

Redescription of *Sinlochmostyilia sinica* Yang, the First Palearctic Member of the Little-Known Family Ctenostylidae (Diptera: Acalyptratae)

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Ho-Yeon Han (2006) Redescription of *Sinlochmostyilia sinica* Yang, the first Palearctic member of the little-known family Ctenostylidae (Diptera: Acalyptratae). *Zoological Studies* 45(3): 357-362. The monotypic genus *Sinlochmostyilia* has been known only by the female holotype of its type species, *S. sinica* Yang from Zhejiang Province, China. This species is a member of the little-known family Ctenostylidae, which includes 12 described species and 7 nominal genera from the Oriental, Afrotropical, and Neotropical Regions. The discovery of *S. sinica* in Korea as reported in the present study is the first record of the Ctenostylidae in the Palearctic Region. Male specimens were also discovered for the first time. A redescription based on both sexes with illustrations of the postabdominal structures is provided. The following characteristics were found to be useful for distinguishing *S. sinica* from other ctenostylids: 1) crossvein R-M situated approximately at basal 1/3 of cell dm; 2) vein R_{2+3} very short, ending at midlength of wing; 3) costa without an apparent subcostal break; and 4) apical 1/2 of wing entirely dark brown. The possible close relationship of *Sinlochmostyilia* with *Nepaliseta* and *Ramuliseta* is also discussed. <http://zoolstud.sinica.edu.tw/Journals/45.3/357.pdf>

Key words: Diptera, Tephritoidea, Ctenostylidae, Lochmostyliinae, *Sinlochmostyilia sinica*.

Sinlochmostyilia sinica Yang (1995) was described as the sole member of the new genus based on a single female from Zhejiang Province, southeastern China. Since then, no additional specimens of the genus have been reported. Yang (1995) recognized this species as a member of the subfamily Lochmostyliinae of the family Pyrgotidae, but this taxon is now recognized as the independent family Ctenostylidae (McAlpine 1990, Barraclough 1994 1995 1998, Korneyev 2001).

The family Ctenostylidae includes unusual looking flies with a strongly branching fan-shaped arista in females. Based on collection data and dissection of female abdomens, we only know that they are nocturnal and viviparous, but lack any further biological information. They are rare in collections and comprise only 12 described species and 7 nominal genera from the Oriental, Afrotropical,

and Neotropical Regions (Korneyev, pers. com.). The discovery of *S. sinica* in Korea as reported in the present study is the first record of the Ctenostylidae in the Palearctic Region.

The systematic position of the Ctenostylidae is unclear at this point. They were once assigned to the family Pyrgotidae of the superfamily Tephritoidea (e.g., Hendel 1934, Keiser 1951, Aczél 1956), but McAlpine (1990) treated them as the family Ctenostylidae and suggested that they did not even belong to the superfamily Tephritoidea based on the postabdominal structures of both sexes. Korneyev (2001) was also unsure of the relationship between the Ctenostylidae and Tephritoidea, but he suggested that if the Ctenostylidae belongs to the superfamily Tephritoidea, then it is related to the Platystomatidae + Pyrgotidae + Tephritidae group of families. Korneyev, in his latest communication, is

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more convinced about this relationship based on a further study of male terminalia in the Neotropical genus *Furcisetia* of the Ctenostylidae (Korneyev, in prep.). Han and Ro (2005) conducted a phylogenetic analysis of the tephritoid families based on mitochondrial 16S, 12S, and COII gene sequences. They found 2 clear monophyletic groups within the Tephritoidea, but, unfortunately, the Ctenostylidae was not included in that study. I recently obtained fresh specimens of Ctenostylidae (*S. sinica*) and some additional problematic tephritoids (e.g., *Tachinisca* and *Ortalotrypeta* spp.), and we are currently reanalyzing the tephritoid relationships based on an expanded molecular dataset (Han and Ro, in prep.).

I herein provide a detailed redescription of *S. sinica* based on both sexes from Korea. Illustrations of the postabdominal structures that were not available in the original description are also included. As the only member of the genus *Sinolochmostylia* as well as the only Palearctic representative of the family Ctenostylidae, such detailed morphological characteristics provided here will be an importance source of information to infer the phylogenetic relationships of this little-

known family.

MATERIALS AND METHODS

The terminology and morphological interpretations used in this paper follow the glossary of White et al. (1999). Wing lengths were measured from the basicosta to the apex of vein R_{4+5} . In addition, the following 6 ratios were used: the frons-head ratio (narrowest width of the frons in dorsal view/width of the head); eye ratio (shortest eye diameter/longest eye diameter); gena-eye ratio (genal height/longest eye diameter) (genal height is the distance between the ventral eye margin and ventral genal margin anterior to the genal seta); vein R_{4+5} ratio (the distance along vein R_{4+5} between crossvein R-M and the apex of vein R_{4+5} /the distance between crossvein R-M and the basal node of vein R_{4+5}); vein M ratio (the distance along vein M between crossveins R-M and DM-Cu/the distance between crossveins R-M and BM-Cu); and wing-thorax ratio (wing length/thorax length). All specimens examined in this study are deposited in the Department of Life Science, Yonsei University, Wonju campus, Korea.

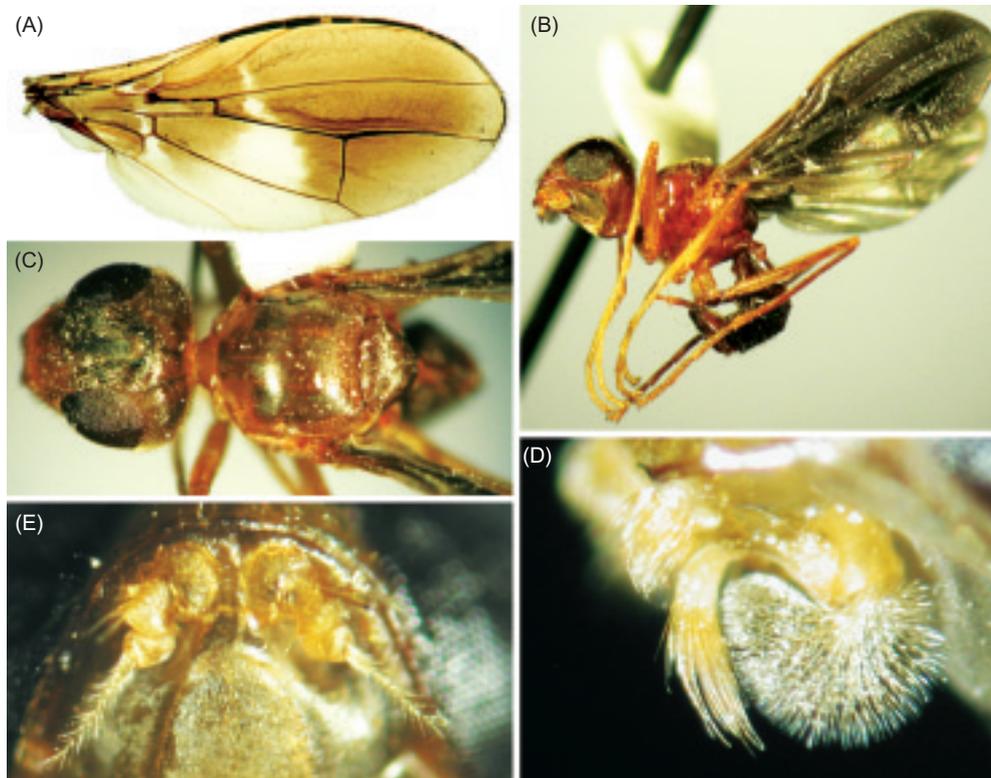


Fig. 1. *Sinolochmostylia sinica* Yang. (A) Wing; (B) female body lateral view; (C) female head and thorax dorsal view; (D) female antenna, dorsolateral view; (E) male antennae, frontal view.

***Sinolochmostylia sinica* Yang**

Sinolochmostylia sinica Yang, 1995: 248 (type-locality: CHINA: Zhejiang Prov., Kaihua Co., Mt. Gutian; holotype female in Beijing Agricultural University) (not examined).

Diagnosis: This species can be readily distinguished from all other 11 species of the Ctenostylidae based on the combination of the peculiar structures of the female antennae (Figs. 1D, 2D) and the following wing characteristics (Fig. 1A): 1) crossvein R-M situated approximately at basal 1/3 of cell dm; 2) vein R₂₊₃ very short, ending at midlength of wing; 3) costa without apparent subcostal break; and 4) apical 1/2 of wing entirely dark brown.

Male Description: Body yellowish-brown to brown, often with dark brown pattern on dorsum (as in Figs. 1C, 2F); setulae yellowish-brown to brown; wing length 4.87-5.02 mm. Head (Figs. 1E, 2A, 2B) densely setulose but no macrosetae discernible from setulae, yellowish-brown to brown with a frons-head ratio of 0.19-0.20, eye ratio of

0.88-0.91, and gena-eye ratio of 0.45-0.53; frons yellowish-brown to brown, densely setulose; fronto-orbital plate finely rugose near vertex; ocelli lacking; antenna (Figs. 1E, 2A, B) yellowish-brown with large scape, round in outline (diameter about as long as pedicel), densely setulose; pedicel densely setulose laterally (setulae 2-3 times as long as those on scape); flagellomere 1 globular, about 0.6 times as long as pedicel; arista long, pubescent, with rays 2-3 times as long as basal arista width; face yellowish-brown, microtrichose with wide, inverted U-shaped carina (Fig. 2B), carina flattened but with sharply defined edge; parafacial narrow, with single row of setulae; gena yellowish-brown with dense setulae; occiput and postgena strongly convex, densely setulose except for ventral 2/3 of median occipital sclerite; supracervical setae lacking; mouthparts lacking except small palpi (Fig. 2B). Thorax (as in Figs. 1B, C, 2F, G) ground color yellowish-brown, with short setulae; prosternum broad, bare; proepisternum bare; postpronotal lobe setulose; scutum with 2 pairs of brown longitudinal stripes discernible in well-hard-

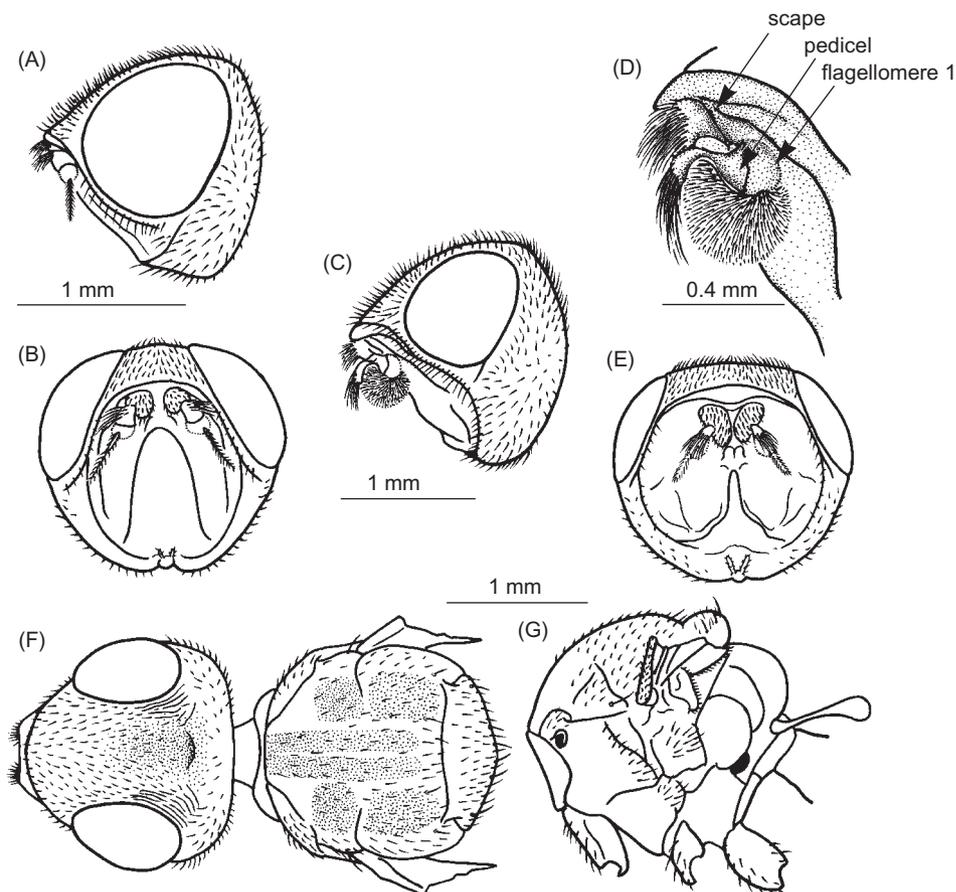


Fig. 2. *Sinolochmostylia sinica* Yang. (A) Male head, lateral view; (B) male head, frontal view; (C) female head, lateral view; (D) female antenna, lateral view; (E) female head, frontal view; (F) female head and thorax, dorsal view; (G) female thorax, lateral view.

ened specimens, lateral stripes broken near transverse suture; 1 dorsocentral and 1 postalar setae barely discernible from slightly shorter adjacent setulae; notopleuron setulose, with 1 posterior seta; scutellum short, strongly convex, about 3-times as wide as long; 1 basal, 1 subapical, 1 apical scutellar setae discernible; all scutellar setae erect, slightly longer than adjacent setulae; anepisternum posteriorly with 2 irregular rows of setulae twice as long as those of scutum; katepisternum posterolaterally with 7 or 8 setulae and ventromedially with 4 or 5 dark brown, strong, erect setae twice as long as posterolateral setulae; anepimeron setulose on dorsal 1/2; katepimeron, meron, katatergite, and anatergite bare; mediotergite bare, very large, strongly convex. Legs yellowish-brown, long, slender, short setulose, with no macrosetae or tibial spurs. Wing (Fig. 1A) mostly dark brown except for hyaline areas including middle of cell dm, most of cell Cu_1 , alula, anal lobe, and small spots at basal 1/4 of cell r_{2+3} and basal 1/8 of cell r_{4+5} ; wing-thorax ratio 3.12-3.33, vein

R_{4+5} ratio 3.85-4.31, vein M ratio 1.92-2.08; costa with only costagial break; subcostal break discernible as a slightly constricted area in a few specimens; vein Sc present in basal 1/3, evanescent in apical 2/3; vein R_1 with short setulae along entire length; vein R_{2+3} very short, ending at midlength of wing; cell bm open anterobasally. Abdomen more or less cylindrical, petiolate, short setulose (Fig. 3A, B); syntergite 1+2 pale yellowish-brown; tergites 3-5 each with a brown transverse band at least on basal 1/2; sternites pale yellow; sternite 1 bare, V-shaped; sternite 2 oblong, about twice as long as wide, setulose on posterior 2/3; sternites 3 and 4 setulose, widely ovate; sternite 5 largest, transverse, short setulose except medially; 5 pairs of spiracles on preabdomen often hard to distinguish but traceable by associated tracheae; sternite 8 (sensu Korneyev 2001) setulose, well sclerotized, relatively large. Genitalia as in Fig. 3A-C; hypandrium weakly sclerotized, without conspicuous structures; pallus long, bare, apically pointed without sclerotized glans; epandrium setu-

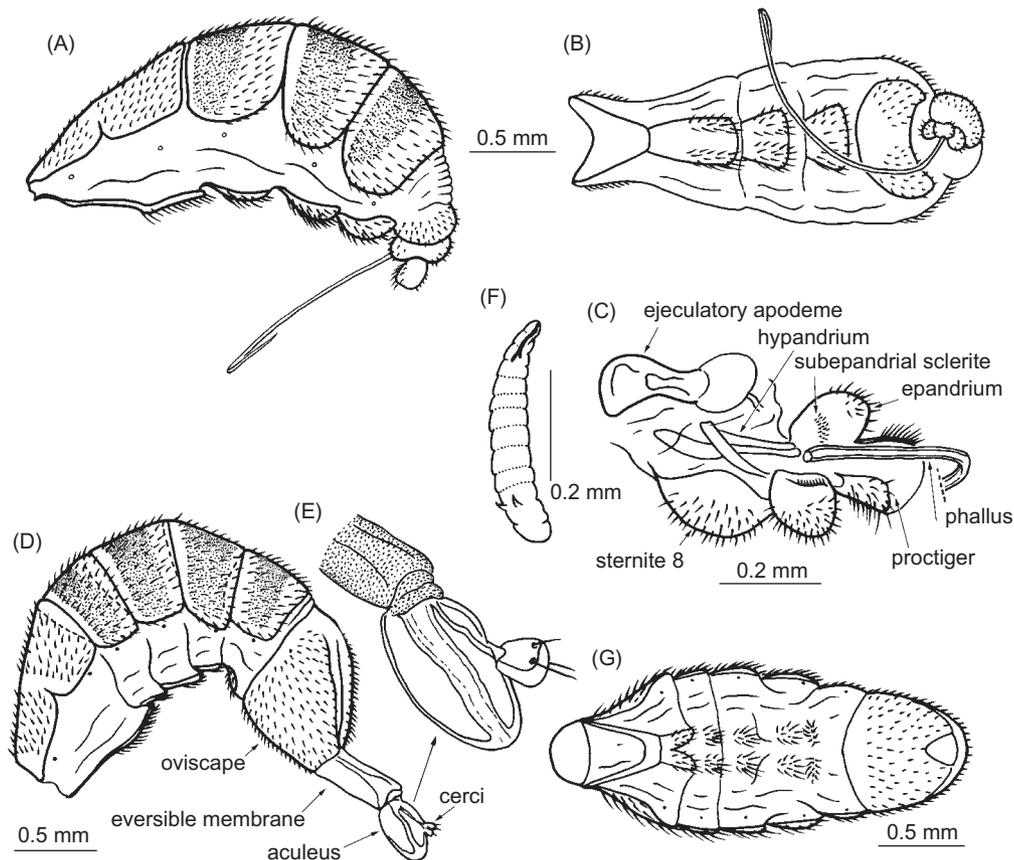


Fig. 3. *Sinolochmostylia sinica* Yang. (A) Male abdomen, lateral view; (B) male abdomen, ventral view; (C) male genitalia, ventral view (with phallus partially removed); (D) female abdomen, lateral view; (E) eversion membrane and aculeus, lateral view; (F) 1st instar larva; (G) female abdomen, ventral view (with eversion membrane and aculeus removed).

lose; subepandrial sclerite with series of tiny but stout setulae; proctiger setulose.

Female Description: Similar to male except for sexually dimorphic head and abdominal structures; wing length 4.53-5.36 mm. Head (Figs. 1B-D, 2C-E) with frons-head ratio of 0.41-0.44, eye ratio of 0.86-0.92, and gena-eye ratio of 0.70-0.81; ocellar triangle often darker than adjacent area (Fig. 2F); antenna (Figs. 1D, 2C-E) yellowish-brown, highly modified; scape large and swollen, densely setulose dorsally; pedicel basodorsally with densely setulose, finger-like, curved process (setulae about twice as long as those on scape); flagellomere 1 more or less globular, about 0.6-times as long as pedicel; arista heavily branched, fan-shaped; face with narrow but clearly defined carina (Fig. 2E). Wing (Fig. 1A) with wing-thorax ratio of 3.01-3.58, vein R_{4+5} ratio of 4.64-5.58, vein M ratio of 2.15-2.55. Abdomen (Fig. 3D-G) more or less cylindrical, petiolate, short setulose; syntergite 1+2 pale yellowish-brown; tergites 3-6 each with a brown transverse band at least on basal 2/3 except for narrow medial area where band gradually becomes fainter; sternites almost transparent, not easily discernible; sternite 1 bare, narrowly V-shaped; sternite 2 shaped as an inverted V, setulose, forming an X-shaped pattern with sternite 1; sternites 3-6 each consisting of a pair of small round sclerites discernible by setulose areas; 6 pairs of spiracles on preabdomen often hard to distinguish but traceable by associated tracheae; oviscape (syntergosternite 7) setulose, with narrow tergite and large, convex sternite; eversible membrane finely microtrichose, without taeniae; aculeus forming narrowly elliptic membranous tube with short, blunt cerci dorso-subapically (Fig. 3E); no spermathecae found; abdomen full of 1st instar larvae (at least 200 larvae counted from a single dissected specimen); 1st instar larva (Fig. 3F) with mouthhooks more or less straight, abdominal segment 7 dorsally with a pair of horn-like processes.

Distribution: Known only from the type locality, Zhejiang Prov. of China, and South Korea. Considering the rarity of this species in general collections, the distribution gap is likely to be filled as more-rigorous collecting efforts are made.

Biology: Unknown. Two females were collected using black and mercury vapor light traps at night. As in other ctenostylids, the atrophied mouthparts (Fig. 2B, E) indicate that the adults are not able to feed.

Specimens examined: KOREA: Jeollanam-do: Sandong-myeon, Simwon, 30-31.VII.1992, J.S. Park, 3 ♂♂. Gyeongsangnam-do: Haman-gun,

Chuseong-dong, 20-30.VII.1992, J.S. Park, 2 ♀♀. Gangwon-do: Injae-gun, Girin-myeon, north valley of Mt. Bangtaesan, black and mercury vapor light, 1.VIII.1996, H.-Y. Han et al., 1 ♀; Wonju-si, Heungop-myeon, Mt. Deokgasan, black and mercury vapor light, 7.VIII.1999, D.-S. Choi et al., 1 ♀. All of the above specimens are deposited in the Department of Life Science, Yonsei University, Wonju campus, Korea.

Remarks: Korneyev (2001) provided a diagnosis for the family Ctenostylidae, but *S. sinica* shows 1 important difference by apparently lacking both the humeral and subcostal breaks of the costa. In 3 specimens, however, the place where a subcostal break normally occurs appeared slightly constricted, suggesting that the loss of the break might be secondary. The costagial break near the wing base was clearly discernible. Both characteristics appear to be autapomorphic conditions of the genus *Sinolochmostylia* within the family. The very short vein R_{2+3} (reaching only to the midlength of the wing, Fig. 1A) and the basodorsal process of the pedicel in the female (Figs. 1D, 2D) are also unique within the family, and can also clearly be considered autapomorphic conditions. Investigating the phylogenetic relationships of this species with other ctenostylids is beyond the scope of this study, but *Sinolochmostylia* seems to show close affinities to *Ramuliseta* Keiser (1951) and *Nepaliseta* Barraclough (1995) by sharing the proximal position of crossvein R-M. Among them, *Sinolochmostylia* and *Nepaliseta* may be more closely related as indicated by the lack of both the apicoventral process on the female flagellomere 1 and the ocellar setae.

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