

First record of the genus *Empidideicus* Becker, 1907 (Diptera, Mythicomyiidae) in China and the Oriental Region, with description of a new species

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Abstract

Empidideicus Becker, 1907 is newly recorded from China and the Oriental Region, with one new species, *E. pentagonius* sp. n., described and illustrated. Observations are provided on the biology of *E. pentagonius* sp. n. visiting flowers of *Stemona mairei* (Levl.) Krause (Liliflorae, Stemonaceae). A key to the genera of Mythicomyiidae known to occur in China is provided.

Keywords

Empidideicus, flower visiting, new record, new species, pollinator

Introduction

Mythicomyiidae is a cosmopolitan family in the Bombylioidea with more than 330 described species in 25 extant genera from six subfamilies (Evenhuis 2002). This family has the greatest diversity in semi-arid and arid regions and is strongly associated with flowers. Hitherto, only three genera of Mythicomyiidae have been reported from China: *Mythen-telea* Hall & Evenhuis, 1986, *Cephalodromia* Becker, 1914, and *Platypygus* Loew, 1844.

Empidideicus Becker, 1907 belongs to the monogeneric subfamily Empidideicinae. So far, 42 species have been described, with 20 species distributed exclusively in the Afrotropical Region and 20 species distributed exclusively in the Palaearctic Region, and two species are distributed in both Afrotropical and Palaearctic regions (Evenhuis 2002, 2007, 2009; Gharali et. al. 2010, 2011, 2015; Hakimian et. al. 2014). The tribe Empidideicini was established by Hull (1973) within the Mythicomyiinae, when he first introduced tribal-level classification into Bombyliidae. Initially four genera, *Empidideicus* Becker, 1907, *Anomaloptilus* Hesse, 1938, *Euanthobates* Hesse, 1965, and *Leylaiya* Efflatoun, 1945, were included in Empidideicini. Recent studies have focussed on the Afrotropical fauna (Evenhuis 2009, 2007), and described 10 new species of *Empidideicus* in Iran (Gharali et. al. 2010, 2011, 2015; Hakimian et. al. 2014).

The genus *Empidideicus* is reported from China and Oriental Region for the first time, and a new species, *E. pentagonius* sp. n., is described. Observations are provided on the flower visiting behaviour of *E. pentagonius* in northwestern Yunnan, China. A key to the genera of Mythicomyiidae from China is presented. The distribution of the new species updates the easternmost distribution of the genus and more species might be distributed in the dry-hot valleys of the Oriental and eastern Palaearctic regions.

Material and methods

Specimens were collected by sweeping flowers of *Stemona mairei* (Levl.) Krause in June beside the Jinsha River in southwest China (28°21'18.91"N, 99°12'52.20"E). The photos of adults visiting flowers were taken with a Canon 5D digital Camera and combined into figures using Adobe Photoshop CS3 software. Photos of male genitalia were taken by KEYENCE VHX-2000. The specimens were studied and illustrated with an Olympus SZ61 stereo microscope. Preparations of genitalia were made by macerating the apical portion the abdomen in cold 10% NaOH for 12–15 h. After examination, dissected material was transferred to fresh glycerine and stored in a microvial together with the specimen. The holotype and other specimens examined are deposited in the Entomological Museum of the China Agricultural University, Beijing (CAU).

Taxonomy

Key to genera of Mythicomyiidae from China

- | | | |
|---|--|---------------------|
| 1 | Wing vein R ₂₊₃ absent..... | 2 |
| – | Wing vein R ₂₊₃ present..... | 3 |
| 2 | Wing m-cu crossvein present; female spermathecae spherical with apical invagination..... | <i>Empidideicus</i> |
| – | Wing m-cu crossvein absent; female spermathecae reservoir conical..... | <i>Mythenteles</i> |

- 3 Wing cell dm open distally, not closed by crossvein *Cephalodromia*
 – Wing cell dm closed distally by crossvein *Platypygus*

Genus *Empidideicus* Becker

Empidideicus Becker 1907: 97. Type species: *Empidideicus carthaginiensis* Becker, 1907, by monotypy.

Cyrtoides Engel 1933: 102 (as subgenus of *Empidideicus* Becker). Type species: *Empidideicus efflatouni* Engel, 1933, by monotypy.

Ecliptica Engel 1933: 103. Unavailable name; name proposed in synonymy with *Cyrtoides* and not made available before 1961.

Anomaloptilus Hesse 1938: 983 (as subgenus of *Empidideicus* Becker). Type species: *Empidideicus celluliferus* Hesse, 1938, by monotypy.

Aetheoptilus Hesse 1967: 112 (as subgenus of *Empidideicus* Becker). Type species: *Empidideicus zuluensis* Hesse, 1967, by original designation.

***Empidideicus pentagonius* sp. n.**

<http://zoobank.org/5BA3F89D-BC77-4EA0-A116-CAE9501157D5>

Figures 5–11

Diagnosis. Head with ocellar tubercle yellowish, frons and face yellowish with a cup-shaped brown area between frons and face; thorax with two yellowish subtriangular marks anterolaterally, with a subtrapezoidal yellowish brown area posteriorly; katepisternum with upper 1/3 yellow; aedeagal apodeme base semicircular, with acute tip in dorsal view, aedeagal apodeme arched in lateral view; epiphallus pentagonal, with narrow tip in dorsal view.

Description. Male. Body length 0.8–1.4 mm, wing length 1.1–1.4 mm.

Head black and yellowish, eyes red, bare; ocellar tubercle black, ocelli yellowish; eyes dichoptic, 2 × width of ocellar tubercle, frons and face bare, yellowish, except a cup-shaped brown area between frons and face; occiput black. Antenna (Fig. 11) yellowish brown, scape semicircular nearly twice wider than long; pedicel trapezoidal, slight wider than long; first flagellomere ovoid, nearly 1.7 × longer than wide; second flagellomere about 1/3 length of first flagellomere, cylindrical, about 3 × longer than wide, with minute apical style. Antennal ratio: 1:2:8. Proboscis brown except base with a yellowish quadrilateral area laterally, nearly 2 × length of head.

Thorax (Fig. 10) black and yellowish, mesonotum mostly black except edge yellowish, postpronotal lobe yellowish, anterior with two yellowish subtriangular marks laterally, and a subtrapezoidal yellowish brown area posteriorly, mesonotum with three brown prealar bristles, anepisternum and anepimeron mostly yellow except edge of front and bottom black, katepisternum mostly black except upper 1/3 yellow.

Scutellum yellowish brown. Legs yellow except femora and tarsi brown. Legs with short brown hairs; tibiae with short black hairs and bristles, tarsi with short black hairs.

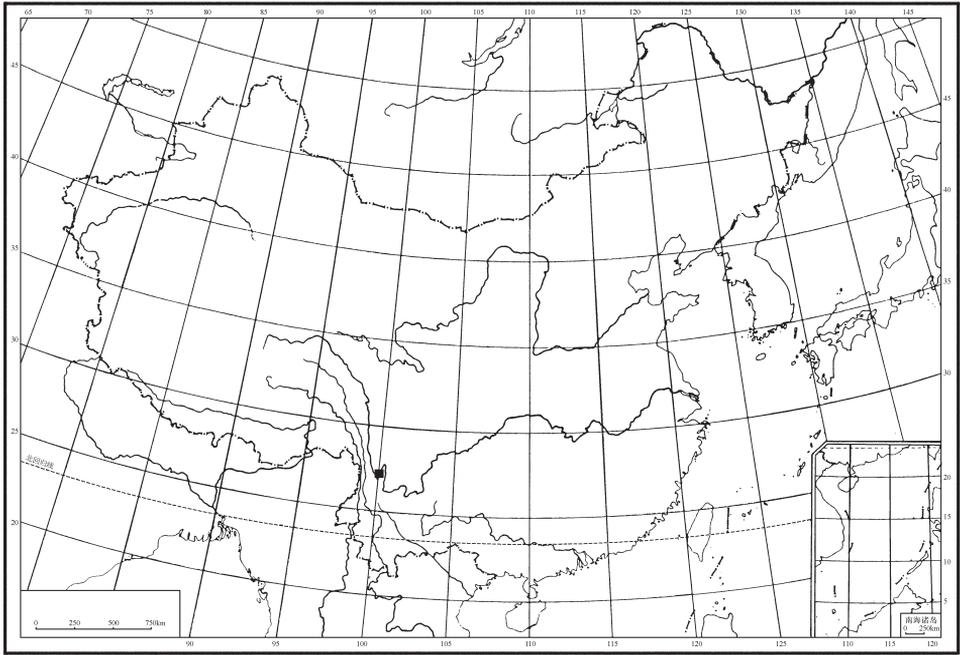
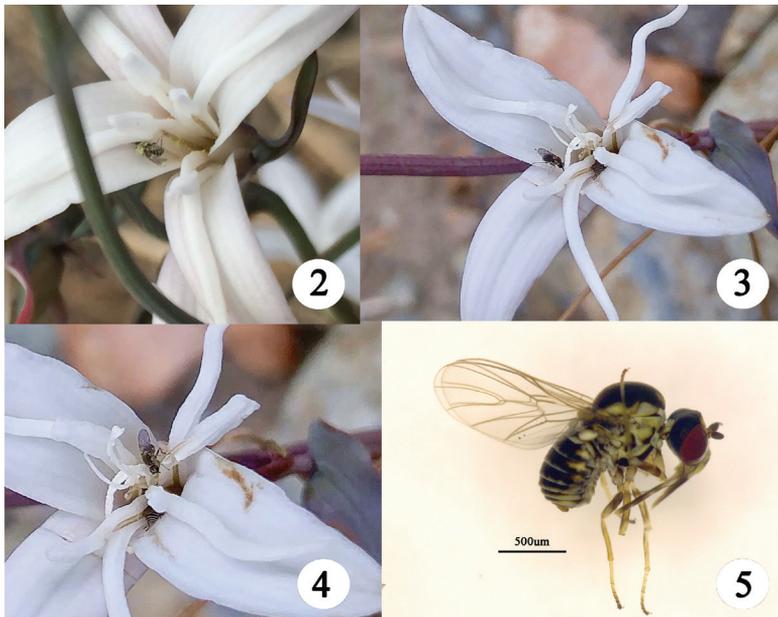
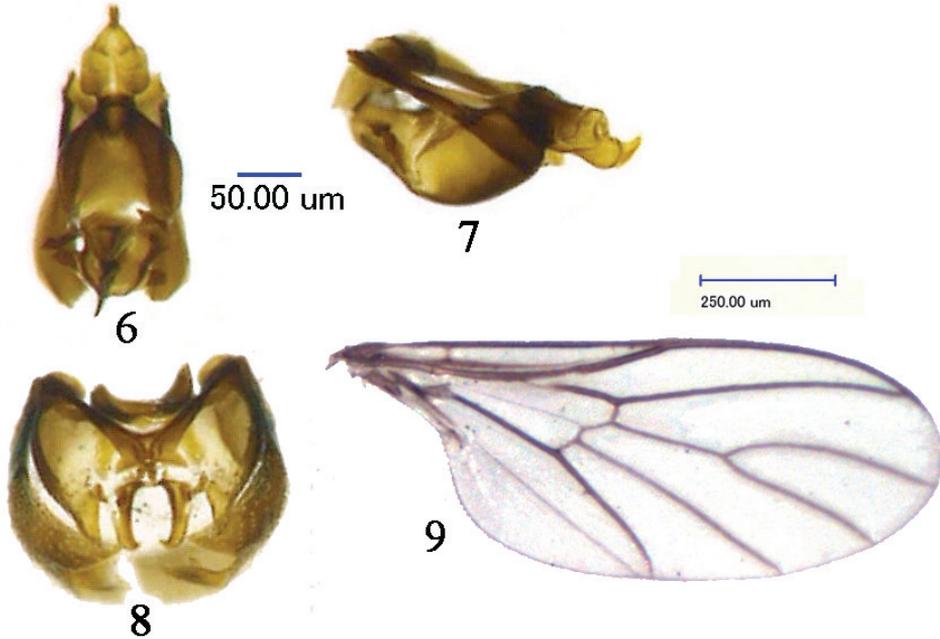


Figure 1. The location of the specimens of *Empidideicus pentagonius* sp. n. collected.



Figures 2–5. 2–4 Photographs of *Empidideicus pentagonius* sp. n. visiting *Stemona mairei* 5 adult of *Empidideicus pentagonius* sp. n. Photographs in nature by Yan Qin.



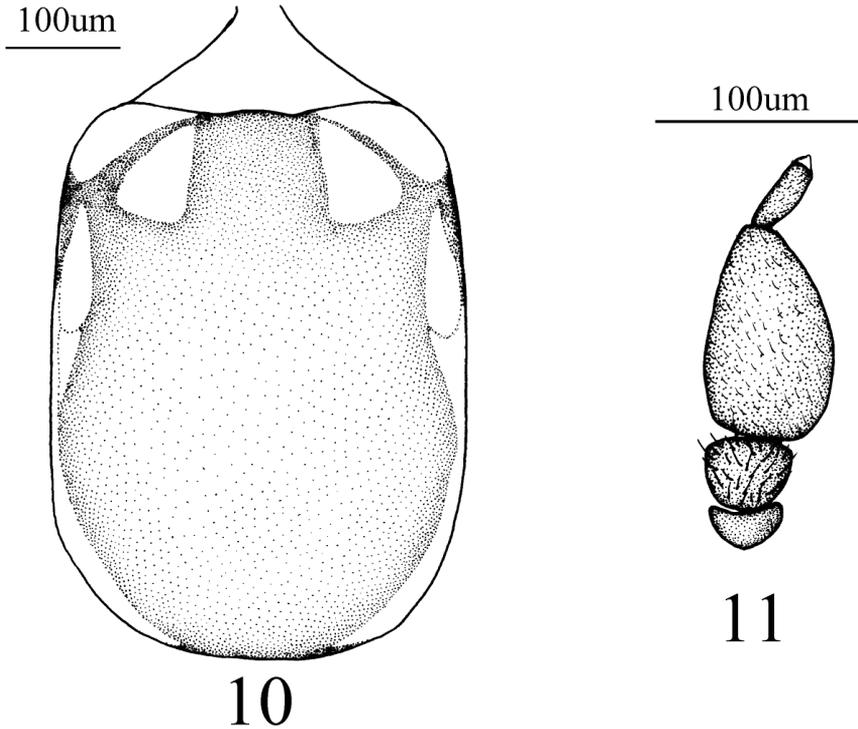
Figures 6–9. Photographs of male genitalia and wing of *Empidideicus pentagonius* sp. n. **6** phallus and gonocoxa, dorsal view **7** phallus and gonocoxa, lateral view **8** epandrium, ventral view **9** wing.

Wing (Fig. 9) hyaline, except veins brown. Wing length $2.3 \times$ width, wing with veins R_1 , R_{4+5} , M_1 , M_2 , M_{1+2} , CuA and Cup present, Sc incomplete; Costa, Sc, R_{4+5} and CuA₂ strongly sclerotized, vein M_1 , M_2 , M_{1+2} and CuA₁ less sclerotized; vein R_1 ending nearly in middle of costa, R_{4+5} slightly curved anteriorly, M_1 and M_2 form an acute angle, crossvein r-m at bottom of cell dm. Wing with tiny hairs at margin. Halteres yellowish, except edge of tip brown.

Abdomen with all tergites dark brown, except posterior margin with narrow pale brown band, and with yellow posterolaterally. Sternites yellowish mostly, except yellowish brown centrally, and pale laterally.

Male genitalia brown and black (Figs 6–8). Epandrium brown except edge black, nearly as long as wide, cercus well exposed, narrow and long, tip acutely in ventral view; gonocoxa L-shaped, nearly $2 \times$ longer than wide, with acute tip, gonostylus triangular with acute tip in lateral view; aedeagal apodeme base semicircle, extremely long, and narrowly apically, with acute tip in dorsal view, aedeagal apodeme arch in lateral view; epiphallus pentagonal, with narrow tip in dorsal view, epiphallus tip sickle-shaped in laterally view.

Female. Body length 1.2–1.7 mm, wing length 1–1.2 mm. Female genitalia (Figs 12, 13) furca subtriangular, 1.7 higher than wide, with concavity at middle of bottom; spermathecal bulb subglobular when viewed on edge, nearly rectangular in lateral view, invaginated apically, subquadrate in form, slightly wider than deep in lateral view.



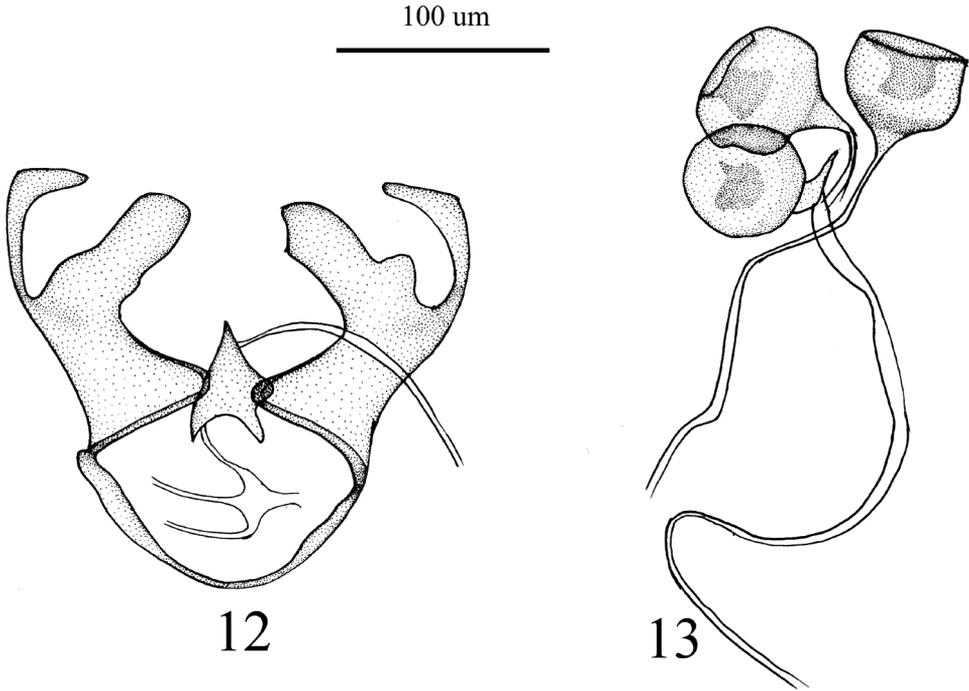
Figures 10, 11. *Empidideicus pentagonius* sp. n. **10** Thorax, dorsal view **11** Antenna, dorsal view.

Type material. Holotype male, CHINA: Yunnan Deqin Benzilan (28°21'18.91"N, 99°12'52.20"E), 08–18. XI. 2017, Yan Qin; Paratype female, CHINA: Yunnan Deqin Benzilan (28°21'18.91"N, 99°12'52.20"E), 08–18. XI. 2017, Yan Qin; 29 males 12 females, CHINA: Yunnan Deqin Benzilan (28°21'18.91"N, 99°12'52.20"E), 08–18. XI. 2017, Yan Qin.

Distribution. China (Yunnan).

Etymology. The specific name refers to the epiphallus pentagonal in dorsal view.

Remarks. The new species is similar to *E. legulicoxa* Gharali & Evenhuis, 2010 (Iran), but it can be separated from the latter by the following features: the frons and face are yellowish, except a cup-shaped brown area between frons and face; the katepisternum mostly black except for the upper 1/3, which is yellow; the abdomen with all tergites is dark brown, except the posterior margin, which has a pale brown narrow band, and laterally, which is yellow posteriorly. In *E. legulicoxa*, the frons is yellowish white, and slightly depressed medially with a large squarish brown spot medially, and the lower 3/4 of the katepisternum is yellowish white; the abdomen is predominantly yellow and with medial brown color dorsally, tergites I–III are brown with undulating posterior margins (Babak et al. 2010).



Figures 12, 13. Female genitalia of *Empidideicus pentagonius* sp. n. **12** Female genitalia **13** spermathecal bulb.

Observations

Empidideicus pentagonius sp. n. is one of the most important pollinators for *Stemona mairei* (Levl.) Krause in southwestern China (Fig. 1) (Yan Qin personal observation). During the collection of the specimens, the following observations were made by Yan Qin (Yan Qin 2018): (1) *E. pentagonius* sp. n. rests on the flowers of *Stemona mairei* for a few minutes to half an hour, apparently feeding pollen or nectar. (2) After visiting a flower, much pollen was observed on the body of flies, which visited one flower after another. (3) *E. pentagonius* sp. n. is considered an important pollinator of *S. mairei* in June, but this species is rare in July, and beetles became the dominant visitors of *S. mairei* instead. (4). Different from other species of *Stemona*, *S. mairei* has a faint fragrance instead of a rotting smell (Chen et al. 2017), which might attract *E. pentagonius*. (5) The eggs and larvae of the flies were not found in the flower, and the life history of *E. pentagonius* is unknown (Figs 2–5).

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