



Two new species of the genus *Afissa* Dieke, 1947 (Coleoptera: Coccinellidae) from Xizang, China

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Abstract

Two new species of *Afissa* Dieke, 1947 are described from Xizang, China: *Afissa motuoensis* **sp. nov.** and *Afissa pyramidalis* **sp. nov.** Diagnosis, description and illustrations are provided for both species.

Key words: Coccinellidae, Epilachnini, new species, taxonomy, Xizang

Introduction

The genus *Afissa* Dieke, 1947, a recently redefined group of ladybird beetles, is known from south and southeast Asia. Most of the species formerly placed in *Afissula* Kapur, 1955 and in the Asian members of *Epilachna* Chevrolat, 1837 are now assigned (Tomaszewska & Szawaryn 2016) to the genus *Afissa*. Currently, there are nearly 52 species of *Afissa* recorded worldwide.

Afissa was initially established by Dieke (1947) to include the Eurasian species of *Epilachna*, which are characterized by the undivided sixth abdominal ventrite in females and toothless claws, with *Coccinella flavicollis* Thunberg, 1781 [= *Afissa flavicollis* (Thunberg, 1781)] as the type species. Li & Cook (1961), upon examining the type species of both *Epilachna borealis* Fabricius, 1775 and *Afissa flavicollis* (Thunberg, 1781), observed that these two species share the aforementioned morphological traits and possess similar typical characters of male genitalia. Consequently, Li & Cook (1961) treated *Afissa* as a synonym of *Epilachna*. Szawaryn *et al.* (2015) resurrected this genus from synonymy, transferred some Asian species previously placed in *Epilachna* into *Afissa*, and synonymized *Afissula* with *Afissa* based on molecular phylogenetic evidence. Subsequently, Tomaszewska & Szawaryn (2016) conducted a comprehensive revision of the tribe Epilachnini Mulsant, 1846 based on morphological characters. In this work, several species were transferred from *Afissa* to *Uniparodentata* Wang & Cao, 1993, and a number of *Epilachna* species were reassigned to *Afissa*. They proposed that the majority of Asian species historically assigned to *Epilachna* and those previously placed in *Afissula* are members of *Afissa*. Subsequent studies further supported this taxonomic framework (Szawaryn 2018; Das *et al.* 2020, 2023; Iqbal *et al.* 2024).

The recent redefinition of *Afissa* has also clarified its distinct morphological characters. This genus can be distinguished from all other Asian genera and the remaining genera within Epilachnini by a unique combination of characters: antenna longer than head width; coxites much longer than wide; mandibular incisor edge without teeth; lateral margins of elytra most often not or hardly visible from above (sometimes visible from above, but narrow); metanepisternum with simple, smooth inner margin; mid- and hind coxae with smooth hind margin. The taxonomy of *Afissa* has recently been revised, yet its species diversity remains incompletely known. In this paper, two new species of *Afissa* collected from Xizang are described and illustrated.

Materials and methods

The specimens used in this study were collected from Xizang Autonomous Region, and deposited in the Department of Entomology Insect Collection, South China Agricultural University (SCAU), Guangzhou, China.

The classification system follows Szawaryn *et al.* (2015). Adult morphological terminology used in this paper follows Ślipiński and Tomaszewska (2010). The measurements were made using a micrometer attached to a SteREO Discovery V20 dissecting stereoscope, and are defined as follows: TL—total length, from apical margin of clypeus to apex of elytra; TW—total width, across both elytra at widest part; TH—total height, through the highest point of elytra to metasternum; PL—pronotal length, from the middle of anterior margin to the base of pronotum; PW—pronotal width at widest part; EL—elytral length, along the suture, from the apex to the base including the scutellum; EW—elytral width, across both elytra at widest part.

The abdomen was detached and cleared in warm 10% NaOH solution for several minutes. Genitalia of both sexes were dissected, rinsed with distilled water, transferred to glycerol, and examined on slides.

All images were taken with a camera (EOS 5D SR, Canon), mounted on a focus stacking rail (WeMacro Rail), with software WeMacro utilized for image capture. Photographs of the habitus of specimens were taken with LAOWA FF 25 mm F2.8 2.5X Ultra Macro, genitalia were imaged using Aurogon FF 10–20X NA0.5 Supermicro APO. All images were further processed by Helicon Focus 8.1.1 software and Adobe Photoshop 2023.

Taxonomy

Afissa motuoensis Jin, Chen & Wang, sp. nov.

(Fig. 1)

Type material. HOLOTYPE: CHINA: ♂, **Xizang:** The Rear Mountains, Mêdog County, 1200 m, 28.X.2007, Wang XM *et al.* leg. (SCAU). **PARATYPES: CHINA: Xizang:** 4 ♂♂, 5 ♀♀, same collecting data as for holotype (SCAU); 9 ♂♂, Pailong Town, Linzhi City, 2370 m, 23.IX–15.XI.2007, Wang XM and Liang JB leg. (SCAU); 2 ♂♂, 113K of Zhamo Highway, Mêdog County, 835 m, 30.X.2007, Wang XM leg. (SCAU); 11 ♂♂, 5 ♀♀, 90–113K of Zhamo Highway, Mêdog County, 1000–1500 m, 2.XI.2007, Wang XM *et al.* leg. (SCAU); 3 ♂♂, 3 ♀♀, Pailong Town, Linzhi City, 2100 m, 13.X.2009, Wang XM *et al.* leg. (SCAU); 1 ♂, 2 ♀♀, The Number 1 Hanmi Bridge, Mêdog County, 14.X.2009, Wang XM *et al.* leg. (SCAU); 2 ♂♂, 1 ♀, 113K of Zhamo Highway, Mêdog County, 940 m, 21.X.2009, Wang XM *et al.* leg. (SCAU).

Diagnosis. This species closely resembles *Afissa craspedotricha* Yu, 2004 and *Afissa pyramidalis* Jin, Chen & Wang, sp. nov. in external appearance. However, *A. motuoensis* sp. nov. can be distinguished from the latter by its penis guide, which is apically acute and slender, distinctly longer than parameres, and inner margin of penis guide abruptly narrows near apex in inner view. Whereas in *A. craspedotricha*, penis guide bears papilliform apical projection and is slightly longer than parameres. In *A. pyramidalis* sp. nov., penis guide longer than parameres, apically acute, slender and distinctly conical. In inner view, penis guide gradually narrows from base toward apex and terminating in acute tip (Fig. 1O, P).

Description. TL: 4.5–5.6 mm, TW: 3.5–4.3 mm, TH: 1.7–2.5 mm, TL/TW: 1.29–1.3; PL/PW: 2.08–2.2; EL/EW: 1.09–1.12.

Body (Fig. 1A–C) medium, oval and strongly convex, with only narrow lateral margin extending outward and flattened; dorsum densely covered with golden yellow pubescence. Head (Fig. 1B) yellowish-brown, with T-shaped black marking. Pronotum (Fig. 1B) black with yellowish anterior and posterolateral corners, lateral margins of prosternum yellow, prosternal process dark brown (Fig. 1G). Scutellar shield black. Elytron (Fig. 1A) black, with five oval yellow spots without contact outer margin or suture, arranged in a 2-2-1 pattern, lateral margins (epipleura) of elytra yellowish to dark brown. Mesosternum and metasternum (Fig. 1H) black, abdomen (Fig. 1N) dark brown. Legs yellowish-brown except coxae black (Fig. 1I, J).

Head (Fig. 1B) small, head width approximately 0.35× body width. Frons flat, slightly concave, with uniform and fine punctures; punctures separated by 0.2–0.5× punctures width, bearing golden-yellow pubescence. Compound eyes large, conspicuously protruding, with rough surface showing distinct ommatidia; interocular distance about 0.6× head width.



FIGURE 1. Habitus and morphological details of *Afissa motuoensis* Jin, Chen & Wang, **sp. nov.** **A.** Adult, dorsal view. **B.** Adult, frontal view. **C.** Adult, lateral view. **D.** Left and right mandible. **E.** Maxilla. **F.** Labium. **G.** Prothorax. **H.** Mesoventrite and metaventrite. **I.** Mid-leg. **J.** Hind leg. **K.** Antenna. **L.** Female genitalia. **M.** Penis. **N.** Abdomen. **O.** Tegmen, inner view. **P.** Tegmen, lateral view. Scale bars: 1 mm in A–C, G–P; 0.5 mm in D–F.

Antenna (Fig. 1K) longer than head width, composed of 11 antennomeres, antennomere 1 large and bent, 2 shorter and narrower than 1, 3 slender and elongate, 4–8 longer than wide, 9–11 gradually dilated, forming a broad club.

Mandible (Fig. 1D) multidentate apically; incisor margin somewhat roundly produced, without teeth, its surfaces smooth, prostheca well developed, labial palps with three palpomeres, basal palpomere shortest (Fig. 1F). Maxillary palps well developed, terminal palpomere securiform, expanding toward apex (Fig. 1E).

Pronotum transverse (Fig. 1A), with arcuate lateral margins; anterior angles inconspicuously projecting, rounded, anterior margin centrally concave in arc in front view (Fig. 1B); posterior angles rounded, posterior margin

fits tightly with basal margin of elytra, pronotum width $0.6 \times$ body width (body width: pronotum width = 1.63). Punctures uniformly distributed, fine and dense, $1.5\text{--}2.0 \times$ diameter apart. Elytra strongly convex, bearing mixture of coarse and fine punctures; fine punctures larger than those on pronotum, $1.5\text{--}2.0 \times$ diameter apart.

Prosternum (Fig. 1G) T-shaped; prosternal process rectangular, with indistinct longitudinal ridges, surface slightly rough, densely covered with pubescence. Mesosternum (Fig. 1H) trapezoidal, anterior margin centrally truncate; surface rough, sparsely covered with pubescence. Metasternum (Fig. 1H) broad, with distinct median line; surface bears coarse punctures, bearing pubescence. Abdominal postcoxal lines (Fig. 1N) incomplete, semicircular, extending to about $6/7$ length of abdominal ventrite 1 and returning at middle.

Legs (Fig. 1I, J) elongate, femora moderately enlarged, tarsi with four tarsomeres, third tarsomere minute. Tarsal claws bifid at the apex.

Male genitalia: Penis (Fig. 1M) slender and elongate, basally one third circularly curved, apically two thirds straight; penis capsule with prominent outer arm and indistinct inner arm. In lateral view, penis guide robust, with outer margin straight and inner margin that abruptly narrows near apex, terminating in sharp point; parameres slightly curved, bearing long setae at apex, and are $1/3$ shorter than penis guide (Fig. 1P). In inner view, penis guide broadest at base, gradually tapering toward apex into sharp tip, with apex distinctly bifurcated (Fig. 1O).

Female genitalia: coxite (Fig. 1L) four times longer than width, subtriangular, densely pubescence apically. Inner margins smooth, without depressions. Each with one long seta apically.

Distribution. China: Xizang.

Etymology. The specific epithet “*motuoensis*” refers to the type locality Mêdog County, Xizang, China.

Afissa pyramidalis Jin, Chen & Wang, sp. nov.

(Fig. 2)

Type material. HOLOTYPE: CHINA: ♂, Xizang: Hanmi Village, Mêdog County, 2100 m, 13.X.2009, Wang XM leg. (SCAU). PARATYPES: CHINA: Xizang: 6 ♂♂, 6 ♀♀, same collecting data as for holotype (SCAU); 2 ♂♂, from Beibeng Village to Hanmi Village, Mêdog County, 800–2100 m, 5–8.X.2011, Huo LZ and Li WJ leg. (SCAU).

Diagnosis. This species appears to be closely related to *Afissa craspedotricha* Yu, 2004 and *Afissa motuoensis* Jin, Chen & Wang, sp. nov. in external appearance. However, *A. pyramidalis* sp. nov. can be distinguished from the latter by its penis guide longer than parameres, apically acute, slender and distinctly conical. Penis guide gradually narrows from base toward apex and terminating in acute tip in inner view. In *A. craspedotricha*, penis guide bears papilliform apical projection and is slightly longer than parameres in lateral view. In *A. motuoensis* sp. nov., penis guide apically acute and slender, distinctly longer than parameres, and inner margin of penis guide abruptly narrows near apex in inner view (Fig. 2O, P).

Description. TL: 4.4–5.4 mm, TW: 3.5–4 mm, TH: 1.6–2 mm, TL/TW: 1.26–1.35; PL/PW: 2–2.01; EL/EW: 1.06–1.13.

Body (Fig. 2A–C) medium, oval and strongly convex, with only narrow lateral margin slightly flattened outward. Dorsum densely covered with golden pubescence. Head (Fig. 2B) yellowish-brown. Pronotum (Fig. 2B) yellow to brown, bearing fan-shaped or T-shaped black marking medially, hypomera (Fig. 2G) yellow, prosternal process dark brown. Scutellar shield black. Elytron (Fig. 2A) black, with five round yellow spots that do not contact lateral margin or elytral suture; spots are arranged in 2-2-1 pattern, lateral portions of elytral epipleura black, while central portion is yellow to dark brown. Mesosternum and metasternum (Fig. 2H) black. Abdomen (Fig. 2N) yellowish-brown. Legs (Fig. 2I, J) yellowish-brown except coxae and basal half of femora black.

Head (Fig. 2B) small, head width approximately $0.33 \times$ body width. Frons flat, slightly concave, and evenly covered with fine, dense punctures, punctures separated by $0.2\text{--}0.5 \times$ punctures width, bearing fine and golden pubescence. Compound eyes large, distinctly prominent laterally, with rough surface showing clearly visible ommatidia, interocular distance $0.6 \times$ head width.

Antenna (Fig. 2K) composed of 11 antennomeres, longer than head width; pedicel distinctly narrower than scape; antennomeres 3–8 elongate, 9–11 gradually dilated, forming broad club.

Mandible (Fig. 2E) bifid at apex, incisor margin somewhat roundly produced, without tooth, surfaces smooth, prosthema well developed. Labial palps (Fig. 2F) with three palpomeres, basal palpomere shortest. Maxillary palps (Fig. 2E) developed, terminal palpomere gradually dilating apically to be securiform.

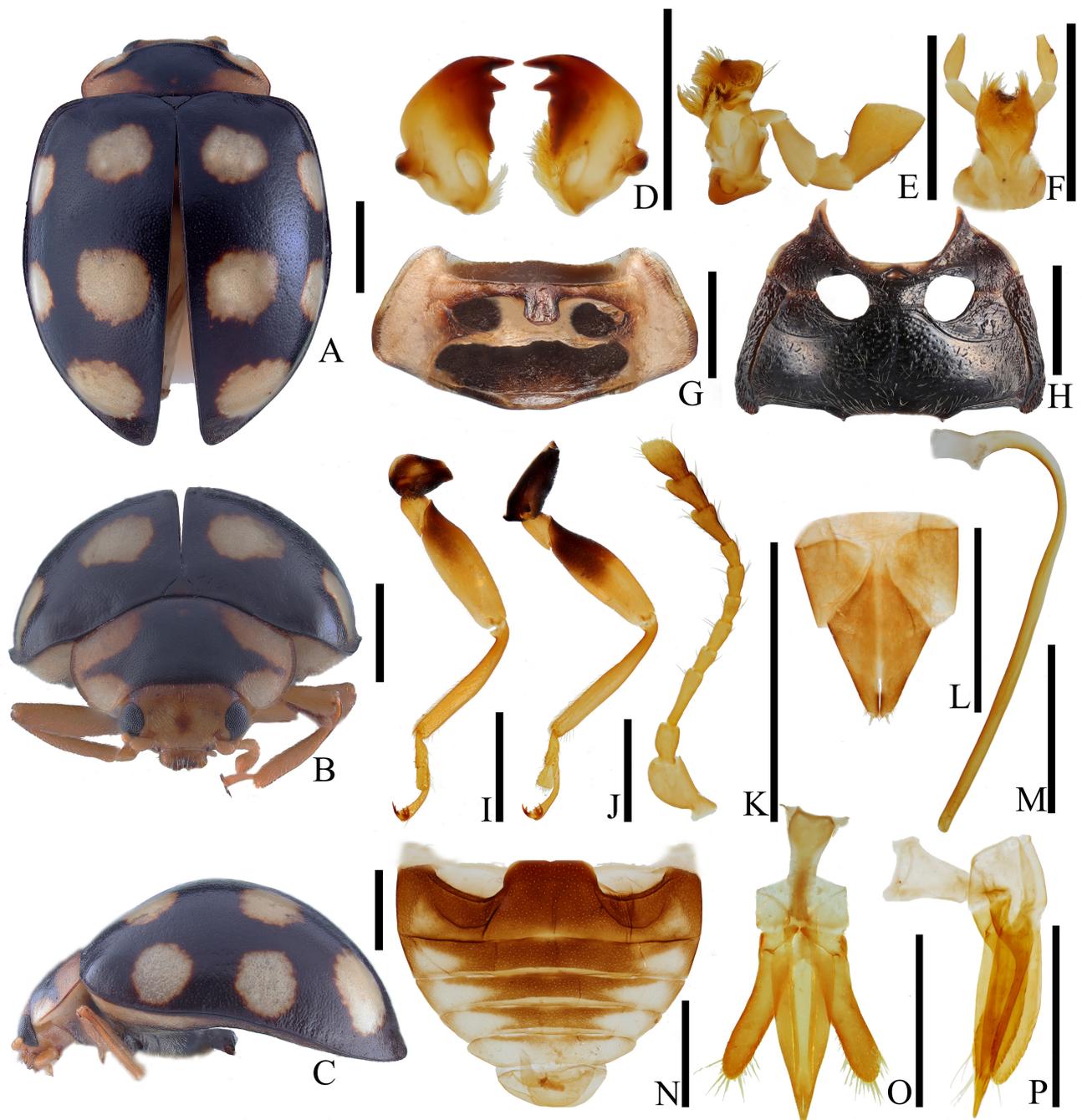


FIGURE 2. Habitus and morphological details of *Afissa pyramidalis* Jin, Chen & Wang, **sp. nov.** **A.** Adult, dorsal view. **B.** Adult, frontal view. **C.** Adult, lateral view. **D.** Left and right mandible. **E.** Maxilla. **F.** Labium. **G.** Prothorax. **H.** Mesoventrite and metaventrite. **I.** Mid-leg. **J.** Hind leg. **K.** Antenna. **L.** Female genitalia. **M.** Penis. **N.** Abdomen. **O.** Tegmen, inner view. **P.** Tegmen, lateral view. Scale bars: 1 mm in A–C, G–L, N; 0.5 mm in D–F, M, O, P.

Pronotum (Fig. 2B) transverse, with arcuate lateral margins. Anterior angles indistinct, rounded, and not prominently projecting; anterior margin medially arcuately concave. Posterior angles rounded, posterior margin fits tightly against basal margin of elytra. Pronotum width approximately 0.63× body width (body width: pronotum width = 1.6). Surface bears punctures that are larger than those on head, evenly distributed, 2.0–2.5× diameter apart. Elytra strongly convex, with punctures larger than those on pronotum, 1.5–3.0× diameter apart.

Prosternum (Fig. 2G) T-shaped; prosternal process rectangular, with indistinct longitudinal carinae. Surface slightly rough and densely covered with long setae. Mesosternum (Fig. 2H) trapezoidal, with anterior margin medially truncate. Surface rough and sparsely covered with long setae. Metasternum (Fig. 2H) broad, with distinct median

line. Surface bears coarse punctures, bearing long, fine setae. Abdominal postcoxal lines (Fig. 2N) incomplete, semicircular, extending to about 6/7 length of abdominal ventrite 1 and returning at middle.

Legs (Fig. 2I, J) elongate, femora moderately enlarged, tarsi with four tarsomeres, third tarsomere minute. Tarsal claws bifid with basal tooth.

Male genitalia: Penis (Fig. 2M) robust, basal one third circularly curved, while apical two thirds straight. Penis capsule with well-developed and distinctly protruding outer arm and indistinct inner arm. In lateral view, penis guide stout, with outer margin straight and inner margin that gradually narrows from base toward apex, terminating in acute tip. Parameres broad, slightly curved, shorter than penis guide, bearing long setae at apex (Fig. 2P). In inner view, penis guide conical, gradually narrowing in apical one-third to form sharply pointed apex, which is bifid slightly at tip (Fig. 2O).

Female genitalia: coxite (Fig. 2L) three times longer than width, subtriangular. Inner margin simple, straight and ventral surface smooth. Tapering apically, conical in shape, each with one long seta.

Distribution. China: Xizang.

Etymology. The specific epithet of this species is derived from the Latin word “*pyramidalis*” (means conical), referring to the conical shape of penis guide in inner view.

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References

- Dieke, G.H. (1947) Ladybeetles of the genus *Epilachna* (*sens. lat.*) in Asia, Europe, and Australia. *Smithsonian Miscellaneous Collections*, 106 (15), 1–183.
<https://doi.org/10.1093/aesa/40.2.349>
- Das, P., Chandra, K. & Gupta, D. (2020) The ladybird beetles (Coleoptera: Coccinellidae) of Arunachal Pradesh, East Himalaya, India with new combinations and new country records. *Bonn Zoological Bulletin*, 69 (1), 27–44.
- Das, P., Banerjee, D. & Gupta, D. (2023) New records and new combinations of ladybird beetles from India (Coleoptera: Coccinellidae). *Records of the Zoological Survey of India*, 123 (2S), 77–84.
<https://doi.org/10.26515/rzsi/v123/i2S/2023/172502>
- Iqbal, Z., Azad, R., Nasir, M.F., Bodlah, I., Zaman, M., Hassan, M.A., Hayat, A., Naz, F., Wang, X.-M. & Nie, R.-E. (2024) Review of ladybird tribe *Epilachnini* Mulsant, 1846 (Coleoptera: Coccinellidae) from Pakistan. *Oriental Insects*, 59 (1), 54–100.
<https://doi.org/10.1080/00305316.2024.2374352>
- Li, C.S. & Cook, E.F. (1961) The Epilachninae of Taiwan (Col.: Coccinellidae). *Pacific Insects*, 3 (1), 31–91.
- Ślipiński, A. & Tomaszewska, W. (2010) Coccinellidae Latreille, 1802. In: Leschen, R.A., Beutel, R.G. & Lawrence, J.F. (Eds.), *Handbook of Zoology. Vol. 2. Coleoptera*. Walter de Gruyter GmbH & Co. KG, Berlin/New York, pp. 454–472.
<https://doi.org/10.1515/9783110911213.454>
- Szawaryn, K., Bocak, L., Ślipiński, A., Escalona, H.E. & Tomaszewska, W. (2015) Phylogeny and evolution of phytophagous ladybird beetles (Coleoptera: Coccinellidae: Epilachnini), with recognition of new genera. *Systematic Entomology*, 40, 547–569.
<https://doi.org/10.1111/syen.12121>
- Szawaryn, K. (2018) Taxonomic notes on Australian herbivorous ladybird beetles (Coccinellidae: Epilachnini). *Zootaxa*, 4413 (1), 158–162.
<https://doi.org/10.11646/zootaxa.4413.1.5>
- Tomaszewska, W. & Szawaryn, K. (2016) Epilachnini (Coleoptera: Coccinellidae)—A revision of the world genera. *Journal of Insect Science*, 16 (1), 101, 49–53.
<https://doi.org/10.1093/jisesa/iew082>
- Yu, G.-Y. (2004) Coleoptera: Coccinellidae. In: Yang, X.-K. (Ed.), *Insects of the great Yarlung Zangbo Canyon of Xizang*. The Straits Publishing & Distributing Group, Beijing, pp. 60–67.

西藏长崎齿瓢虫属*Afissa*两新种描述（鞘翅目：瓢虫科）

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摘要: 记述西藏长崎齿瓢虫属*Afissa*两新种, 墨脱长崎齿瓢虫*Afissa motuoensis* **sp. nov.**和锥叶长崎齿瓢虫*Afissa pyramidalis* **sp. nov.**, 并给出整体、重要鉴定特征和外生殖器图。

关键词: 瓢虫科; 食植瓢虫族; 新种; 分类研究; 西藏