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RESEARCH ARTICLE

A new species of *Cenosoma* Wulp, 1890 (Diptera: Tachinidae: Dexiinae) from the Neotropical Region, with an updated host record for its tribe

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Abstract

Cenosoma Wulp, 1890 is a New World genus placed in the tribe Oestrophasiini (Tachinidae: Dexiinae). A new species, C. catiae sp. n., is described from Brazil and Guyana. Descriptions and illustrations of the male and female, and a key for the identification of the four known species of Cenosoma are given. Finally, an updated host record list for Oestrophasiini is given.

Keywords: description, microtype eggs, morphology, Oestrophasiini, taxonomy.

Zusammenfassung

Cenosoma Wulp, 1890 ist eine Gattung aus der Neuen Welt, die zur Tribus Oestrophasiini (Tachinidae: Dexinae) gehört. Eine neue Art dieser Gattung, C. catiae sp. n., wird aus Brasilien und Guyana beschrieben. Die Beschreibungen und Abbildungen des Männchens und Weibchens sowie ein Bestimmungsschlüssel für die vier bekannten Arten von Cenosoma werden aktualisiert, um diese neue Art einzubeziehen. Schließlich wird eine aktualisierte Wirtsliste für die Oestrophasiini vorgelegt.

Introduction

The New World genus Cenosoma Wulp, 1890, with its three species C signiferum Wulp, 1890 (type species), C. thompsoni Guimarães, 1977 and C. sabroskyi Guimarães, 1977, presents a somewhat confusing taxonomic history. Shortly after its original description, it was considered a synonym of the closely resembling genus Oestrophasia Brauer & Bergenstamm, 1889 by Brauer & Bergenstamm (1893), who placed it within the subfamily Oestrophasiinae (= Oestrophasiini, in part). Coquillet (1897) confirmed Brauer & Bergenstamm's (1893) synonymy and further included, among other genera, Euoestrophasia Townsend, 1892 in the synonymic list of Oestrophasia. However, Townsend (1936) maintained Euoestrophasia as valid and placed this genus, along with Oestrophasia, in the Glaurocarini tribe sensu Townsend (Tachininae). A few decades afterwards, GUIMARÃES (1971, 1977) made some fundamental contributions to this group. First, he recognized that Cenosoma, in addition to five other genera, would be best placed in Proseninae (= Dexiinae, in part), and removed from this tribe the genera that currently comprise Glaurocarini, i.e., Glaurocara Thomson and Semisuturia Malloch, 1927 (GUIMARÃES 1971). Later, Guimarães (1977) revised the tribe Oestrophasiini and considered it with just the following four genera: Cenosoma, Jamacaria Curran, 1928, Oestrophasia and Euoestrophasia, removing the monotypic genus Mesembrinormia Townsend, 1931, currently an unplaced genus of Tachininae (O'HARA et al. 2020). In his revision of Cenosoma, GUIMARÃES (1977) conclusively presented the evidence (e.g., female ovipositor with sternite 8 with a piercing structure) that this genus is distinct from others of its tribe, adding a consistent diagnosis to it and describing two new species: C. thompsoni Guimarães, 1977 and C. sabroskyi Guimarães, 1977. Nevertheless, Cenosoma was once again considered a synonym of Oestrophasia, this time by Wood (1987), who did not provide any justification. This new hypothesis was later maintained by O'HARA & WOOD (1998). A few years later, another hypothesis was put forward for this genus: it was considered as a subgenus of Oestrophasia by O'HARA & WOOD (2004), followed by O'HARA et al. (2020). Together with its allied genera, Cenosoma was included in a phylogenetic analysis of Dufouriini by Santis & Nihei (2022), which provided the phylogenetic evidence that Cenosoma is a monophyletic genus within the Oestrophasiini tribe and is indeed a distinct genus from Oestrophasia. Additionally, Oestrophasiini was recovered as a strongly supported clade defined by 19 unambiguous synapomorphies, being sister to Dufouriini with three synapomorphies (Santis & Nihei 2022). Furthermore, *Oestrophasia* is the sister group

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of Cenosoma, Euoestrophasia and Jamacaria (Santis & Nihei 2022, clade 11).

This paper describes and illustrates a new species of *Cenosoma* from Brazil and Guyana, based on male and female specimens. An updated key to the four known species of *Cenosoma* is given based on Guimarães's (1977) revision of the genus. Finally, as host records for the tribe are very scarce, an updated host record list for Oestrophasiini is provided.

Material and methods

The examined material is deposited at the Natural History Museum, London, UK (NHMUK) and Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (MZSP). The new host record for *E. panamensis* Guimarães, 1977 is based on a label pinned together with the specimen. Label data are presented within quotation marks for each label, with forward slashes indicating line breaks and semicolons separating different labels.

To study the adult morphology, dried and pinned specimens were examined under a Leica EZ4 stereomicroscope. The terminology follows Cumming & Wood (2017). The photographs were taken with a Leica DFC420 digital camera coupled to a Leica MZ16 stereomicroscope. The images were obtained through the software LAS V4.1, then stacked in the software Helicon Focus 5.3.14 and edited in Adobe Photoshop CS6 and Adobe Illustrator CS6.

Results

Genus Cenosoma Wulp, 1890

Cenosoma Wulp, 1890a: 44 [in key] (WULP 1890b: 166, description). Type species: Cenosoma signifera Wulp, 1890, by subsequent monotypy of WULP (1890b: 167).

References

Brauer & Bergenstamm (1893: 218, as synonym of Oestrophasia); Couillett (1897: 70, key to species of Oestrophasia, with Cenosoma and Euoestrophasia in synonymy); Townsend (1936: 94, diagnosis of adults and immatures of Glaurocarini, incl. Cenosoma); Townsend (1938: 323, redescription); SABROSKY & ARNAUD (1965: 979, catalogue of Nearctic Diptera); GUIMARÃES (1971: 19, catalogue of Neotropical Tachinidae); MESNIL (1973: 1228, discussion on the classification of Oestrophasia and Cenosoma, whereby these genera should in his opinion be placed in his Old World group Campogastrina [= Dufouriini, in part]); GUIMARÃES (1977: 217, key to Oestrophasiini genera; 222, revision, with description of C. thompsoni and C. sabroskyi); Wood (1987: 1260, as synonym of Oestrophasia); O'HARA & WOOD (1998: 754, 764, synonymy and new combinations of Wood [1987]); O'HARA & WOOD (2004: 40, catalogue of Nearctic Tachinidae; as subgenus of Oestrophasia); Wood & Zumbado (2010: 1391, as synonym of Oestrophasia in key to Central American Tachinidae; 1409, comments about distribution and hosts [as subgenus of Oestrophasia]); O'HARA & Henderson (2020: 54, as subgenus of Oestrophasia; world checklist of tachinid genera); O'HARA et al. (2020: 95, as subgenus of Oestrophasia; checklist of World Tachinidae); Santis & Nihei (2022, phylogenetic hypothesis on Oestrophasinii incl. *Cenosoma*; 32, revalidation of *Cenosoma* as a genus distinct from *Oestrophasia*).

Key to genera of Oestrophasiini

Following the phylogenetic results of Santis & Nihei (2022), *Cenosoma* is regarded as a distinct genus from *Oestrophasia*. In order to differentiate *Cenosoma* from *Oestrophasia* and other oestrophasiiine genera, the following key, modified from Guimarães (1977), is proposed:

- 2 Fronto-orbital plate in both sexes with one or two rows of 5–7 proclinate orbital setae, the outer row diverging in female; vibrissae usually weak, hardly differentiated from subvibrissal setae; microtype eggs with exochorion bearing black pigmentation (see Santis & Nihei 2022, fig. 4B)........

In addition, to further identify *Cenosoma* one can use the key for Tachinidae found in the Manual of Central American Diptera (Wood & Zumbado 2010), where it is keyed as a synonym of *Oestrophasia*. Finally, *Cenosoma* was recovered by Santis & Nihei (2022) as a monophyletic genus bearing three synapomorphies in the female terminalia: sternite 8 elongated (Santis & Nihei 2022, character 172: 2); sternite 10 sharp (Santis & Nihei 2022, character 174: 4); presence of one spiracle (Santis & Nihei

Distribution

2022, character 177: 1).

Canada (Ontario province [New record]); USA (California, Delaware, Louisiana, Georgia, New York, Nevada, New Hampshire, North Carolina, Pennsylvania, Virginia, Florida states); Mexico (Guerrero, Coahuila, Veracruz [New record] states); Cuba (Matanzas province); Costa Rica (Cártago province); Guyana; Brazil (Mato Grosso do Sul [New record], Rio de Janeiro [New record], São Paulo, Paraná [New record] states).

Key to species of Cenosoma Wulp, 1890

[modified from Guimarães (1977)]

- 3 Abdomen shiny black in ground color, yellowish at base; scutum reddish yellow C. sabroskyi Guimarães, 1977

Cenosoma catiae sp. n.

(Figs. 1–6)

Diagnosis

Medium-sized tachinid fly with body yellow with black markings; wings bearing conspicuous maculae; female terminalia ending with a piercer structure visible externally. The new species closely resembles *C. thompsoni* as both have an epimeron entirely yellow, but *C. catiae* **sp. n.** is readily distinguished by bearing greater ampulla brownish, katepisternum black anteriorly, katatergite and anatergite black on posteroventral margin and female terminalia with sternite 8 yellow with a brownish black stripe on lateral margin. In addition, it is easily distinguished from its congeners by bearing the katepisternum black anteriorly, and katatergite and anatergite black on posteroventral margin.

Type material

Holotype Q: "BRASIL: MT: P. N. Chapada dos Guimarães/ Cerrado- Trilha da Pedra, final/ (mirante)/ S15°24′21.8″ W055°50′07.5″/ Malaise 22 / 9.iii. – 18.iv.2012/ Lamas, Nihei & eq. col./ [SISBIOTA CNPq/FAPESP]" "Holótipo" [red label with black borders] (MZSP).

Paratype &: "BRIT.GUIANA:/ Kutari Sources. / Jan.-Feb. 1936. / G.A. Hudson. / B.M. 1936-360." "Parátipo" [green label with black boards]" (NHMUK).

Description

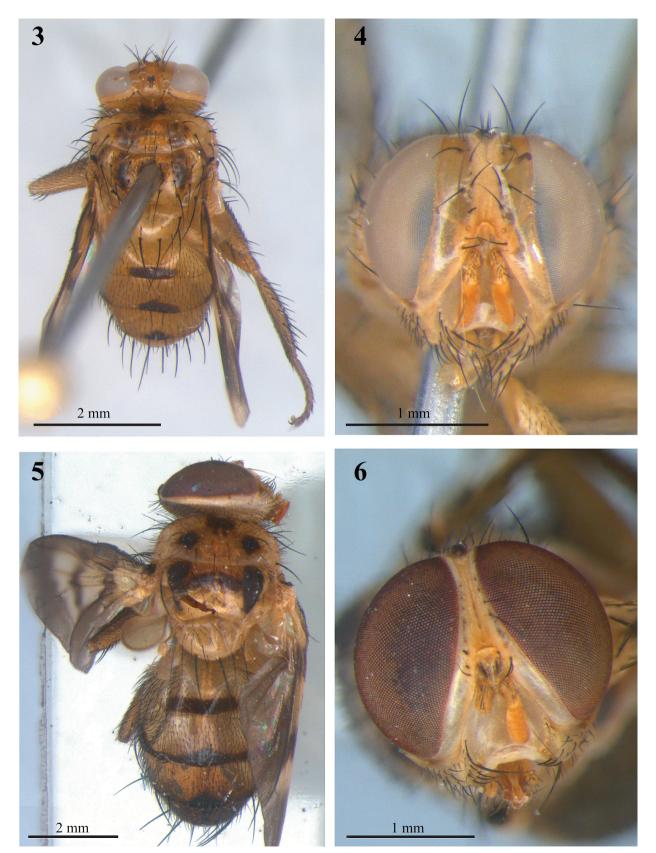
Female (Figs. 1, 3, 4). Body length: 4.67 mm; wing length: 4.78 mm; head height: 1.65 mm; eye height: 1.25 mm.

Coloration. Scape and pedicel yellow. Postpedicel orange. Arista black, but basal 1/4 yellow. Head yellow with ocellar triangle dark brown and median region of occiput with two vertical black bands. Genal groove dark vellow with black setulae. Palpus vellow, labellum orange. Thorax yellow but presutural region with 2 lateroposterior dark brown spots and one anterior black stripe on mid portion; postsutural region with four black vittae, 2 narrow ones on lateral margin (2 median ones in male) and 2 anteromedially. Subscutelum and postnotum black. Katepisternum and anepimeron with anterior region black. Meron black. Anatergite and katatergite yellowish, but with black markings on posteroventral margin. Calypters yellowish (posterior margin brownish). Femora black, tibiae and tarsi brownish black. Halter yellow. Tegula black, basicosta yellow. Wing hyaline with black patterns (Figs. 1, 2). Abdomen yellow but syntergite 1+2 with brownish black band on posterior margin and on mid region, tergites 3 and 4 with the same posterior brown and broad margin extending laterally, tergite 5 with a brownish black triangular spot on the apex and two rounded black spots later-





Figs. 1–2. Cenosoma catiae sp. n., lateral habitus. 1. Holotype female. 2. Male paratype.



Figs. 3-6. Cenosoma catiae sp. n., dorsal habitus and head in frontal view. 3, 4. Holotype female. 5, 6. Male paratype.

oventrally. Sternite 8 yellow with black lateral stripe on each margin.

Head. Somewhat flattened in profile. Dichoptic. Eye bare. Ocellar setae developed, proclinate and diverging, inner vertical setae convergent and outer vertical setae diverging, both well developed. Fronto-orbital plate weekly developed in profile. Parafacial bare and somewhat concave in lateral view. Fronto-orbital plate broad, somewhat larger than the width of the frontal vitta. Frontoorbital plate with 1 reclinate orbital seta and 2 proclinate orbital setae. Postocular setae short, bending forwards. Frons with 8 convergent frontal setae descending to level of scape base. Lunula with small setulae. Arista bare, about twice the length of the antenna. Face and lower facial margin not visible in lateral view. Facial ridge with a row of 4 robust setulae on lower third. Gena height 0.32 mm. Genal dilation scarcely developed and genal groove developed, both covered with setulae. Vibrissae convergent and arising at level of lower facial margin. Prementum and labellum short. Palpus filiform, well developed.

Thorax. Prosternum bare. Proepimeral seta 1. Proepisternal setae 2. Postpronotal lobe with 2 basal setae. Notopleuron with two equal-sized setae. Acrostichal setae 2+3 (last postsutural one strong). Dorsocentral setae 2+3 (last postsutural one longer). Intra-alar setae 1+2. Supra-alar setae 1+2 (first postsutural one longer). Postalar setae 2 (posterior one longer). Scutellum with one (weak) discal, one basal, one lateral, one subapical and one apical pair of setae. Anepimeron setulose. Anepisternal setae with 5 strong setae and with 1 dorsoclinate setula in the upper anterior corner. Katepisternal setae 2 (one anterior and one posterior). Katepimeron with one setula posteriorly. Katatergite and anatergite bare. Posterior spiracle with posterior lappet larger than anterior one.

Wings. Costal spine strong. Base of R vein setulose ventrally, with one seta dorsally and two ventrally. Vein M_1 ending at wing margin close to tip, separately from vein R_{4+5} . Vein R_{4+5} with two setae dorsally and one ventrally. Bend of M slightly slightly rounded.

Legs. Fore femur with rows of posterodorsal and posteroventral setae, fore tibia with 1 inframedian posteroventral seta and preapical setae, 1 dorsal, 1 posterodorsal, 2 ventral and 1 posteroventral setae. Mid femur with 2 supramedian posteroventral, 1 dorsal at apical third and 2 posterodorsal setae; mid tibia with 1 supramedian posterodorsal, 2 inframedian posterodorsal and 1 anterodorsal setae, 1 posterodorsal at distal third and preapicals, 1 ventral, 1 posteroventral and 2 anteroventral setae. Hind femur with a row of anterodorsal setae, 2 supramedian posterodorsal setae, 1 anteroventral seta at apical third, 2 anteroventral setae at apical third and 1 posteroventral seta on middle; mid tibia with a row of 7 posterodorsal setae, 7 rows of setae on anterodorsal (long) margin and 1 preapical seta on anteroventral surface. Pulvilli and tarsal claws

not elongate, about the same length as 5th tarsomere.

Abdomen. Elliptical. Syntergite 1+2 with mid-dorsal longitudinal depression extending halfway to posterior margin. Syntergite 1+2 without setae. Tergite 3 with one lateral marginal and one median marginal pair of setae. Tergites 4 and 5 with a row of marginal setae and several irregular discal setae. Sternites hidden.

[Genitalia not dissected (only holotype available).]

Male (Figs. 2, 5, 6). Differs from the female as follows. Head height: 2 mm. Eye height: 1.7 mm. Holoptic. Ocellar setae lateroclinate; postocellar setae proclinate; inner vertical setae convergent and outer vertical setae divergent, of the same length. Fronto-orbital plate very narrow, about 1/3 of the frontal vitta. Postsutural region of thorax with four black vittae, 2 narrow ones on median margin. Scutellum with one (weak) discal, one basal, one lateral, one subapical and one apical pair of setae. Pulvilli and tarsal claws elongate, longer than 5th tarsomere. Postabdomen yellow. [Genitalia: not dissected (only paratype available).]

Type locality Brazil, Mato Grosso, Chapada dos Guimarães.

Distribution

Guyana (Kutari Sources, easternmost district of Acarai Mountains) and Brazil (Mato Grosso).

Note

The male and female were associated by following clues typical for the tribe. The black markings on the thorax are of high specific value, as many valid species of Oestrophasiini are diagnosed through these (e.g., Guimarāes 1977). The thorax of both sexes of *Cenosoma catiae* sp. n. bears an epimerum and katepisternum black anteriorly, greater ampulla brownish and katatergite and anatergite black on posteroventral margin. These characters are sufficiently relevant to regard both specimens as belonging to the same species.

Etymology

The specific name is a homage to Dr. CATIA ANTUNES DE MELLO-PATIU, formerly from the Departamento de Entomologia (Entomology Department) of the Museu Nacional, Universidade Federal do Rio de Janeiro, who sadly recently passed away (24.xi.2021), for her great contribution to the knowledge of Neotropical Diptera, particularly of the Sarcophagidae family and forensic entomology.

CÁTIA ANTUNES DE MELLO-PATIU was a remarkable Brazilian entomologist, who dedicated her life to the study of the taxonomy, systematics, morphology, phylogeny and biology of the dipteran families Sarcophagidae and Conopidae and also to forensic entomology. A globally recognized professional, she made a significant scientific contribution, including numerous papers, books, book chapters and various presentations at national and international conferences. Cátia was born in August 1958 and passed away on November 24th, 2021, leaving a lasting legacy, not only in the scientific community but also in the lives of

all those who had the opportunity to have known her and spent time with her, experiencing her joyful presence. Besides being an excellent and competent professional, Cátia was a great person. Generous, friendly, smiling, good-humored, conciliatory, always looking ahead, in addition to being an excellent daughter, wife and mother. Dr. CATIA PATIU joined the Museu Nacional in August 1997, fulfilling her lifelong dream of working in this institution. Before becoming a professional, she was a student of the renowned experts in Sarcophagidae Dr. Hugo de Souza LOPES (Instituto Oswaldo Cruz, IOC) and Dr. RITA TIBANA (Museu Nacional/Universidade Federal do Rio de Janeiro). She was a committed and inspiring educator and mentor, guiding students at all levels of education, always devoted to their wellbeing. She also had a deep love for fieldwork and the field expeditions in the company of her husband, a biologist by choice, were always very enjoyable. She showed a remarkable dedication to the daily care and organization of the scientific collection of insects at the Museo National and following the tragic fire in 2018, she worked tirelessly to recover the entomological collection, demonstrating her unwavering commitment to preserving its invaluable scientific resources. We said goodbye to her with deep sadness, regretting the loss of her presence in our daily work and in the joyful gatherings with colleagues, friends and family. She left two sons and a granddaughter.

Taxonomic remarks

Cenosoma and Oestrophasia, in addition to Euoestrophasia and Jamacaria, are poorly represented in museum collections, and some species are known only from the type material, e.g., E. guatemalensis Guimarães, 1977 and E. portoriquensis Guimarães, 1977. Also, the species described in the present work is recorded from a single male and female from Guyana and Mato Grasso, Chapada dos Guimarães (Brazil), respectively. The male from Guyana is from Kutari Sources in the easternmost district of

the Acarai Mountains (FRATELLO et al. 2015), one of the four mountain ranges in Guyana that lies along the border shared with Brazil (ALONSO et al. 2008). As this area is poorly explored and presents a unique range of habitats from non-flooded forest to mountain streams, it probably is home to various endemic and undescribed species. Additionally, the distance from Chapada dos Guimarães to the Acarai Mountains is about 1,933 km, and no information about this species is available within this range, as is the case for other species of *Cenosoma* and even other genera of the tribe. Hence, this outline provides compelling evidence that more collecting efforts should be made in order to make this peculiar and interesting group better known. The present work, with the description of a new species, represents an advance in this direction, but we predict that new species of Oestrophasiini will be found in the north of Brazil, mainly in the Amazon Forest. We reached this conclusion by noting that there are various species (mainly of Euoestrophasia) that are distributed from the Central America (Guatemala, Porto Rico, Panama, Jamaica) through southern Brazil (Minas Gerais, Rio de Janeiro, São Paulo, Santa Catarina) to Argentina (Buenos Aires) and Uruguay (Montevideo) (GUIMARÃES 1977); yet, no species or distributional records are known from the Amazon and most of the central region of Brazil.

Host-parasite list of the tribe Oestrophasiini

The host records of members of Oestrophasiini are known from isolated papers. When Guimarães (1977) revised this tribe, only two records were available, for *Cenosoma signiferum* and *Euoestrophasia aperta* (Brauer

Table 1. Summary of known host records for Oestrophasiini

Oestrophasiini species	Coleoptera host	Distribution	References
Cenosoma sp.	Pachnaeus litus (Germar, 1824) (Curculionidae)	Neotropical (Cuba)	Grillo & Alvarez (1984)
	Amphidees latifrons (Sharp, 1891) (Curculionidae)	Neotropical (Mexico)	Velázquez et al. (2002)
	Amphidees macer Sharp, 1891 (Curculionidae)	Neotropical (Mexico)	Velázquez et al. (2002)
Cenosoma signiferum Wulp, 1890	Colaspis pini Barber, 1937 (Chrysomelidae)	Nearctic (USA)	Guimarães (1971, 1977)
Cenosoma sabroskyi Guima- rães, 1977	Artipus floridanus Horn, 1876 (Curculionidae)	Nearctic (USA)	Kovarik & Reitz (2005)
Euoestrophasia aperta (Brauer & Bergenstamm, 1889)	Listroderes costirostris Schoenherr, 1826 (Curculionidae)	Nearctic (USA)	Parker et al. (1950)
Euoestrophasia panamensis Guimarães, 1977	Undetermined species of Eumolpinae (Chrysomelidae)	Neotropical (Brazil)	Neotropical (Brazil)
Oestrophasia clausa Brauer & Bergenstamm, 1889	Diplotaxis moerens Leconte, 1856 (Scarabaeidae)	Nearctic (USA)	Spangler & Burger (1999)

& Bergenstamm, 1889). An update of the host records is relevant, as all taxa of Oestrophasiini with known biology infect adult Coleoptera, like its two allied tribes Dufouriini and Freareini (SANTIS & NIHEI 2022); this is uncommon for dexiines and for tachinids overall. In addition, the species of this tribe reproduce though microtype eggs, as argued and summarized by SANTIS & NIHEI (2022): small eggs containing the fully developed first instar larva are deposited on leaves to be accidentally eaten by the phytophagous host (THOMPSON 1963). This characteristic is one of the synapomorphies of Oestrophasiini (Santis & Nihei 2022, character 1:2). Since Guimarães's (1977) work, recent records were available from the literature in addition to those newly presented herein (see Table 1). All records are from the coleopteran families Chrysomelidae, Curculionidae and Scarabaeidae.

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