



## Full Length Article

Contribution to the knowledge of the genus *Ainu* Lewis, 1894 (Coleoptera: Tenebrionidae: Stenochiinae)Caixia Yuan<sup>a</sup>, Maxim Nabozhenko<sup>b,c,\*</sup>, Guodong Ren<sup>d</sup><sup>a</sup> College of Life Sciences, Yan'an University, Yan'an, 716000, China<sup>b</sup> Caspian Institute of Biological Resources of the Russian Academy of Sciences, M. Gadzhiev str. 45, Makhachkala 367000, Russia<sup>c</sup> Dagestan State University, M. Gadzhiev str. 43a, Makhachkala 367000, Russia<sup>d</sup> College of Life Sciences, Hebei University, Baoding 071002, China

## ARTICLE INFO

## Keywords:

Darkling beetles  
Cnodalonini  
Helopini  
New combination  
New species  
New synonymy

## ABSTRACT

The genus *Erulipus* Fairmaire, 1903 (previously in the subfamily Tenebrioninae, tribe Helopini), after the study of the type species (*Erulipus fruhstorferi* Fairmaire, 1903), is transferred to the genus *Ainu* Lewis, 1894 (subfamily Stenochiinae, the tribe Cnodalonini) as a subgenus. Consequently, two new combinations are established: *Ainu* (*Erulipus*) *fruhstorferi* (Fairmaire, 1903), **comb. nov.** and *Ainu* (*s. str.*) *multicolor* (Pic, 1927), **comb. nov.** The syntypes of *Erulipus fruhstorferi* and *Erulipus multicolor* Pic, 1927 are studied and the new synonym is proposed: *Erulipus fruhstorferi* = *Ainu grandis* Ren and Yuan, 2005, **syn. nov.** Two new species are described from China: *Ainu linwenxini* Nabozhenko & Ren, **sp. nov.** (Taiwan) and *Ainu basifemoratum* Nabozhenko & Ren, **sp. nov.** (Yunnan). Both the new species are closely related to *A. sichuanum* Ren and Yuan, 2015.

## Introduction

*Ainu* Lewis, 1894 (type species *Ainu tenuicornis* Lewis, 1894) is a small genus constituted of eight species, distributed in the Eastern Palearctic and Oriental regions (Ren and Yuan, 2015). The genus was included in the subfamily Strongyliinae by Gebien (1911) and later in the tribe Strongyliini (Gebien, 1943). Hayashi (1966) described the larva of *A. tenuicornis* and also assigned this genus to Strongyliini, although the structure of the larval antennae and IX abdominal segment strongly differ from *Strongylium* Kirby, 1819. The Chinese species of the genus were revised by Ren and Yuan (2005, 2015), who moved the genus in the tribe Cnodalonini without any comments and described *Ainu grandis* Ren et Yuan, 2005, *A. medoganus* Ren et Yuan, 2005 and *A. sichuanus* Ren et Yuan, 2015. Other species from the Oriental and Eastern Palearctic regions were described by Lewis (1894) (*A. tenuicornis*), Nakane (1968) (*A. masumotoi*) and Masumoto (1981) (*A. fukudai*) respectively, and listed in the Catalogue of Palearctic Coleoptera by Löbl et al. (2008). Recently Ruzzier (2014) described *A. andoi* from Laos and China.

*Erulipus* Fairmaire, 1903 was erected for *Erulipus fruhstorferi* Fairmaire, 1903 (Vietnam). Lately Pic (1927) described the second species *E. bicolor* from the same area. Fairmaire (1903) compared the genus *Erulipus* with *Helops* Fabricius, 1775 *sensu lato*. *Erulipus* was placed in the tribe Helopini by Gebien (1911, 1943), Löbl et al. (2008)

and Nabozhenko (2012). The genus *Erulipus* was included in the subfamily Helopinae (Gebien, 1911) and after in the tribe Helopini (Gebien, 1943; Löbl et al., 2008; Nabozhenko, 2012) accordingly to the Fairmaire's diagnosis. We studied type specimens of both *Erulipus* species and established that this genus must be transferred to the genus *Ainu* Lewis, 1894 (Cnodalonini) based on the structure of the labro-clypeal membrane, male genitalia and the ovipositor (see below). On the other hand members of *Erulipus* differs from *Ainu* (*s. str.*) in the structure of the protarsi and the colour of body, and is here considered as a subgenus of *Ainu*. *Erulipus multicolor* Pic, 1927 is transferred here to the nominotypical subgenus of the genus *Ainu*.

## Material and methods

This study is based on the examination of specimens from the following institutes: ZIN – Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia (Mark Volkovitsh); MNHN – Muséum National d'Histoire Naturelle, Paris, France (Antoine Mantilleri); HNHM – Hungarian Natural History Museum, Budapest, Hungary (Ottó Merkl); HBUM – Hebei University Museum, Baoding, China (Xiuyuan Yang).

The photographs of *Erulipus* from ZIN were made by Dr. Denis Kasatkin (Rostov brunch of State Quarantine Committee, Rostov-on-Don, Russia). Measurements were taken and photographs of two new species captured using a Leica (M205 A) dissecting microscope.

\* Corresponding author at: Caspian Institute of Biological Resources of the Russian Academy of Sciences, M. Gadzhiev str. 45, Makhachkala 367000, Russia.  
E-mail address: [nalassus@mail.ru](mailto:nalassus@mail.ru) (M. Nabozhenko).

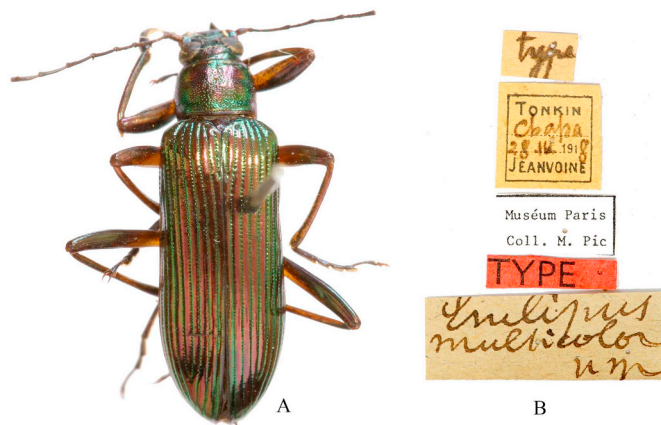


Fig. 1. *Ainu multicolor* (Pic, 1927), syntype from MNHN. A. Male, habitus. B. Labels of male.

Lectotypes were not designated because Prof. Kiyoshi Ando (Ehime University, Japan) informed us that he is preparing a revision of *Ainu* and allied genera with designations of all necessary lectotypes.

## Taxonomy

Family Coleoptera.

Tenebrionidae Latreille, 1802.

Subfamily Stenochiinae Kirby, 1837.

Tribe Cnodalonini Gistel, 1856.

Genus *Ainu* Lewis, 1894 (type species *Ainu tenuicornis* Lewis, 1894).

Diagnosis. Body slender, multicolored, with weak metallic shine: head, pronotum, elytra purple-green, bronze (nominotypical subgenus) (Figs. 1A, 2A, 3A) or head and pronotum blue-green, and elytra goldish, sometimes with purple or green shine (subgenus *Erulipus*) (Fig. 4A–D). Head (Figs. 2B, 3B) with clear, transverse, impressed semicircular furrow between frons and frontoclypeus. Frontoclypeus produced beyond front edges of genae. Anterior margin of head straight. Genae feebly elevated, with regularly widened external margin. Lateral margin of head with deep or feeble sinuation between gena and frontoclypeus, on each side. Frontoclypeo-labral membrane narrow, visible frontally. Eyes large and convex, reaching laryngeal margin in ventral view, with larger dorsal part. Eyes separated by distance of less than one eye diameter dorsally or distance between eyes dorsally subequal to one eye diameter. Males have larger eyes than females. Mentum transverse, regularly convex, without medial longitudinal elevation, divided into narrow anterior weakly sclerotized part and wide basal strongly sclerotized part. Maxillar apical palpomeres securiform, subequal in length and width; apical labial palpomeres weakly securiform, oblonged. Eyes and laryngeal margin beaded ventrally. Vertex with wrinkles or coarse foveae along laryngeal margin. Gula smooth, not wrinkled. Antennae filiform (Figs. 2D, 3D), with antennomere 2 short and antennomeres 3–11 markedly elongated.

Prothorax. Pronotum with two large, oblique, transverse impressions in the basal third on each side (Figs. 2C, 3C, 4A–D). Prosternum before procoxae narrow, 1.5–2 times as short as before coxae as postcoxal bridge. Prosternal hypomera smooth, without visible punctation, often with smooth wrinkles. Prosternal process strongly projected posteriorly laterally compressed with subquadrate apex in lateral view; apex of the prosternal process acute one and deeply depressed in ventral view.

Pterothorax. Elytra bearing strong (s. str.) or markedly impressed striae (in number of nine) consisting of circular punctures and the scutellar striole. Humeral callus well developed. Epipleura not reaching sutural angle of elytra. Fully winged, wings without medial fleck. Mesoventrite wrinkled, with deep V-shaped impression and medial keel. Mesepisterna and mesepimera with sparse punctation, sometimes

mesepimera without punctation. Mesocoxal cavities open, with long, wide transverse gap between trochantin and metaventrite. Trochantin strongly transverse. Metaventrite usually smooth, with unclear micro-wrinkles, sometimes with minute sparse punctation, depressed along mesocoxae. Metepisterna punctate. Abdominal ventrites wrinkled, sometimes with sparse punctation at the middle.

Legs. Femora and tibiae long, slender. Trochanters glabrous, without long setae. Femora usually lighter in basal part. Male tibiae with hair brush on inner side in the apex proximity. Male pro- and mesotibiae slightly curved (Figs. 2A, 3A, 4B), female tibiae straight (Fig. 4A). Tibial spurs short, poorly visible. Male pro- and mesotarsi slightly widened, longitudinal (s. str.) (Figs. 1A, 2A, 3A) or widened, transverse or of subequal length and width (subgenus *Erulipus*) (Fig. 4B, C). Female protarsi not widened (s. str.) or widened and weakly longitudinal (subgenus *Erulipus*).

Male genitalia and terminalia (no substantial differences observed between nominotypical subgenus and *Erulipus*). Aedeagus (Figs. 2H–J, 3H–J, 4H, I) not inverted. Median lobe strongly sclerotized apically, with acute and strongly curved outer apex. Median lobe baculi sclerotized only in apical half. Apical piece with widened separate apex, S-shaped in lateral view and lanceolate in dorsal view, suture between parameres reaching basal third of apical piece. Alae of apical piece triangular, reaching apical third of basal piece, connected in apical half or only near apex. Basal piece approximately 1.5 times as long as apical piece. Inner sternite VIII with deep emargination, membranous medial part and long basal processes, moderately pubescent (Figs. 2G, 3G, 4J). Gastral spicula with curved branches conjoined to long bent trunk. Lobes of gastral spicula large, longitudinal, with inwardly curved acute apices (Figs. 2F, 3F, 4K).

Female genitalia and terminalia. Ovipositor blade-shaped, sclerotized, with strongly reduced gonostyles (visible as foveae), two coxites and reduced to two small sclerites paraproct (at least in the subgenus *Erulipus*) (Figs. 4L, M). Ventral spicula with short, weakly sclerotized trunk.

Comments. *Erulipus* differs from all representatives of the tribe Helopini in the structure of frontoclypeo-labral membrane (wide and visible dorsally in Helopini), prosternum (wider than postcoxal bridge in Helopini), prohypomera (strongly wrinkled or punctate in Helopini), trochantine (small and suboval in Helopini), gap between metaventrite and trochantine (very narrow and short in Helopini), trochanters (with single long seta in Helopini) male genitalia and gastral spicula (several differences, see structure and types of Helopini male genitalia and terminalia in Nabozhenko (2005)), ovipositor (not sclerotized, not blade-shaped, with developed gonostyles, four lobes of coxite and long paraproct in Helopini). As a result this taxon must be excluded from the tribe Helopini.

Most characters of *Erulipus* suggest that it is congeneric with the genus *Ainu*. Several differences (see key below) allow it to be included in the genus *Ainu* as a subgenus:

1(2). Male and female protarsomeres longitudinal. Head, pronotum and elytra usually similar in colour (subgenus *Ainu*).

2(1). Male protarsomeres 1–4 transverse, those of female slightly transverse, with subequal length and width or slightly longitudinal. Head and pronotum differ in colour from elytra (subgenus *Erulipus*).

The genus *Ainu* belongs to the tribe Cnodalonini (Löbl et al., 2008), and combines external characters of the tribe Stenochiini (especially *Strongylium*) and internal structures similar to cnodalonine genera. The following characters are typical of the *Strongylium* genus-group of Stenochiini (Matthews and Bouchard, 2008): very long and thin filiform antennae, postcoxal bridge 1.5–2 times as long as prosternum before procoxae, large eyes with interocular space shorter than eye diameter, frontoclypeus produced beyond front edge of genae. The blade-shaped strongly sclerotized ovipositor with reduced gonostyles does not support the position of the genus *Ainu* in the tribe Stenochiini. This

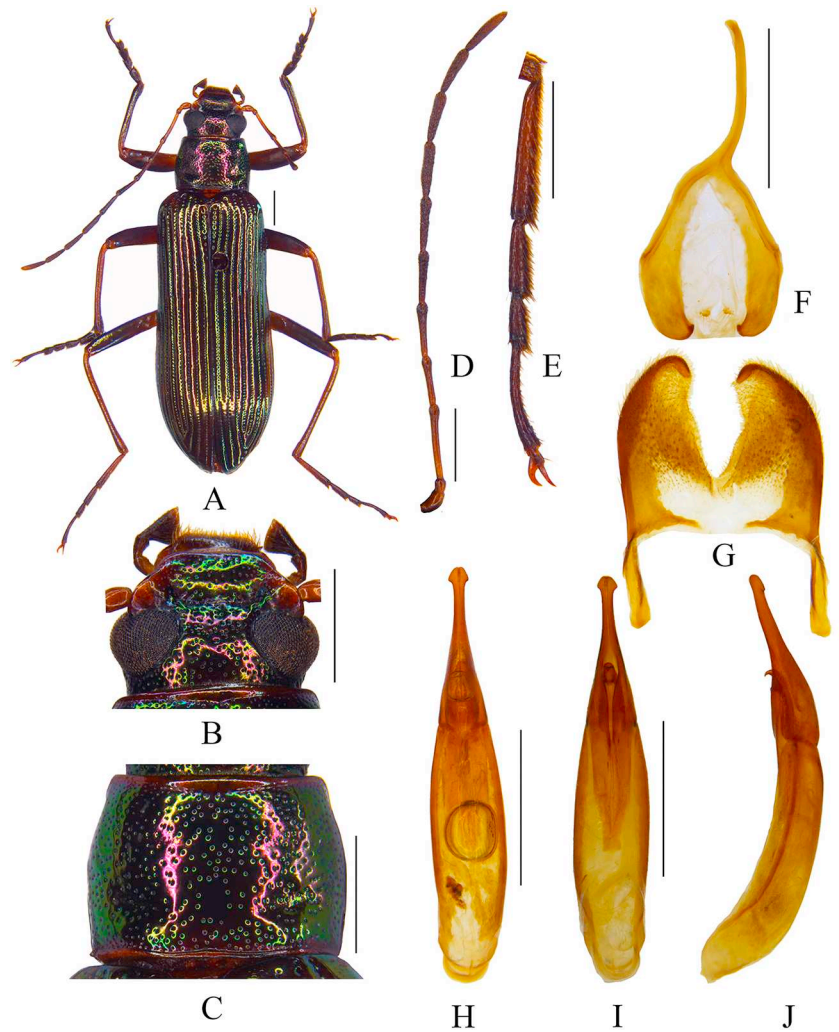


Fig. 2. *Ainu basifemoratum* sp. n., habitus, details of structure (male). A. Habitus. B. Head. C. Pronotum. D. Antennae. E. Metatibia. F. Gastral spicula. G. Inner sternite VIII of male. H. Aedeagus, dorsal view. I. Aedeagus, ventral view. J. Aedeagus, lateral view. Scale bars: 1 mm.

ovipositor morphology is characteristic of several genera of the tribe Cnodalonini (Bouchard and Yeates, 2001; Ando, 2003; Masumoto and Akita, 2007), which is probably polyphyletic because Matthews et al. (2010, p. 632) wrote that “Cnodalonini probably includes several natural clades that will become separate tribes in the future”.

Subgenus *Ainu* Lewis, 1894.

#### *Ainu* (s. str.) *multicolor* (Pic, 1927), comb. n. (Fig. 1)

Pic, 1927: 18 (*Erulipus*); Kaszab, 1954: 249 (*Erulipus*); Kaszab, 1980: 180.

Type material (MNHN)

Syntype (male) with labels: “type” “Tonkin, Chaha, 28.IV.1918 Jeanvoine”, “Muséum Paris Coll. M. Pic”, “TYPE”, “*Erulipus multicolor* n. m.”

#### Comments

The species can be assigned to the nominotypical subgenus *Ainu* on the base of the following characters: oblonged protarsomeres, feebly dilated and head, pronotum and elytra uniform in colour.

#### *Ainu* (s. str.) *basifemoratum* Nabozhenko & Ren, sp. n. (Fig. 2)

#### Diagnosis

This species is similar to *A. sichuanum* Ren and Yuan, 2015, but differs in having antennomeres 9–11 black, the interocular space (ratio of the head at eye level to the interocular space 3.25 in *A. sichuanum* and 5.16 in *A. basifemoratum* sp. n.) (Figs. 2B), basal third of femora yellowish brown, pronotum punctate along median line, very weakly impressed at apical third on both sides and without convex hind impressions in the basal third (Fig. 2C); the shape of the aedeagus is also different (Fig. 2H–J) (see Ren and Yuan, 2015, Fig. 2G, H). This new species is also similar to *A. linwenxini* sp. n. (see differences in the diagnosis of *A. linwenxini*).

Type material (HBUM)

Holotype, ♂: Yunnan Prov., Pingbian County, Dawei Shan Mt., 9–10.V.2014, Zhu Xiaoyu leg.; paratype: 1♂, the same data as holotype.

#### Description of male

Body slender, cylindrical, blackish brown, antennae black except base of antennomeres 1–3 shallowly brown, coxae, trochanters, basal

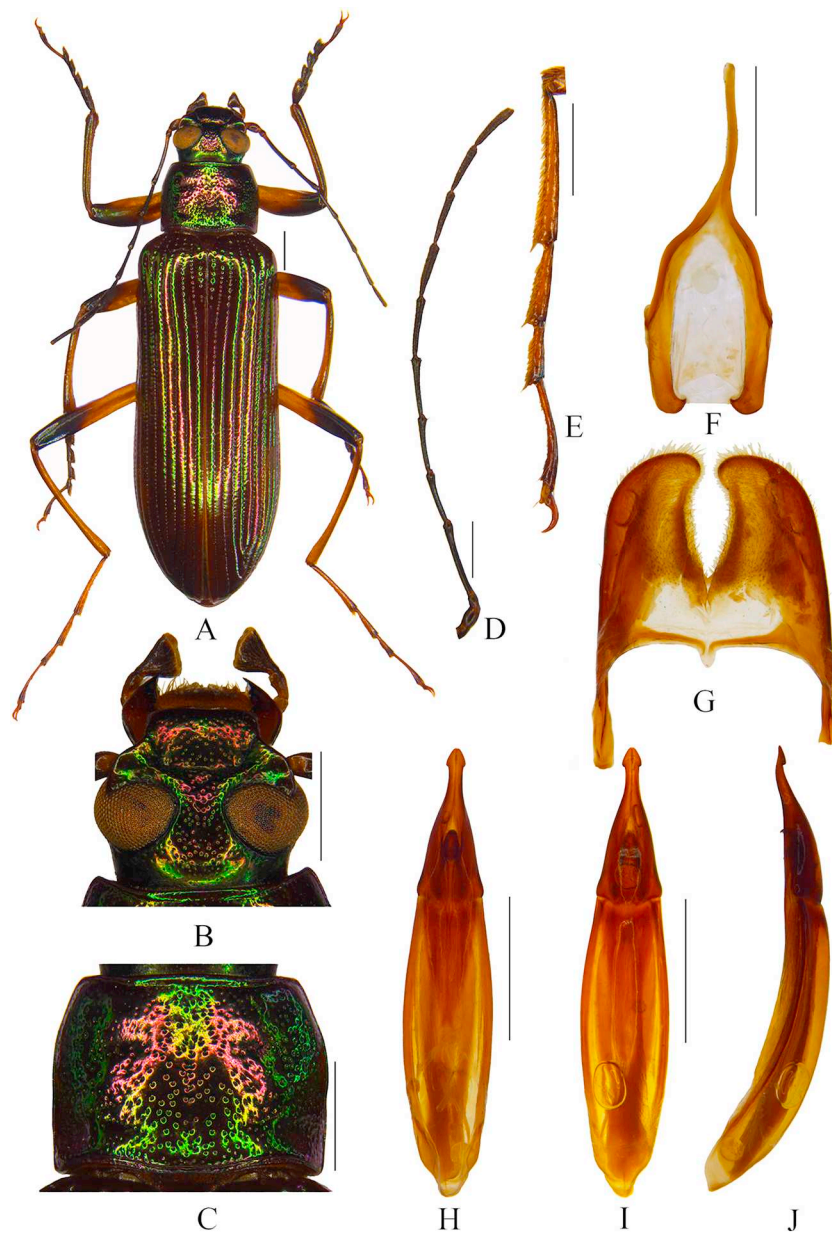


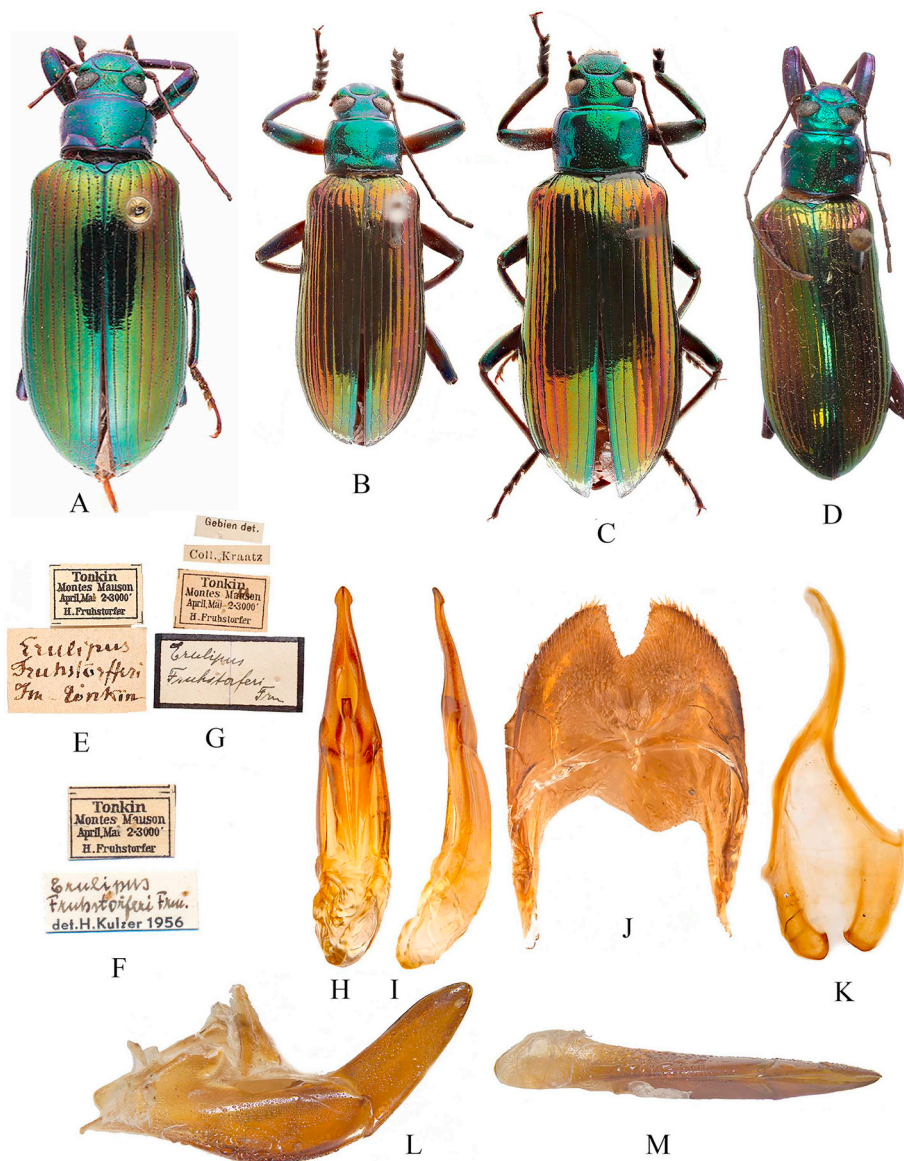
Fig. 3. *Ainu linwenxini* sp. n., habitus, details of structure (male). A. Habitus. B. Head. C. Pronotum. D. Antennae. E. Metatibia. F. Gastral spicula. G. Inner sternite VIII of male. H. Aedeagus, dorsal view. I. Aedeagus, ventral view. J. Aedeagus, lateral view. Scale bars: 1 mm.

third of femora, internal side of tibiae and tarsi yellowish brown; dorsum with strongly metallic shine, head and pronotum greenish purple; elytra greenish along elytral striae and purple in interstriae; antennae weakly shiny; legs with moderately strong shine; ventral surface purplish, and with a weak greenish reflection, moderately shiny.

Head widest at eye level. Frontoclypeus coarsely and sparsely punctate (puncture diameter 3–4 times as short as interpuncture distance), without hairs, anterior margin straight, suture between frons and anterior margin of head straight, distinctly grooved, extending outer margins; genae with obtuse-angled outer margins, scattered with a little punctation; lateral margins of head between frontoclypeus and genae strongly widely emarginate; frons moderately wide, gradually inclined forward, distinctly shallowly and longitudinally impressed at middle, densely punctate (puncture diameter subequal to interpuncture distance); punctures coarse and often fused to each other on frons and frontoclypeus. Ratio of head on eye level to interocular space as 5.16; vertex feebly convex, irregularly covered with fine punctures and

nearly impunctate on the lateral and posterior parts; eyes medium-sized, with distinct groove along inner and posterior margins, moderately protruding; antennae slender, thin and filiform, with six apical antennomeres extending beyond base of pronotum, about reaching basal 2/3 of elytra; ratio of the length of antennomeres 2–11 is 0.22, 1.38, 0.92, 1.01, 1.05, 1.05, 0.97, 0.98, 0.86, 0.93.

Pronotum transverse, 1.36 times as wide as long, widest point at basal half; 1.28 times as wide as head, straightly narrowed anteriorly with lateral margins parallel at basal half; anterior margin straight, widely beaded; base bisinuate and finely beaded, bead coarsely punctate; lateral margins completely beaded, bead visible in dorsal view; pronotal disc weakly convex, slightly impressed along median line and transversely impressed at apical third on both sides (sometimes very weakly impressed at apical third); disc covered in coarse and irregularly sparse punctation, anterior and posterior angles subrectangular. Prothoracic hypomera rugoso-punctate at middle and basal part, sparsely punctate anteriorly. Prosternal process narrow between procoxal cavities, nearly flattened, without impression at middle, weakly



**Fig. 4.** *Ainu fruhstorferi*, habitus, details of structure. A. Female (syntype, MNHN, photo of Kiyoshi Ando). B. Male (syntype, ZIN). C. Female (syntype, ZIN). D. Male (syntype, HNHM). E. Labels of syntype from MNHN. F. Labels of the syntypes from ZIN. G. Labels of the syntype from HNHM. H. Aedeagus, ventral view. I. Aedeagus, lateral view. J. Inner sternite VIII of male. K. Gastral spicula. L. Ovipositor, lateral view. M. Ovipositor, ventral view. Not scaled.

gradually inclined posteriad in lateral view, sparsely, vaguely and minutely punctate. Scutellum triangular, lateral sides weakly concave, with minute, sparse punctation, apex narrowly rounded.

Fully winged. Elytra elongate, lateral margins nearly parallel, weakly narrowed at middle, 2.56 times as long as wide, 1.87 as wide as head, 1.47 times as wide and 5.13 times as long as pronotum, widest at apical third; elytral dorsum moderately convex, elytral striae finely and closely punctate, concave toward interstriae. Interstriae slightly convex, with sparse and very fine punctation, transversely, moderately and closely aciculate.

Mesoventrite with convex middle line at middle of anterior part, coarsely wrinkled on sides, widely V-impressed in basal half and without depression between mesocoxae. Mesepisterna with dense and fine punctation, metepisterna with a little very fine punctation. Mesepimera densely punctate, metepimera impunctate. Metaventrite with very sparse, minute punctation and irregular smooth wrinkles at middle part, moderately densely punctate near lateral margins.

Abdominal ventrites 1–4 closely wrinkled on both sides and sparsely punctate at middle; ventrite 5 feebly almost round impressed at apical

2/5, with acutely rounded apex. Legs slender, femora longer than tibiae, very sparsely, minutely punctate, tibiae with moderately dense punctation and with fine short hairs on inner side, pro- and mesotibiae slightly curved, metatibiae straight; ratio of the length of metatarsomeres 1–4 is 1.73, 0.86, 0.64, 1.2 (Fig. 2E). Aedeagus 3.13 mm long, 0.62 mm wide, apical piece 1.13 mm long.

Body length 12.7–13.8 mm, width 3.7–3.75 mm.

Female. Unknown.

Distribution. China (Yunnan).

**Etymology.** The name derives from two Latin words: basis (base) and femur. This species is named for the basal third of the femora, which are a different colour from the rest of the body.

#### *Ainu (s. str.) linwexini* Nabozhenko & Ren, sp. n. (Fig. 3)

##### Diagnosis

This species is similar to *A. basifemoratum* sp. n. and *A. sichuanum* Ren and Yuan, 2015, but differs from the latter by the apical half of

antennomere 11 being yellowish brown (Fig. 3D), pronotum punctate along median line (Fig. 3C), without convexity behind impressions in basal third, and the shape of the aedeagus, male inner sternite VIII and gastral spicula is different (Fig. 3H–J) (see Ren and Yuan, 2015, Fig. 2). The new species differs from the *A. basifemoratum* sp. n. in the interocular space (ratio of head on eye level to interocular space 2.9 in *A. linwenxini* and 5.16 in *A. basifemoratum*), not widely sinuate lateral margins of head between frontoclypeus and genae, much wider lobes of gastral spicula (Fig. 3F), longer parameres without sinuate lateral margins at base and more transverse male abdominal tergite VII.

#### Type material (HBUM)

Holotype, ♂: Taiwan, Guandaoshan Mt., 29.IV.2007, Lin Wenxin leg. Paratypes: 1♂, the same data as holotype; 1♂: Taiwan, Nantou, Puli town, 1.V.2008, 1400 m, Lin Wenxin leg.

#### Description of male

Body slender, cylindrical, dark brown, antennomeres 1 and 2, basal half of antennomeres 3 and 4, apical half of antennomere 11, procoxae, metacoxae, trochanters, basal third of femora yellowish brown; mesocoxae, metatibiae, metatarsomere 1 (except apex), anterior and posterior margins of pronotum brown; dorsum with moderately strongly metallic shine, head and pronotum greenish purple, elytra greenish along elytral striae and purple in interstriae; antennae and legs strongly lustrous; ventral surface weakly greenish and purplish.

Head widest at eye level. Frontoclypeus sparsely punctate, without hairs, anterior margin straight, suture between frons and anterior margin of head straight, finely grooved, extending to outer margins; genae nearly impunctate, with obtuse-angled outer margins; frons wide, abruptly inclined forward, densely punctate. Ratio of head at eye level to interocular space 2.92. Vertex weakly convex, densely punctate; eyes medium-sized, with fine groove along inner and posterior margins, moderately protruding; antennae slender, filiform, with six apical antennomeres extending beyond base of pronotum, reaching just beyond the middle of the elytral length. Ratio of the length of antennomeres 2–11 is 0.17, 1.04, 0.67, 0.72, 0.74, 0.75, 0.73, 0.67, 0.75.

Pronotum transverse, subrectangular, 1.39 times as wide as long, widest at middle, 1.39 times as wide as head, weakly gradually narrowed anteriorly and posteriorly; anterior margin straight, emargination wide in middle; base of pronotum very weakly rounded at middle, beaded; lateral margins finely beaded, visible in basal

1 half in dorsal view. Disc transversely convex, with oblique transverse impressions at basal third on both sides and very weakly impressed at apical third; disc with moderately coarse and irregularly sparse punctation (interpuncture distance subequal or shorter than puncture diameter). Anterior angles right, posterior angles obtuse. Prothoracic hypomera presenting wrinkles in the anterior and posterior part, densely punctate. Prosternal process narrow, with fine and longitudinal impression in middle, abruptly gradually inclined posteriad in lateral view. Scutellum triangular, with widely rounded acute apex.

Winged. Elytra elongate, lateral margins nearly parallel, weakly narrowed at middle, 2.41 times as long as wide, 1.88 times as wide as head, 1.57 times as wide and 5.1 times as long as pronotum, widest at apical third; dorsum weakly flattened, elytral striae finely and closely punctate, interstriae slightly convex, glabrous, with a little very fine and sparse punctation. Eighth and ninth interstriae fusing together at apical quarter of the elytra. Epipleura not reaching sutural angle, terminating at level between the abdominal ventrites 4 and 5.

Mesoventrite with convex middle line in anterior part, coarsely wrinkled on sides, widely V-impressed in basal half and shallowly depressed between mesocoxae. Mesepisterna densely punctate, metepisterna sparsely and vaguely punctate. Mesepimera densely punctate, metepimera impunctate. Metaventrite transverse, with very sparse

punctuation, with sparse and irregular wrinkles in middle, densely punctate laterally.

Abdomen shagreened, ventrites 1–3 very finely and sparsely punctate, weakly impressed and wrinkled laterally, ventrite 5 acutely rounded at apex, bearing short pubescence. Legs slender, femora longer than tibiae, covered in sparse and minute punctation; tibiae covered in close punctures and bearing brown subrecumbent pubescence on the inner side; pro- and mesotibiae weakly curved, metatibiae straight; ratio of the length of metatarsomeres 1–4 is 1.26, 0.62, 0.40, 0.98. Aedeagus 2.63 mm long, 0.49 mm wide, apical piece 1.17 mm long.

Body length 10.6–11.2 mm, width 3.2–3.38 mm.

Female. Unknown.

Distribution. China (Taiwan).

Etymology. The specific name is given in honour of Mr. Lin Wenxin, who collected specimens of the type series.

Subgenus *Erulipus* Fairmaire, 1903 (type species *Erulipus fruhstorferi* Fairmaire, 1903).

The subgenus contains two species: *Ainu fruhstorferi* and *Ainu andoi* Ruzzier, 2014.

#### *Ainu (Erulipus) fruhstorferi* (Fairmaire, 1903), comb. n. (Fig. 4)

= *Ainu grandis* Ren and Yuan, 2005: 98, syn. n.

#### Type material

*Erulipus fruhstorferi*. One syntype, female (MNHN) with labels (Fig. 4E): “Tonkin, Montes Mauson, April, Mai 2–3000, H. Fruhstorfer” and “*Erulipus fruhstorferi* Fm Tonkin”. One syntype, male (HNHM) with labels (Fig. 4B): “Gebien det.”, “Coll. Kraatz”, “Tonkin, Montes Mauson, April, Mai 2–3000, H. Fruhstorfer”, “*Erulipus fruhstorferi* Fm”. Two syntypes (ZIN), male and female with labels (Fig. 4C): “Tonkin, Montes Mauson, April, Mai 2–3000, H. Fruhstorfer”, “*Erulipus Fruhstorferi* Fm. Det. H. Kulzer 1965”.

*Ainu grandis* (Ren & Yuan). Holotype, ♂: Guangxi, Linhaishanzhuang (1000 m), Jinxiu (24.1 N, 110.1 E, 2.VII.2000), Jun Chen leg. Paratypes. 1♂: Guangxi, Luoxiang (450 m), Jinxiu, 30.VI.2000, Jun Chen leg.; 1♀: Guangxi, Huawangshanzhuang (600 m), Jinxiu, 20.V.1999, Wenzhu Li leg.

#### Redescription

Male. Body large, slender, metallic shine, head and prothorax bluish-green, elytra green along elytral suture and laterally, and red-violet on sides, meso- and metaventrite golden-green, abdominal ventrites red-violet; femora reddish at the base and green on the remaining surface, tibiae blue-green, with reddish sheen; antennae brown, with weak green sheen.

Head widest at eye level. Ratio of head on eye level to interocular space 3.3. Anterior margin of frontoclypeus straight, frontoclypeus transversely and longitudinally convex. Lateral margins of the head emarginate between frontoclypeus and genae. Genae regularly rounded. Frontoclypeus separated from frons by deep semicircular depression. Punctuation on head irregular: frontoclypeus presenting fine and dense punctation; frons covered in coarse and moderately dense punctures in the middle and sparse punctures on the sides. Vertex presenting deep and coarse wrinkles and coarse dense punctures along eyes, and with very fine smoothed wrinkles on other surface. Antennae long and thin; with sixth apical antennomeres extending beyond base of pronotum (if laid down along the body, surpassing the basal margin of the pronotum), reaching mid point of elytral length.

Pronotum transverse (1.3 times as wide as long), widest at middle and at base, 1.35 times as wide as head. Lateral margins weakly rounded, widely emarginate in basal third. Anterior margin

emarginate; base of the pronotum rounded with a small sinuation at the middle. Anterior angles right, posteriors obtuse. All angles narrowly rounded. All margins beaded, anterior margin with very wide bead. Disc of the pronotum strongly transversely convex (in dorsal view), with deep angle-shaped impression on each side of basal third and weak, oblique impression on each side near middle. Lateral margins of the disc sinuate in lateral view. Punctuation on the disc irregular, sparse and moderately coarse. Prothoracic hypomera smoothly wrinkled in outer half, without visible punctuation. Prosternal process sharp, posteriorly oriented in ventral view, flattened and clipped at apex in lateral view.

Winged. Elytra elongate (twice as long as wide), presenting the widest point just after the middle of their length. Elytra 1.6 times as wide and 4.2 times as long as pronotum, twice as wide as head. Interstriae weakly convex, without visible punctuation; striae punctures small, connected in moderately deep furrows. Eighth and ninth interstriae merging in the proximity of the elytral apex. Epipleura not reaching the sutural angle and terminating at level between abdominal ventrites 4 and 5.

Mesoventrite presenting an elevated keel at middle and coarse wrinkles at sides; Mesoventrite deeply depressed between mesocoxae. Meso- and metepisterna with fine and dense smoothed punctuation. Mes- and metepimera smooth, without punctuation. Metaventricle without punctuation and presenting only fine, smooth and irregular wrinkles.

Abdominal ventrites 1–3 with fine, distinct longitudinal wrinkles, roundly impressed laterally; 4th ventrite wrinkled only on lateral impression, 5th one without wrinkles. Only abdominal ventrite 1 finely beaded on margins.

Legs long, slender, femora longer than tibiae. Femora sparsely covered by fine punctures; the punctuation on the tibiae is coarser than what observed on femora. Pro- and mesotibiae weakly curved, inner side bearing brown, subrecumbent pubescent. Mesotibiae with longitudinal depression outside. Metatibiae straight. Pro- and mesotarsi widened, tarsomere 1 longitudinal, tarsomeres 2–4 transverse, tarsomere 4 bilobed.

Body length 18 mm, width 6.5 mm.

Female (syntype). Body more robust. Pronotum widest before middle, lateral margins not sinuate. Discal impressions weak. Pro- and mesotibiae less widened. Body length 21 mm, width 8 mm.

#### Comments

Léon Fairmaire described *Erulipus fruhstorferi* on the base of the material belonging to the collection of Hans Fruhstorfer, who collected several species of *Ainu* in Mầu Sơn Mts. (situated at the border between Lạng Sơn Province, Vietnam and Guangxi, China). The four specimens in Fruhstorfer's collection match with Fairmaire's description, especially for the characters present on the pronotum, elytra and colouration. The holotype of *Ainu grandis* Ren and Yuan, 2005 is conspecific with the syntypes of *Ainu fruhstorferi* and here proposed as junior synonyms of the latter species.

#### Variability

Legs can be green, blue or reddish-green. Elytral intervals are almost flattened, weakly or moderately convex. Pronotum is widest at (Fig. 4B) or before the middle (Fig. 4A,C,D), with a distinct or indistinct convexity after the transverse basal impressions.

#### Acknowledgements

The authors are much obliged to Maxwell V. L. Barclay and Enrico Ruzzier (Natural History Museum, London) for the linguistic review and valuable comments, to anonymous reviewer for helpful comments, to

Mark Volkovitsh (ZIN), Antoine Mantilleri (MNHN) and Ottó Merkl (HNHM) for providing material, to Denis Kasatkin (Rostov Branch of All-Russian Centre for Plant Quarantine, Rostov-on-Don, Russia) for the preparation of photographs of syntypes from ZIN and Vladimir Shmatko (Southern Scientific Centre of the Russian Academy of Science) for photographs of genitalia of this species, thanks are also due to Mr. Xiaoyu Zhu and Mr. Changqing Chen for providing the specimens of two new species. The first author also thanks Antoine Mantilleri (MNHN) and Ottó Merkl (HNHM) for their kind help during examination of the tenebrionid type specimens in Paris and Budapest. The authors are very grateful to Kiyoshi Ando (Ehime University, Japan) for allowing us to use his photographs of the syntype of *E. fruhstorferi* from MNHN and discussion (despite disagreements in the interpretation of the rank of *Erulipus*).

The study was supported by the National Natural Foundation of China (31501888, 31370541) and the High-level University Construction Projects Funded Projects of Shaanxi Province (2012SXTS03). The study was also supported by the Russian Foundation for Basic Research (grant 18-04-00243-A) for Maxim Nabozhenko.

#### References

- Ando, K., 2003. A systematic revision of the genus *Eucyrtus* and its complex (Coleoptera, Tenebrionidae). *Jpn. J. Syst. Entomol.*
- Bouchard, P., Yeates, D.K., 2001. Phylogenetic relationships of the Australasian Coelometopini (Coleoptera: Tenebrionidae); a quantitative cladistic analysis with a review of biology. *Org. Divers. Evol.* 1, 17–43.
- Fairmaire, L., 1903. Descriptions de quelques hétéromères recueillis par M. Fruhstorfer dans le Haut-Tonkin. *Annales de la Société Entomologique de Belgique* 47, 13–20.
- Gebien, H., 1911. Tenebrionidae, Trictenotomidae. Pars. In: Junk, W., Schenckling, S. (Eds.), *Coleopterorum Catalogus Auspiciis et Auxilio W. Junk Editus a S. Schenckling*. Vol. 18. W. Junk, Berlin, pp. 1–740.
- Gebien, H., 1943. Katalog der Tenebrioniden Teil III. *Mitteilungen der Münchener Entomologischen Gesellschaft* 33, 895–926.
- Hayashi, N., 1966. A contribution to the knowledge of the larvae of Tenebrionidae occurring in Japan (Coleoptera: Cucujoidea). *Insecta matsumurana*. Supplement 1, 1–41.
- Kaszab, Z., 1954. Über die von Herrn J. Klapperich in der chinesischen Provinz Fukien gesammelten Tenebrioniden (Coleoptera). *Annales historico-naturales Musei nationalis hungarici* 46 (s. n. 5), 247–264.
- Kaszab, Z., 1980. Angaben zur Kenntnis der Tenebrioniden Nordvietnams (Coleoptera). *Annales historico-naturales Musei nationalis hungarici* 72, 169–221.
- Lewis, G., 1894. On the Tenebrionidae of Japan. *Ann. Mag. Nat. Hist.* 6 (13), 465–484.
- Löbl, I., Merkl, O., Ando, K., Bouchard, P., Egorov, L.V., Iwan, D., Lillig, M., Masumoto, K., Nabozhenko, M., Novák, V., Petterson, R., Schawaller, W., Soldati, F., 2008. Family Tenebrionidae Latreille. In: Löbl, I., Smetana, A. (Eds.), *Catalogue of Palaearctic Coleoptera. Tenebrionidae*. Apollo Books, Stenstrup, pp. 105.
- Masumoto, K., 1981. Tenebrionidae of Formosa (1). *Elytra* 8 (2), 37–53.
- Masumoto, K., Akita, K., 2007. Two new *Lycidioides* (Coleoptera, Tenebrionidae) from Borneo. *Elytra* 35 (2), 529–536.
- Matthews, E.G., Bouchard, P., 2008. Tenebrionid Beetles of Australia: Descriptions of Tribes, Keys to Genera, Catalogue of Species. Australian Biological Resources Study, Canberra, pp. 410.
- Matthews, E.G., Lawrence, J.F., Bouchard, P., Steiner, W.E., Ślipiński, Jr., Ślipiński, S.A., 2010. Tenebrionidae Latreille. In: Leschen, R.A.B., Beutel, R.G., Lawrence, J.F. (Eds.), *Handbook of zoology*. Walter de Gruyter, Berlin, pp. 574–659.
- Nabozhenko, M.V., 2005. Interstructural correlations in evolution of darkling beetles of the tribe Helopini (Coleoptera: Tenebrionidae). *Caucasian entomological bulletin* 1 (1), 37–48.
- Nabozhenko, M.V., 2012. A review of the genus *Nalassus* Mulsant, 1854 (Coleoptera: Tenebrionidae: Helopini) of China with new concept of the distribution of the genus. *Caucasian entomological bulletin* 8 (1), 33–36.
- Nakane, T., 1968. New or little-known Coleoptera from Japan and its adjacent regions 27. *Fragmenta Coleopterologica* 21, 83–851.
- Pic, M., 1927. Coléoptères de l'Indo-Chine. *Mélanges exotico-entomologiques* 49, 1–36.
- Ren, G., Yuan, C., 2005. Taxonomic study of the arboreal darkling beetles from China *Ainu* Lewis 1894 (Coleoptera, Tenebrionidae). *Acta Zootaxon. Sin.* 30 (1), 98–103.
- Ren, G., Yuan, C., 2015. Taxonomy of the genus *Ainu* Lewis, 1894 (Coleoptera: Tenebrionidae) from China, with description of a new species. *Entomotaxonomia* 37 (2), 129–133. <https://doi.org/10.11680/entomotax.2015019>, ISSN 2095–8609.
- Ruzzier, E., 2014. A new species of *Ainu* Lewis, 1894 (Coleoptera: Tenebrionidae) from Southeast Asia. *Coleopt. Bull.* 68 (4), 659–662. <https://doi.org/10.1649/0010-065X-68.4.659>.