

# Definition of Rhiniidae Family (Insect: Diptera).

Carlos Henrique Marchiori<sup>1</sup>

<sup>1</sup> Instituto Federal Goiano

**Potential competing interests:** No potential competing interests to declare.

**Co-authors:** Marco Vinícios de Oliveira Santana<sup>2</sup> and Klebert de Paula Malheiros<sup>3</sup>.

<sup>1-2</sup>Instituto Marco Santana, Goiânia, Goiás, Brazil.

The Rhiniidae belong to the higher Diptera suborder Brachycera, division Calyptratae, superfamily Oestroidea. Traditionally, it has been divided into two subfamilies, Cosmininae and Rhiniinae. This classification has been controversial and even considered unnecessary by several authors. Recent molecular evidence based on sequences of ultraconserved DNA elements has allowed the identification of three major clades within the Rhiniidae, where monophyly is supported for the subfamily Rhiniinae, while Comininae, a priori, is a paraphyletic group (Figure 1) [1-3].

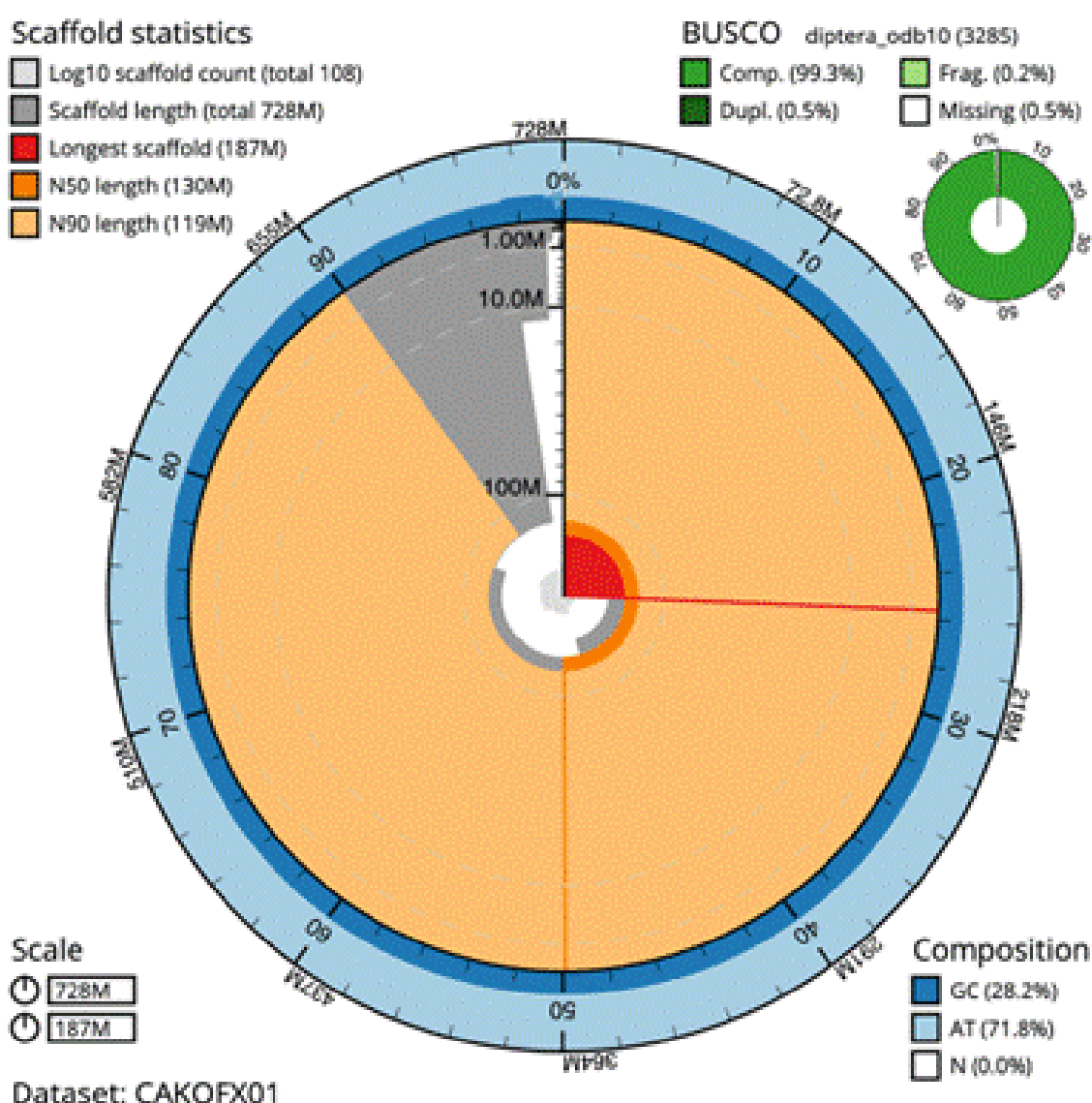


**Figure 1.** The fly *Stomorhina lunata* (Fabricius, 1805), is now in the family Rhiniidae. Source: Photo Olga Sivell and <https://www.brc.ac.uk/article/news-recording-schemes>.

In the Afrotropical region, the traditional subfamily Cosmininae is made up of around 150 species described in 12 genera, being the most diverse subfamily of Rhiniidae in the region. For its part, the Rhiniinae subfamily is composed of around 20 species in four genera. The family of Diptera Rhiniidae (Diptera: Oestroidea) is distributed mainly in tropical and subtropical areas of the Afrotropical, Australian, Eastern, and Palearctic regions. Traditionally it was considered with the

rank taxonomic subfamily of the family Calliphoridae. However, recent phylogenetic studies, based on the analysis of morphological and molecular characters, show that Calliphoridae is not a monophyletic group [3-7]

Usually, the Rhiniidae are characterized by having a narrow and elongated body between 4 to 15 mm in length; a very striking color pattern, from metallic and shiny green-blue-black, to dull brown or yellowish, with wings arranged in the form of a canopy over the body. The taxonomic characters of the family are elongation of the lower facial margin; bare, pectinate or feathered antenna; the dorsal edge of the occiput adjacent to the postocular bristles naked and shiny, devoid of preciousness; dorsal chaetotaxy of the thorax and abdomen generally reduced; two notopleural setae and two katepisternal setae; bubble on non-hairy wing; wing setulose vein remigius; and shield-shaped second sternites, with their lateral edges above the corresponding tergite, the remainder of the sternites (Figure 2) [8-10].



**Figure 2.** Genome assembly of *Stomorphina lunata* (Fabricius, 1805), idStoLuna1.1: metrics. Sources: <https://wellcomeopenresearch.org/articles/8-330> and (<https://doi.org/10.12688/wellcomeopenres.19532.1>).

There is very little information on the diversity, biology, and geographic distribution of the Rhiniidae family. The biological cycle and in particular the habits and larval morphology are unknown for most of the species. Most of the knowledge is limited to a few species restricted to very specific geographical enclaves. In general, it is known that they have a strong ecological association with natural environments, that adults frequent flowers for which they are believed to be important pollinators, and that some species seem to have a close relationship with termites. About Rhiniidae in the Afrotropical region, for which the knowledge of the group is outdated. Furthermore, their morphological identification, in many cases, depends exclusively on the male terminalia and therefore many female specimens remain unidentified or inadequately identified [11-15].

In general, the biology, immature stages, and habits of most Rhiniidae species are poorly understood. The family is known to be associated with wild and rural environments and is believed to have diverse ecological associations. Others have a close relationship with termite mounds and anthills, but the nature of this relationship is not known fully. It has been suggested that the larvae of Rhiniidae behave as parasitoids, predators, or scavengers within termite nests. Adults can often be seen on flowers where they feed on pollen and nectar. The larvae are predators of grasshopper eggs. The family is associated with wild and rural environments and is believed to have diverse ecological associations. The females of some species are attracted to or deposit their eggs in soils rich in the organic matter around elephant or cow dung; others on the ootheca of grasshoppers or inside the burrows of the African anteater ((Table 1) [11-15].

**Table 1. Countries with several species on the way (Countries/Species)**

South Africa	899	Indonesia	9	Tanzania	4
Pakistan	270	Gabon	9	China	3
Australia	107	Ethiopia	8	Sri Lanka	3
Kenya	62	Madagascar	8	Netherlands	2
Bangladesh	37	Vietnam	6	Cameroon	2
Malaysia	27	India	5	Uganda	1
Costa Rica	20	Portugal	4		

**Source:** [http://v3.boldsystems.org/index.php/Taxbrowser\\_Taxonpage?taxid=349573](http://v3.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxid=349573)

*Stomorhina lunata* (Fabricius, 1805) (Diptera: Rhiniidae)

*Stomorhina lunata* has long been recognized as an important predator of locust eggs in many parts of Africa, but there has been little work on its biology or its importance in natural locust control. Fieldwork on *S. lunata* as a predator of eggs of the desert locust, *Schistocerca gregaria* Forskål, 1775 (Orthoptera: Acrididae), was carried out in East Africa.

The life history, from oviposition to dispersal of the resulting adults, is described, and typical observations that suggest the importance of smell in locating hosts and inducing oviposition are described and discussed. The feeding method of the larvae is such that an infested grasshopper egg is usually prevented from hatching [16].

## References

- [1] Thomas A. Rhiniidae (Diptera: Oestroidea) diversity in South Africa. Taxonomic review and phylogenetic advances for the Afrotropical region [Ph.D. dissertation]. Alicante, Universidad de Alicante; 2020.
- [2] Ramos A. 1st ed. Madrid: National Museum of Natural Sciences (CSIC). 2021.
- [3] Cerretti P, Stireman JO, Badano. Reclustering the cluster flies (Diptera: Oestroidea, Polleniidae). *Systematic Entomology*. 2019; 44: 957–972.
- [4] Sivell O. Blow flies (Diptera: Calliphoridae, Polleniidae, Rhiniidae). *Handbook Identify of Bristol Institute*. 2021; 10(16): 1–208.
- [5] Kirk-Spriggs AH, Stuckenberg BR. Afrotropical Diptera - rich savannas, poor rainforest. In: Bickel D, Pape T, Meier R, eds. *Diptera diversity: status. challenges and tools*. 1st ed. Leiden: Brill Academic Publishers; 2009. p. 155–196.
- [6] Tinaut A, Cortés SPJ, Aguayo BD, Ruano DF, Tierno FJM. Checklist of the arthropod fauna of the Sierra Nevada Mountain range (Almería and Granada, Spain). 1st ed. Granada: University of Granada. 2021.
- [7] Verves YG. A catalog of Oriental Calliphoridae (Diptera). *International Journal of Dipterological Research*. 2005; 16: 233–310.
- [8] Cerretti P, Stireman JO, Pape T. First fossil of an oestroid fly (Diptera: Calyptratae: Oestroidea) and the dating of oestroid divergences. *Plo Sone*. 2017; 12: 1–24.
- [9] Arce BJ, Clout S, Pat DL, Bharti M, Pape T, Marshall SA. Viviparity and oviparity in termitophilous Rhiniidae (Diptera: Oestroidea) in the Western Ghats, India. *Oriental Insects*. 2019; 1: 1–6.
- [10] Pohjoismäki J, Kahanpää J. Checklist of the superfamilies Oestroidea and Hippoboscoidea of Finland (Insecta, Diptera). *ZooKeys*. 2014; 441: 383–408.
- [11] Pape T, Blagoderov V, Mostovski MB. Order Diptera Linnaeus, 1758. *Zootaxa*. 2011; 3148: 222–229.
- [12] Ferrar P, El-Hawagry MS, El-Azab SA. Catalog of the Calliphoridae, Rhiniidae, and Sarcophagidae of Egypt (Diptera: Oestroidea). El-Hawagry MS, El-Azab SA. Catalog of the Calliphoridae, Rhiniidae, and Sarcophagidae of Egypt (Diptera: Oestroidea). *Egyptian Journal of Biological Pest Control*. 2019; 29(1): 1-1.
- [13] Kutty SN, Meusemann K, Bayless KM, et al. Phylogenomic analysis of Calyptratae: Resolving the phylogenetic relationships within a major radiation of Diptera. *Cladistics*. 2019; 35: 605–622.
- [14] El-Hawagry MS, El-Azab SA. Catalog of the Calliphoridae, Rhiniidae, and Sarcophagidae of Egypt (Diptera: Oestroidea). *Egyptian Journal of Biological Pest Control*. 2019; 29: 15.
- [15] Buenaventura B, Michael WL, López JMP, Vanessa L, Thomas-Cabianca GA, Dikow T. Protein-encoding ultra-

conserved elements provide a new phylogenomic perspective of Oestroidea flies (Diptera: Calyptratae). *Systematic Entomology*. 2020; 46(1): 5-27.

[6] Greathea DJ. The biology of *Stomorhina lunata* (Fabricius) (Diptera: Calliphoridae), predator of the eggs of Acrididae. *Journal of Zoology*. 2009; 139(1):139 – 180.