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Scientific Note

The first record of *Sarcophaga ruficornis* Fabricius, 1794 (Diptera: Sarcophagidae) from Egypt: flesh flies of medical interest

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Abstract. In this study, *Sarcophaga ruficornis* Fabricius, 1794 (Diptera: Sarcophagidae) is recorded for the first time from the Egyptian fauna. The identification was confirmed using integrative approach of morphology and molecular technique.

Keywords: Taxonomy, identification, Molecular, fauna, DNA barcoding.

The genus *Sarcophaga* Meigen, 1826 (Diptera: Sarcophagidae), is distributed globally, especially in the Old World. Currently, it comprises about 169 subgenera and 890 valid species (Buenaventura et al. 2017; Ramos et al. 2022). In Egypt, genus *Sarcophaga* was represented by 27 species depending on the morphology of male genetalia (El-Ahmady et al. 2018).

Sarcophaga ruficornis Fabricius, 1794 (Fig. 1) is a medically important species either in viewpoint of forensic entomology or myiasis. It breeds in cadaver and excrement and has been collected at decomposed carrion of fish, chicken and rabbit (Hanan 2010; Suwannayod et al. 2013). It is distributed throughout the world.

Currently, DNA barcoding is important as a rapid tool used to evaluate species identification in consort with the traditional taxonomy (Hebert et al. 2003; Weigand et al. 2019; Japoshvili et al. 2020). It is dynamically used in species-level identification of many organisms, including forensic species (Chen et al. 2004; Guo et al. 2011).

The flies in this work were collected from Abbassyia (Fig. 2), Cairo, Egypt (N 30° 3' 1.152", E 31° 14' 38.1768") by using bait traps. A total of 20 specimens were collected in the years (2022-2023) at 15 July and 28 April respectively. The collected specimens were mounted and deposited in Ain Shams University Collection (ASUC). The flies were dissected and the male genetalia were examined and identified according to Sharma et al. (2017) and Suwannayod et al. (2013).

Morphologically identified *Sarcophaga* flies were subjected to molecular identification, in which the COI gene was targeted and amplified using universal primers LCO1490/HCO2198 (LCO1490 5'-GGTCAACAAATCATAAAGATATTGG-3'; HCO2198 5'-TAAACTTCAGGGTGACCAAAAAATCA-3') (Folmer et al. 1994; Hebert et al. 2003). Genomic DNA was extracted from adult flies' thoracic muscles, legs, and wings (Aly et al. 2013), using the DNeasy Blood and Tissue kit (Germany) according to the manufacturer's instructions and stored at -20°C until further use. The COI gene was amplified. The amplified product was analyzed on a 1% agarose gel electrophoresis. The PCR product was purified and sent for sequencing. Direct sequencing of the forward and reverse strands was performed on each template using an ABI 3730xl sequencer (Applied Biosystems). The sequences were then tested for homology against the BLAST tool (Basic Local Alignment Search Tool) from NCBI (http://blast.ncbi.nlm.nih.gov/Blast.cgi), and species were identified based on the COI locus by BOLD analysis (http://www.boldsystems.org/index.php/IDS_OpenIdEngine).

In the present study, the identification of the fly species based on morphology was confirmed by DNA barcoding to prove its correct identity. DNA sequencing was performed, and the consensus sequences were used for comparison to public databases of DNA sequences.

The barcoding of the COI gene of *S. ruficornis* yielded an amplified fragment of a 817 bp sequence which has been submitted to GenBank, and accession numbers were obtained as OQ077960 and OQ077961 for the female and male, respectively.

Sarcophaga ruficornis is distributed in Afrotropical, Australasian, Nearctic, Neotropical, Oriental and Palaearctic regions (Sharma et al. 2017). The first record of *S. ruficornis* from Egypt is an addition to the flesh flies fauna which are species important in crime investigation and a tool in determining postmortem intervals.

Figure 1. Dorsal view of *S. ruficornis*.

Figure 2. Geographic distribution of *S. ruficornis* in Egypt. The red circle represents the site where the flies were collected (Abbassyia).

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Authors' Contributions

R.H. collected the specimens; G.M.M.A. mounted and identified the material and E.H.G. performed the molecular identification. All authors wrote the manuscript, discussed the results, and contributed to its final version.

Conflict of Interest Statement

The authors declare no conflict of interest.

References

Aly, S.M.; Wen, J.; Wang, X. (2013) Identification of forensically important Sarcophagidae (Diptera) based on partial mitochondrial cytochrome oxidase I and II genes. *The American Journal of Forensic Medicine and Pathology,* 34(2): 159-163. doi: 10.1097/PAF.0b013e31828c390e

Buenaventura, E.; Whitmore, D.; Pape T. (2017) Molecular phylogeny of the hyperdiverse genus *Sarcophaga* (Diptera: Sarcophagidae), and comparison between algorithms for identification of rogue taxa. *Cladistics*, 33 (2): 109-133. doi: 10.1111/cla.12161

Chen, C. J.; Toh, S. C.; Wan, M. F. (2004) The theoretical framework for designing desktop virtual reality based learning environments. *Journal of Interactive Learning Research*, 15(2): 147-167.

El-Ahmady, A.; Taha, M.; Soliman, A. M.; El-Hawagry, M. (2018) A new species and new records of the genus *Sarcophaga* from Egypt, with a key to the known Egyptian species (Diptera: Sarcophagidae). *African Entomol*ogy, 26(2): 507-521. doi: 10.4001/003.026.0507

Folmer, O.; Black, M.; Hoeh, W.; Lutz, R.; Vrijenhoek, R. (1994) DNA primers for amplification of mitochondrial Cytochrome C oxidase subunit I from diverse metazoan invertebrates. *Molecular Marine Biology and Biotechnology*, 3(5): 294-299.

Guo, Y.; Cai, J.; Chang, Y.; Li, X.; Liu, Q.; Wang, X.; Wang, X.; Zhong, M.; Wen, J.; Wang, J. (2011) Identification of forensically important sarcophagid flies (Diptera: Sarcophagidae) in China, based on COI and 16S rDNA gene sequences. *Journal of Forensic Science*, 56(6): 1534-1540. doi: 10.1111/j.1556-4029.2011.01882.x

Hanan, A. M. B. (2010) Prevalence of dipterous flies with veterinary importance in selected sheep's farms and slaughter houses in Jazan, Saudi Arabia. *Egyptian Academic Journal of Biological Sciences*, 3(2): 63-73. doi: 10.21608/eajbsa.2010.15190

Hebert, P. D. N.; Cywinska, A.; Ball, S. L.; DeWaard, J. R. (2003) Biological identifications through DNA barcodes. *Proceedings of the Royal Society of London, Series B: Biological Sciences*, 270 (1512): 313-321. doi: 10.1098/rspb.2002.2218

Japoshvili, B.; Lipinskaya, T.; Gajduchenko, H.; Sinchuk, A.; Bikashvili, A.; Mumladze, L. (2020) First DNA-based Records of New Alien Freshwater Species in the Republic of Georgia. *Acta Zoologica Bulgarica*, 72 (4): 545-55. https://www.acta-zoologica-bulgarica.eu/00SIO_1_13

Ramos, R. L.; Trindade-Santos, M. E.; Pamponet, F. M.; Lopes, D. S.; de Mello-Patiu, C. A.; de Oliveira F. F. (2022) New records of *Sarcophaga* Meigen (Diptera: Sarcophagidae: Sarcophaginae) for the Northeast region of Brazil. *Scientia Plena*, 18(9): 098001. doi: 10.14808/sci.plena.2022.098001

Sharma, M.; Singh, P.; Singh, D. (2017) Morphological studies on *Parasarcophaga albiceps*, *Parasarcophaga macroauriculata* and *Parasarcophaga ruficornis* (Diptera: Sarcophagidae) of Indian origin. *International Journal of Fauna and Biological Studies*. 4(4): 155-161.

Suwannayod, S.; Sanit, S.; Sukontason, K.; Sukontason, K.L (2013) *Parasarcophaga (Liopygia) ruficornis* (Diptera: Sarcophagidae): A flesh fly species of medical importance. *Tropical Biomedicine*, 30(2): 174-180.

Weigand, H.; Beermann, A. J.; Čiampor, F.; Costa, F. O.; Csabai, Z.; Duarte, S.; Geiger, M.F.; Grabowski, M.; Rimet, F.; Rulik, B.; et al. (2019) DNA barcode reference libraries for the monitoring of aquatic biota in Europe: Gap-analysis and recommendations for future work. *Science of the Total Environment*, 678: 499-524. doi: 10.1016/j.scitotenv.2019.04.247