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SCIENTIFIC NOTE

Heleomyza captiosa (Diptera: Heleomyzidae) newly recorded from the Nearctic region, with an updated key to Nearctic *Heleomyza* and similar *Scoliocentra*

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Abstract
The fly *Heleomyza serrata* (Linnaeus) (Diptera: Heleomyzidae) is reported to range widely throughout the United States of America and Canada. However, in Eurasia, this species is restricted to northern regions; in central and southern Europe, *H. serrata* is replaced by the similar species *H. captiosa* (Gorodkov), which can be distinguished from *H. serrata* by the male genitalia. We report *H. captiosa* from Kentucky, United States of America, the first Nearctic record of this species. The taxonomy of Nearctic *Heleomyza* Fallén is discussed, and we propose to transfer three species to the genus *Scoliocentra* Loew: *Scoliocentra* (*Scoliocentra*) *bisetata* (Garrett) **comb. nov.**, *S.* (*Leriola* Gorodkov) *latens* (Aldrich) **comb. nov.**, and *S.* (*L.*) *nebulosa* (Coquillett) **comb. nov.** We recognise *Anypotacta* Czerny as a subgenus of *Heleomyza* and transfer the two Nearctic species to that genus: *H.* (*A.*) *aldrichi* Garrett **comb. nov.** and *H.* (*A.*) *gilli* **nom. nov.** (new replacement name for *Anypotacta czernyi* Gill, 1962). Finally, we provide an updated key to Nearctic *Heleomyza* and morphologically similar species of *Scoliocentra*. Further study will be required to ascertain the range and abundance of *H. captiosa* in North America.

Heleomyza serrata (Linnaeus, 1758) (Diptera: Heleomyzidae) is a synanthropic saprophagic fly that ranges across the Holarctic region. Gill (1962) characterised *H. serrata* as "very common in collections." However, a new species, *Heleomyza captiosa* (Gorodkov, 1962), was described from European material determined in collections as *H. serrata*. Although the two species are externally similar, the male genitalia of *H. captiosa* are distinct from that of *H. serrata*.

In the Palaearctic, *H. serrata* is found in more northern regions (*e.g.*, Sweden, Finland, Mongolia), and *H. captiosa* is found in central and southern regions (*e.g.*, France, Poland, Italy; Gorodkov 1984). Gorodkov (1962) hypothesised that the two species may be allopatric, but because *H. captiosa* specimens have long been identified as *H. serrata*, the range of each species is not precisely known. Accordingly, *Leria domestica* Robineau-Desvoidy, 1830, described from Yonne, France, and *Helomyza fuscana* Meigen, 1838, described from Bavaria, Germany, may be senior synonyms of *H. captiosa*, but the nomenclature is unresolved (Gorodkov 1984).

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Figure 1. Habitus of male *Heleomyza captiosa* (Gorodkov) specimen collected in Deane, Kentucky, United States of America.

Thus far, only *H. serrata*, and not *H. captiosa*, had been recorded from the Nearctic region (Gill 1962, 1965). However, on 4 January 2014, a male *Heleomyza* specimen (Fig. 1) was collected by Lisa Isaacs from decomposing elephant ear plants, *Alocasia macrorrhiza* (Linnaeus) G. Don (Araceae), in Deane, Letcher County, Kentucky, United States of America, and given to B.D.B. for determination. The specimen keys to *Heleomyza serrata* in Gill's (1962) key to *Heleomyza*, but the elongated shape of the epandrium and basistylus (Fig. 2A) is a poor match for that species. Instead, they are consistent with those of *H. captiosa*. The specimen will be deposited in the collection of the Ohio State University, Columbus, Ohio, United States of America.

To our knowledge, this represents the first Nearctic record of *H. captiosa*. To aid in identification of this species, we provide a brief diagnosis for *H. captiosa* and an updated key to *Heleomyza* of the Nearctic region. Morphological terminology follows Cumming and Wood (2017), except that we follow Woźnica's (2004, 2011) treatment of the male genitalia of Heleomyzinae, adopting the term basistylus for the basal genitalic process ("epiphallic process" of Gill (1962); "surstylus" of Gorodkov (1962)), and dististylus for the distal process ("surstylus" of Gill (1962); "editum" of Gorodkov (1962)).

Heleomyza captiosa (Gorodkov, 1962)

Leria captiosa Gorodkov 1962: p. 663, figs. 34, 35
?*Leria domestica* Robineau-Desvoidy 1830: p. 654
?*Helomyza fuscana* Meigen 1838: p. 369

Diagnosis. *Heleomyza captiosa* is externally similar to *H. serrata*, having hyaline wings, one strong katepisternal bristle, a bare anepisternum (rarely with a single setula posteriorly), and a bare anepimeron. The base of the epandrium of *H. captiosa* is extended ventrally into a narrow fingerlike shape. The basistylus is straight for the basal three-fifths of its length and angled posteriorly at about two-fifths of its length from the apex (Fig. 2A). In *H. serrata*, the shape of the epandrium is variable, ranging from short and squared off (Fig. 2B) to extended ventrally (as shown in Dvořák and Dvořáková 2012, fig. 3), but the extension is generally shorter than in

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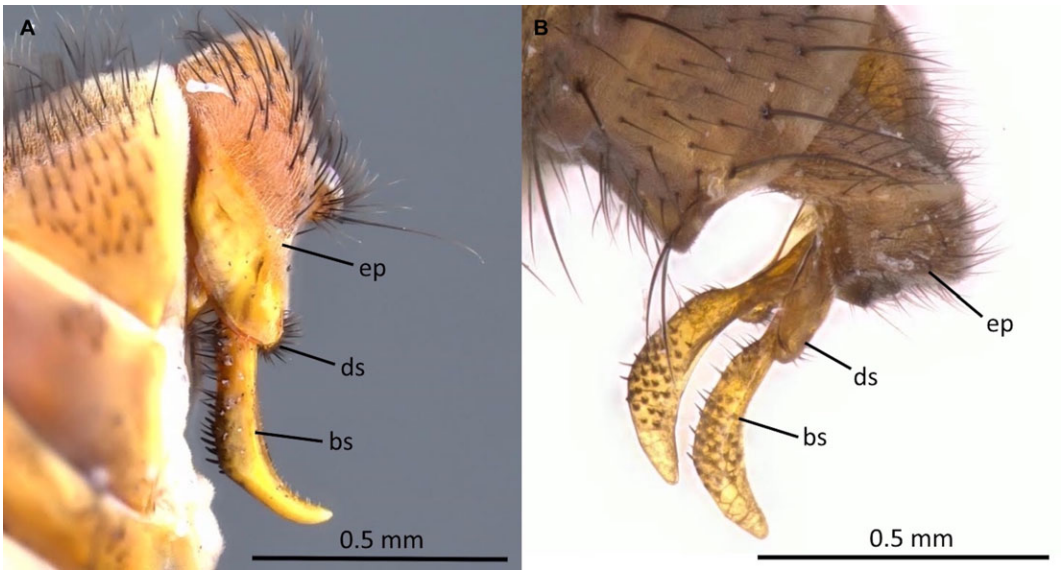

Figure 2. Comparison of male genital structures of two species of *Heleomyza* Fallén: **A**, *Heleomyza captiosa* (Gorodkov) specimen collected in Deane, Kentucky, United States of America, and **B**, *H. serrata* (Linnaeus), modified from Giordani and Vanin (2023). Abbreviations: ep, epandrium; ds, dististylus; bs, basistylus.

that of *H. captiosa*. A more reliable diagnostic character is the shape of the basistylus of *H. serrata*, which is broader, shorter, and curved along its length (Fig. 2B). Females were not examined as part of the present study, but according to Woźnica (2006), female *H. captiosa* have roughly circular spermathecae that are convex at the base, whereas those of *H. serrata* are concave at the base, giving them a mushroom-like shape.

Distribution. EUROPE: France, Germany, Poland, Hungary, Romania, Italy, Yugoslavia [*sic*], Bulgaria, Ukraine (Gorodkov 1984); Scotland (Papp 1978); Austria, Wales (Papp 1982); Czechia (Dvořák and Dvořákova 2012); Spain (Martín-Vega and Baz 2013); Slovakia (Preisler *et al.* 2022). **NORTH AMERICA:** Kentucky (the present paper).

Remarks. Gill (1962) recorded *H. serrata* as ranging from Canada and Alaska as far south as California, Tennessee, and Virginia, in the United States of America. The epandrium and basistylus ("epiphallic process") illustrated by Gill (1962, fig. 89) are clearly that of typical *H. serrata*, but he did not indicate where the specimen depicted was collected. The identities of the specimens represented by Gill's (1962, 1965) more southerly records are unclear, and re-examination of historical specimens is required to determine the Nearctic distribution of *H. captiosa*.

It is interesting to note that Garrett (1925, p. 3) described *Helomyza americana* as the American form of *Heleomyza serrata*, in which "the inner clasp of the hypopygium [*i.e.*, the basistylus] is shorter, more evenly curved and deeper. [. . .] Two or three thousand roughly examined." His description, although terse, appears to describe the genitalia of *H. serrata* and contrast them with those of *H. captiosa*, which Garrett treated as the typical European form of *H. serrata*. This suggests that, although *H. captiosa* is more widespread in the Palaearctic than *H. serrata* is (Gorodkov 1984), Garrett (1925) considered *H. serrata* to be common in North America and did not consider *H. captiosa* to be typical of the Nearctic fauna.

An intermediate form is found in the United Kingdom, and in this form the epandrium is extended downward and the basal section of the basistylus is slightly curved or bent (Sivell *et al.* 2025). It is possible that records of *H. captiosa* in Scotland and Wales published by Papp

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(1978, 1982) are based on such specimens. The assignment of these specimens to one species or the other and their implication for the distinctness of *H. serrata* and *H. captiosa* require further study.

Taxonomy of *Heleomyza* Fallén

The genus *Heleomyza* Fallén, 1810 was previously delimited by Czerny (1924) and Gill (1962) on the basis of the chaetotaxy of the head (two pairs of equal fronto-orbital bristles), prosternum (two or more pairs of bristles), and scutellum (lacking dorsal hairs). However, a study of the male genitalia led Gorodkov (1962) to restrict *Heleomyza* (as *Leria* Robineau-Desvoidy, 1830) to only those species with the dististyli reduced and the basistyli comparatively much larger (Fig. 2). The remaining species, which display the plesiomorphic condition of well-developed dististyli, were transferred to *Scoliocentra* Loew, 1862 *sensu stricto* or to a new subgenus *Scoliocentra* (*Leriola* Gorodkov, 1962).

The genitalic and chaetotaxic characters given by Gorodkov (1962) in revising the Palaearctic species are easily applied to the Nearctic species of *Heleomyza sensu* Gill (1962). Species of subgenus *Leriola* have a short basistylus that extends barely (or not at all) beyond the margin of the epandrium (Gorodkov 1962, figs. 19, 54; Gill 1962, figs. 94, 95). In terms of external morphology, *Scoliocentra* (*Leriola*) species cluster into two groups. The *Scoliocentra nigrinervis* group can be distinguished from *Heleomyza* by the presence of darkened crossveins, and it includes two Nearctic species, *S.* (*L.*) *maculipennis* (Becker, 1897) (= *Heleomyza difficilis* Gill, 1962) and *S.* (*L.*) *nebulosa* (Coquillett, 1910) **comb. nov.** The *Scoliocentra brachypterna* group can be distinguished from *Heleomyza* by the presence of two strong pairs of vibrissae with short peristomal setulae at their base; the vibrissae were described as equal by Gorodkov (1962), but in truth, the lower vibrissae are slightly shorter than the upper vibrissae (Woźnica 2004). In *Heleomyza* species with two pairs of vibrissae, the pairs are more substantially unequal and (or) have enlarged peristomal setulae at their base (Gorodkov 1962). The Nearctic region contains one recognised species of this group, *S.* (*L.*) *latens* (Aldrich, 1896) **comb. nov.**, which was formerly considered synonymous with the Palaearctic *S. brachypterna* (Loew, 1873) (*e.g.*, Gill 1962) but is now considered a distinct member of the *S. brachypterna* group (Gorodkov 1984; Woźnica 2004). In specimens of *S. latens* examined by C.S.A., the lower vibrissae are about two-thirds the length of the upper vibrissae.

In addition, Gorodkov (1962, 1984) removed *Scoliocentra* (*Scoliocentra*) *dupliciseta* (Strobl, 1894) from *Heleomyza* and transferred it to *Scoliocentra sensu stricto*, as this species has both the basistylus and dististylus well-developed. Like *Heleomyza* species, *S. dupliciseta* has hyaline wings and unequal pairs of vibrissae; however, it possesses a small but distinct proepimeral bristle that is absent in *Heleomyza* (Gorodkov 1962). The above chaetotactic and genitalic characters are shared by the Nearctic species *Heleomyza bisetata* (Garrett, 1922) (Gill 1962, fig. 93), and the two species appear to be closely related. In addition, the species differs from *Heleomyza* by the presence of more than one strong bristle on the katepisternum, a character also shared by *S. dupliciseta* and *S. latens*. Accordingly, we transfer this species to *Scoliocentra* as *S.* (*S.*) *bisetata* (Garrett, 1922) **comb. nov.**

Finally, the genus *Anypotacta* Czerny, 1924, which possesses only a single pair of prosternal bristles, is now generally considered a subgenus of *Heleomyza* (*e.g.*, Gorodkov 1984; Woźnica 2006; Roháček *et al.* 2017; but see Papp 1998). Accordingly, we transfer the Nearctic species *A. aldrichi* (Garrett, 1921) and *A. czernyi* Gill, 1962 to *Heleomyza* and include them in the key below. However, the prior name *Helomyza czernyi* Collart, 1933 (in this case, we interpret "*Helomyza*" as an incorrect subsequent spelling of *Heleomyza*), makes *Heleomyza czernyi* (Gill, 1962) an invalid junior secondary homonym. In accordance with Article 60 of the International Code of Zoological Nomenclature (International Commission on Zoological

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Nomenclature 1999), we propose *Heleomyza* (*Anypotacta*) *gilli* **nom. nov.** (**ZooBank Nomenclature Act:** urn:lsid:zoobank.org:act:57ED5DDB-A4E8-4A78-B43F-64194C1D1783) as a new replacement name for *Anypotacta czernyi*, in recognition of the late Gordon D. Gill for his invaluable studies of Nearctic heleomyzid flies.

Key to Nearctic species of *Heleomyza* and similar species of *Scoliocentra*

1. Katepisternum with one strong bristle, often with one or more additional short bristles anteriorly; crossveins of wings without infuscations; dististylus of male reduced, much shorter than basistylus (Fig. 2) . . . . . *Heleomyza,* 2
–. Either katepisternum with two or more strong bristles or crossvein r-m infuscated; dististylus of male as well-developed as basistylus . . . . . *Scoliocentra*, 9
2. Prosternum with two or more pairs of bristles . . . . . subgenus *Heleomyza*, 3
–. Prosternum with a single pair of bristles (females not identifiable beyond this point) . . . . . subgenus *Anypotacta*, 8
3. Anepisternum bare (rarely with a small setula at the posterior margin); abdomen usually orange 4
–. Anepisternum with bristles or setulae (if a single posterior bristle is present, it is strong); abdomen grey or brown 5
4. Basistylus of male hockey stick–shaped, basally straight, and bent about two-fifths down its length from the apex (Fig. 2A); spermathecae of female round, convex at base . . . . . *Heleomyza* (*Heleomyza*) *captiosa* (Gorodkov, 1962)
–. Basistylus of male banana-shaped, curved along its length (Fig. 2B); spermathecae of female mushroom-shaped, concave at base . . . *Heleomyza* (*Heleomyza*) *serrata* (Linnaeus, 1758)
5. Anepisternum with 1–3 bristles in the middle of the posterior margin 6
–. Anepisternum with setulae only, located in areas other than the middle of the posterior margin 7
6. Basistylus of male with spines covering the medial surface; all three spermathecae of female round . . . . . *Heleomyza* (*Heleomyza*) *borealis* (Boheman, 1865) (= *tristissima* Garrett, 1921; *czernyi* Collart, 1933)
–. Basistylus of male with spines restricted to the posterior margin; spermathecae of female not uniform in shape: two spermathecae flattened apically, one round . . . . . *Heleomyza* (*Heleomyza*) *modesta* (Meigen, 1835)
7. Anepisternum covered extensively with setulae . . . . . *Heleomyza* (*Heleomyza*) *pleuralis* (Becker, 1907)
–. Setulae of anepisternum restricted to posteroventral corner . . . . . *Heleomyza* (*Heleomyza*) *genalis* (Coquillett, 1910)
8. Basistylus with two distinct lobes . . . . . *Heleomyza* (*Anypotacta*) *aldrichi* (Garrett, 1921) **comb. nov.**
–. Basistylus single-lobed . . . *Heleomyza* (*Anypotacta*) *gilli* **nom. nov.** (= *czernyi* Gill, 1962)
9. Crossveins hyaline; katepisternum with two or more strong bristles 10
–. At least crossvein r-m infuscated with brown; katepisternum with one strong bristle . . . 11
10. Thorax light brown; anepisternum with several bristles near the posterior margin; first hind tarsomere of male not shorter than second hind tarsomere . . . . . *Scoliocentra* (*Scoliocentra*) *bisetata* (Garrett, 1922) **comb. nov.**
–. Thorax grey; anepisternum bare; first hind tarsomere of male shorter than second hind tarsomere . . . . . *Scoliocentra* (*Leriola*) *latens* (Aldrich, 1896) **comb. nov.**
11. Posterior part of anepisternum and anterior part of anepimeron covered with setulae . . . . . *Scoliocentra* (*Leriola*) *maculipennis* (Becker) (= *difficilis* Gill, 1962)
–. Anepisternum and anepimeron bare . . . . . *Scoliocentra* (*Leriola*) *nebulosa* (Coquillett, 1910) **comb. nov.**

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