margins ventrally each with row of short erect setae posteriorly, with sparse setal patch baso-ventrally, with row of setae along dorsal inner margin. Basiparamere subtriangular in lateral view, midline mostly fused in dorsal view. Cuspis slender, somewhat laterally flattened and spatulate sub-apically, ventral margin straight, inner margin with long dense erect setae; paracuspis stick-like, densely setose. Digitus laterally flattened, triangular with basal portion widened, outer surface sculptured along ventral and posterior margins. Penis valves slender, asymmetrical but similar in length, with blunt ventrally-hooked posterior tooth, pre-apically with shallow ventral lobe; with sparse setae along inner margin.

Variation. In some males, the cuticle of T3 is partly blackened posteriorly. The male clypeal medial projection varies slightly in shape, being slightly more rounded or angular antero-laterally.

Etymology. This species is named for the Tokay Gecko, *Gekko gekko* (Linnaeus, 1758), a charismatic lizard species found throughout southeastern Asia, using the common name in the Betawi Malay language. Treat as a noun in apposition.

Distribution. Indonesia: Java and Sumatra.

Remarks. The male is similar to *A. bagrada* (Cameron, 1902) based on the cylindrical flagellomeres but differs in the morphology and distribution. The male of this species differs from that of *A. bagrada* by having the clypeal ventro-medial rectangular part slender (wider in *A. bagrada*), mandibular apex consistently converging (abruptly converging in *A. bagrada*), paracuspis strongly oriented dorsally (slightly oriented dorsally in *A. bagrada*), and digitus triangular, broadest at base (slender, nearly parallel-sided, and broadest at distal 1/3 in *A. bagrada*).

The female is recognized as a member of *Arkaditilla* based on the smooth pygidial plate, black T2 fringe, and lateral pronotal lamella. The sex association is based on a pair from the same collecting event that were labeled by a previous researcher as “K ♀” and “K ♂” alongside other paired males and females. We are uncertain which evidence, aside from co-occurrence, was used to associate these specimens. We affirm this association based on a process of elimination and relative abundance of *Arkaditilla* species in West Java. Only two species, *A. gibba* and *A. tokek* are known from West Java; we found 48 females and over 100 males of *A. gibba*, but only three females and 11 males of *A. tokek* sp.n.

Lelejidia Williams, gen.n.

Type species: *Mutilla jacobsoni* André, 1907.

Diagnosis. *Female.* Unknown. *Male.* In the eastern Oriental Realm, this genus can be immediately recognized by the metallic body color and dense golden metasomal setae. Additionally, the mandible lacks a ventral tooth, the mesoscutellum is strongly convex without a mesal carina, the hypopygium is armed with an erect transverse lobe laterally, and the penis valves are basically symmetrical.

Description. *Female.* Unknown.

Male. Coloration: Cuticle entirely metallic blue with whitish, golden, blackish setae. Body with simple setae only.

Head: Transverse behind eyes, coarsely punctate. Occipital carina distinct dorsally. Eye vertically ovate with distinct notch anteriorly, not strongly protruding, surface generally dull, ommatidia distinct. Ocelli minute. Antennal tubercles separated basally. Antennal scrobe shallow, with curved transverse carina dorsally. Clypeus with vertical triangular smooth area mesally, antero-ventral margin truncate. Malar space shorter than eye diameter. Genal and postgenal carinae absent. Hypostomal carina indistinct. Scape bicarinate, area between punctures

smooth. Pedicel wider than long, shorter than F1, which is similar in length to F2. Mandible evenly curved and acuminate to bidentate apex, dorsal carina visible only basally, without ventral tooth basally. Maxillary palp 6-segmented; labial palp 4-segmented, densely covered with short setae.

Mesosoma: Surface areolate-punctate except mostly smooth on metapleuron and areolate on propodeum. Pronotal dorsal face (excluding anterior collar) with anterior margin straight, epaulet a small tuft, humeral angle rounded, humeral carina indistinct. Tegula ovate, convex with posterior margin weakly recurved, mostly smooth with a few separated punctures mesally. Mesoscutum with notaulus and parapsidal line, posterolateral corner with indistinct truncate lobe. Mesopleuron unarmed ventrally. Mesoscutellum distinctly convex; axilla evenly punctured, without tooth or lobe. Metanotum simple, transverse. Propodeum with dorsal, lateral, and posterior rounded into one another. Metasternal process tridentate.

Wings: Fore wing with short open pterostigma; marginal cell long, acute-truncate apically, without spurlike vein posteriorly-apically; with three closed submarginal cells.

Legs: Tibial spur formula 1-2-2. Mid and hind tibiae without pre-apical dorsal spines, apical spines not inserted on any processes; apical spurs cylindrical, densely clothed with microsetae. Pro- and mesocoxa each with smooth bump; metacoxa with longitudinal carina along inner margin. Metatibia with small subcircular subapical secretory pore, with complete elongate carina along inner margin.

Metasoma: Punctuation dense and fine except much coarser and less dense on T1, T2, and S2. T1 shape narrowly subsessile, about as long as wide, about $0.5 \times$ width of T2; anterior auricle small, rounded in lateral view. T2 felt line elongate, mesally situated. T7 with convex with raised longitudinal carina. S1 with longitudinal carina weakly raised posteriorly. S2 convex with swollen smooth area mesally; felt line present. S6 and S7 each with lateral smooth tubercle; S8 with large erect transverse smooth ridge laterally, posterior margin with mesal notch.

Genitalia: Paramere elongate, sub-cylindrical in cross-section, apically acuminate, parallel and down-curved posteriorly. Parapenial lobe well developed and apically forming a vertical lamella alongside penis valves. Cuspis short and obliquely laterally flattened, densely setose, paracuspis distinct, stick-like; digitus shorter than cuspis, laterally flattened. Penis valves short, nearly symmetrical, dorsal and ventral margins convex, with distinct postero-ventral tooth.

Species included. One species: *Lelejidia jacobsoni* (André, 1907), **comb.n.**

Etymology. We are proud to name this genus in honor of Arkady S. Lelej, using a suffix commonly used for genera of Trogaspidiini. He is arguably the greatest contributor to research in Oriental and Palaearctic mutillids. This new genus, named for our friend Arkady, joins other Oriental genera of Trogaspidiini that he named after fellow mutillid researchers, such as: *Krombeinidia* Lelej, *Nonveilleridia* Lelej, *Pagdenidia* Lelej, and *Petersenidia* Lelej.

Distribution. This genus is known from Java, Indonesia and Chaityaphum and Nakhon Ratchasima, Thailand.

Remarks. Although it would be preferable to describe both sexes of a genus at once, these rare insects are known from males only. From the male sex, however, we can tell that they obviously belong to the Trogaspidiini. Because of their unique combination of characters, these species cannot be reliably placed into any of the already described genera. Additionally, there are not any Oriental Trogaspidiini recognized from the female sex only, so *Lelejidia* is unlikely to fall under synonymy with any established genus.

Lelejidia jacobsoni (André, 1907), **comb.n.**

Figs 19–23.

<http://zoobank.org/5BD4699D-B047-485A-96B0-6AD148A204E3>

Mutilla jacobsoni André, 1907: 207, ♂, holotype ♂ (Semarang, [Jawa Tengah], Java, [Indonesia]) (RMNH), by monotypy; André, 1909: 172, ♂. **New combination.**

Smicromyrme jacobsoni (André): Mickel, 1935: 284, ♂; Lelej, 2005: 61; Lo Cascio, 2015: 558; Pagliano et al., 2020: 197.

Material. Holotype, ♂, **Indonesia, Java:** Semarang (RMNH). Other material: **Thailand, Chaityaphum:** Tat Tone National Park: Dry Dipterocarp Forest, 15°59.037'N 102°2.103'E, 250m, Malaise trap, 25–27.VI.2006, Michael Sharkey leg., T10 (1♂ EMUS); Phu hang sing, 15°58.723'N 102°02.231'E, 290m, Malaise traps, 5–12.VII.2006, T. Jaruphan & O. Budsawong leg., T220 (1♂ EMUS); **Nakhon Ratchasima:** Wang Nam Khiao, Udom Sap, Sakaerat Environmental Research Station, 14.503, 101.925, 449m, 15–22.IV.2022, Buntika Butcher (1♂ CBGC, sample ID BIOUG98698-G06).

Diagnosis. *Female.* Unknown. *Male.* As for genus.

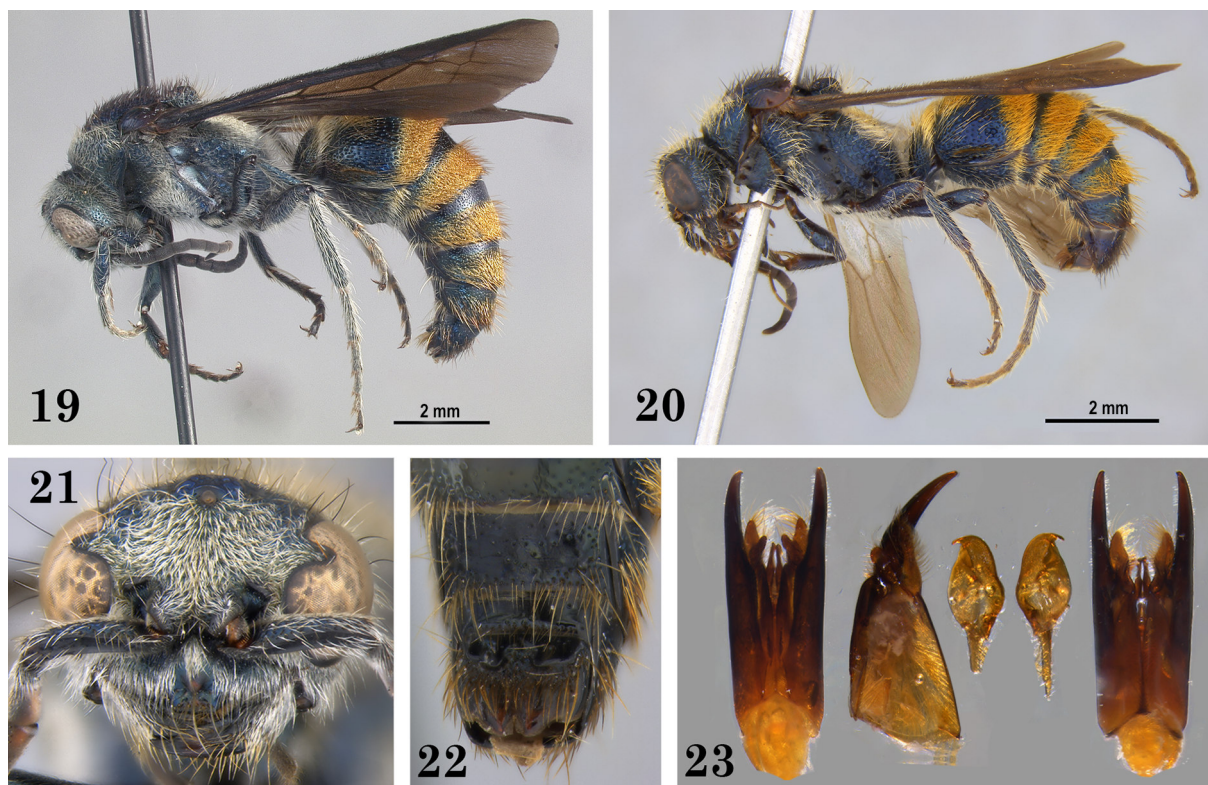
Description (based on material from Thailand). *Male.* Body length 15 mm.

Color and setae. Cuticle entirely dark metallic blue-purple, except flagellum blackish brown with basal segments partly pale yellow-brown and clypeus with small orange-brown spot mesally. Tibial spurs white. Frons, vertex, gena, ventral portion of mesopleuron, and dorsal portion of propodeum with dense silvery setae; mesonotum and tegula with black setae; remainder of mesosoma, including legs, with sparse silvery setae. Fringe of T1 with dense pale yellow setae; fringe of T2, disc of T2 baso-mesally, and discs of T3–5 entirely with dense appressed golden setae; setae of S2–7 whitish or pale yellowish, T6 with moderately dense interspersed blackish and golden setae; T7 with setae blackish. Felt lines with golden setae.

Head. Head transverse, post-ocular distance $1.0 \times$ dorsal eye length at notch. Head sculpture densely punctate. Ocelli minute; OOD $7.1 \times$ DLO, IOD $3.5 \times$ DLO. Scape bicarinate; all flagellomeres cylindrical, F1 length $2.7 \times$ pedicel length; F2 length $2.7 \times$ pedicel length; F2 length $1.0 \times$ F1 length; antennal scrobe dorsally carinate. Mandible apically bidentate, mandible acuminate to apex; without ventral tooth basally; dorsal carina indistinct, visible only basally. Clypeus laterally and dorsally with dense whitish setae; mesally with convex sparsely setose area with mesal tubercle; antero-ventral margin truncate.

Mesosoma. Pronotum, mesoscutellum, and mesopleuron with nearly confluent irregular punctures; mesoscutum with separated deep punctures. Humeral angle rounded, humeral carina indistinct. Notauli and parapsids distinct, not reaching anterior margin of mesoscutum. Tegula sub-ovate, extending posteriorly to plane of anterior mesoscutellar margin; convex and recurved posteriorly, with faint transverse pre-marginal carina posteriorly; smooth with sparse punctures and setae throughout. Mesoscutellum swollen convex and evenly sculptured. Mesopleuron beneath without smooth swollen area. Pro- and mesocoxae each with smooth bump; metacoxa with inner margin defined by carina. Propodeum deeply areolate dorsally and posteriorly, with elongate enclosed area ending in tubercle near junction of dorsal and posterior surfaces mesally; lateral surface mostly areolate, scarcely differentiated from dorsal surface. Wings dark brown with dark brown veins.

Metasoma. T1 fringe with dense small punctures, T1 disc with irregular separated punctures. S1 with longitudinal carina scarcely raised to blunt tooth posteriorly. S2 with distinct felt line. T2 disc with moderately dense punctures; S2 disc with large separated punctures, with distinct large swollen smooth area mesally. T2 and S2 fringe areas, T3–6, and S3–6 densely punctate. T7 densely punctate, margined by carina postero-



Figs 19–23. *Lelejidia jacobsoni* (André, 1907), comb.n. 19, 21, 22, 23 — male, from Chaiyaphum, Thailand; 20 — male, holotype from Java, Indonesia. 19, 20 — habitus, lateral view; 21 — head, anterior view; 22 — hypopygium, ventral view; 23 — genitalia (from left to right): entire in dorsal view, right half minus penis valve in sagittal view, penis valves in lateral view, entire in ventral view.

Рис. 19–23. *Lelejidia jacobsoni* (Андре, 1907), comb.n. 19, 21, 22, 23 — самец из Чайяпхума, Таиланд; 20 — самец, голотип с Явы, Индонезия. 19, 20 — внешний вид, вид сбоку; 21 — голова, вид спереди; 22 — гипопигий, вид снизу; 23 — гениталии (слева направо): целиком в виде сверху, правая половина без пениса в сагиттальном виде, пенис в виде сбоку, целиком в виде снизу.

laterally and posteriorly; indistinct ovate smooth midline not reaching posterior margin, about $0.2 \times T7$ width posteriorly. S6 and S7 each with smooth lateral tubercle; S8 with erect transverse lobe antero-laterally, posterior margin with mesal notch.

Genitalia. In dorsal view, ratio of apical distance of genitalic structures from anterior margin of parapenial lobe: free length of paramere, cuspis, paracuspis, digitus, right penis valve, left penis valve, parapenial lobe apex, parapenial lobe midline: 100:81:72:74:72:72:65:35. Basal ring about as long as cuspis. Paramere down-curved posteriorly with acuminate apex, inner and outer margins each ventrally with row of short erect setae posteriorly, with sparse setae baso-ventrally, with row of setae along dorsal inner margin. Parapenial lobe apically sub-triangular in lateral view, midline clearly divided in dorsal view. Cuspis obliquely laterally flattened, sub-triangular in dorsal view, ventral margin straight, inner margin and externo-ventral surface with long dense erect setae; paracuspis stick-like, densely setose dorsally. Digitus laterally flattened, outer surface sculptured along ventral and posterior margins. Penis valves robust, apparently symmetrical, with single posterior tooth ventrally; with indistinct setae along inner surface posteriorly.

Distribution. This species is known from Java, Indonesia and Chaiyaphum and Nakhon Ratchasima, Thailand.

Remarks. We could find no significant structural differences between the holotype from Java and the Thai specimens. Additionally, many Oriental trogaspidiine species occur in both regions, such as *Eotrogaspidia auroguttata* (Smith, 1855), *Nonveilleridia bataviana* (André, 1909), and *Trogaspidia*

pagdeni (Mickel, 1933). The specimen from Nakhon Ratchasima, Thailand was not examined in person but was easily recognized by photograph due to the unique coloration. The COI barcode for this species was sequenced and is available via Bold Systems under the BIN: BOLD:AFC7004 (Process ID THAMG7024-23. Centre for Biodiversity Genomics. Accessed on 2026.08.07 via boldsystems.org).

Discussion

Males of Oriental Trogaspidiini possess many apparently useful, but often subtle, structural features for recognizing genera, such as the unique inner basal mandibular tooth of *Arkaditilla*, the metallic coloration of *Lelejidia*, the flattened metacoxa of *Eotrogaspidia* Lelej, 1996, and the longitudinal mesoscutellar ridge of *Trogaspidia* Ashmead, 1899 [Lelej, 2005]. These characters, however, are not perfectly consistent within a genus; *Trogaspidia mackieae* (Cockerell, 1928), for example, has the metacoxa flattened like *Eotrogaspidia* [Okayasu et al., 2021] and some *Trogaspidia* lack the mesoscutellar ridge. Additionally, the Oriental *Trogaspidia* are not truly congeneric with the African forms based on molecular phylogenetic results [Waldren et al., 2026]. Frustratingly, females of Oriental Trogaspidiini apparently possess even fewer diagnostic structural features. At this point, we find it impossible to write a

functional key to genera of Oriental Trogaspidiini, even without considering the disparate assemblage of genera and species found on the Indian subcontinent. A better approach may be to key and diagnose each species and then apply genus names after this process.

Acknowledgments

We would like to thank Frederique Bakker (RMNH), James Pitts (EMUS), and Jennifer Debowy (CBGC) for loaning materials that were used in this study. We also thank two anonymous reviewers and the editors: Valery Loktionov and Maxim Proshchalykin. We also thank Arkady Lelej for inspiring our work and for his many years of wonderful progress on the study of Mutillidae.

References

- André Er. 1907. Description d'une nouvelle espèce de Mutillide, de Java (Hym.) // Zeitschrift für Systematische Hymenopterologie und Dipterologie. Jahrg.7. H.5. S.207–208.
- André Er. 1909. Mutillides nouveaux ou imparfaitement connus du Musée royal d'histoire naturelle de Leide // Notes from the Leyden Museum. Vol.31. P.171–180.
- Lelej A.S. 2005. Catalogue of the Mutillidae (Hymenoptera) of the Oriental Region. Vladivostok: Dalnauka. 252 p.
- Lelej A.S. 2007. [Biogeography of mutillid wasps (Hymenoptera, Mutillidae)] // Rasnitsyn A.P., Gokhman V.E. (Eds): Studies on hymenopterous insects. Collection of scientific papers. Moscow: KMK Scientific Press Ltd. P.82–111. [In Russian].
- Lo Cascio P. 2015. Worldwide checklist of the island mutillid wasps (Hymenoptera Mutillidae) // Biodiversity Journal. Vol.6. No.2. P.529–592.
- Mickel C.E. 1935. The mutillid wasps of the islands of the Pacific Ocean (Hymenoptera, Mutillidae) // Transactions of the Royal Entomological Society of London. Vol.83. No.2. P.177–312. <https://doi.org/10.1111/j.1365-2311.1935.tb01207.x>
- Okayasu J. 2021. A new velvet ant genus *Arkaditilla* (Hymenoptera, Mutillidae, Trogaspidiini) from the Oriental Region, with review of species // Journal of Hymenoptera Research. Vol.84. P.145–168. <https://doi.org/10.3897/jhr.84.68709>
- Okayasu J., Lelej A.S., Williams K.A. 2021. Review of *Eotrogaspidia* Lelej (Hymenoptera: Mutillidae: Trogaspidiini) // Zootaxa. Vol.4920 No.1. P.56–90. <https://doi.org/10.11646/zootaxa.4920.1.2>
- Pagliano G., Brothers D.J., Cambra R., Lelej A.S., Lo Cascio P., Matteini Palmerini M., Scaramozzino P.L., Williams K.A., Romano M. 2020. Checklist of names in Mutillidae (Hymenoptera), with illustrations of selected species // Bollettino del Museo Regionale di Scienze Naturali di Torino. Vol.36. No.1–2. P.5–425.
- Williams K.A. 2025. Colorsyndrome terminology for velvetant females (Hymenoptera: Mutillidae and Myrmosidae) // Zootaxa. Vol.5684. No.1. P.1–238. <https://doi.org/10.11646/zootaxa.5684.1.1>

Поступила в редакцию 2.8.2026