

First land snail records from Gebel Elba in southeastern Egypt—at the border between the Palaeartic and Ethiopian regions

Reham Fathey Ali¹ & Bernhard Hausdorf^{2,3}

¹Cairo University, Faculty of Agriculture, Department of Zoology and Agricultural Nematology, Giza, Egypt

²University of Hamburg, Center of Natural History, Zoological Museum, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

³Corresponding author. E-mail: hausdorf@zoologie.uni-hamburg.de

Abstract: A first land snail survey in the Gebel Elba massif in southeastern Egypt revealed the occurrence of just two taxa, *Pupoides coenopictus* and a second pupilloid species, probably a *Truncatellina* species.

Key words: Mollusca; Gastropoda; Gebel Elba; Egypt; *Pupoides*; *Truncatellina*

INTRODUCTION

Gebel Elba is an igneous massif in southeastern Egypt, near the boundary with Sudan and approximately 20 km west of the Red Sea. This region is of special biogeographic interest because it is close to the border of the Palaeartic and Ethiopian regions and the proportion of Palaeartic and Ethiopian elements in this area has yet to be determined. The Gebel Elba massif and the area around it were declared a nature reserve in 1986 as Gebel Elba National Park. The climatic conditions in Gebel Elba are unique because the peaks, which rise to a maximum elevation of 1435 m, act as dew traps, where moist air from the Red Sea condenses and creates a “mist oasis”. The moisture enables the existence of a diverse flora with 458 plant species

(KASSAS & ZAHARAN 1971; ABD EL-GHANI & ABDEL-KHALIK 2006; AL-GOHARY 2008). Gebel Elba also supports a rich fauna including 36 reptile and amphibian species (BAHA EL DIN 2006), 36 breeding bird species (MEININGER & GOODMAN 1996), and 26 mammal species (BASUONY et al. 2010). Unfortunately, little is known about the invertebrate fauna of this region. Among others, 28 arachnid species (EL-HENNAWY 2007), 13 neuropteran species (EL-HAMOULY & FADL 2011), 30 butterfly species (GILBERT & ZALAT 2007; EL-GABBAS & GILBERT 2016), and 244 coleopteran species (including the Red Sea coastal region; FADL & HASSAN 1997) have been recorded. Until now, nothing was known about the occurrence of terrestrial molluscs on Gebel Elba.

MATERIALS AND METHODS

As a first contribution to the investigation of the terrestrial mollusc fauna, one of us (RFA) visited Gebel Elba on 4–5 December 2015 and studied 15 sites in valleys on the northern slopes of the mountains (Figures 1–2; Table 1). The coordinates (datum WGS 84) of the sites were determined with a GPS receiver. At each site snails were

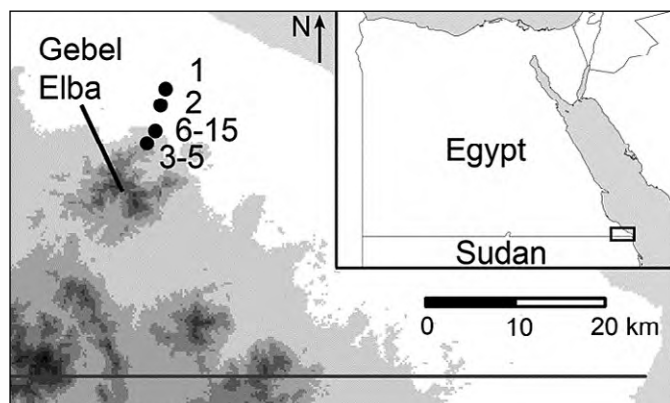


Figure 1. Sampling sites in the Gebel Elba region, Egypt.



Figure 2. Small wadi on the northern slopes of Gebel Elba.

Table 1. Sampling sites in the Gebel Elba region. Sites 1–2 are in Wadi Aideib and Sites 3–15 are in a small northwest-facing side valley. The unribbed shell fragments most probably belong to *Pupoides coenopictus*. ZMH: Zoological Museum of the University of Hamburg.

Site	Latitude (°N)	Longitude (°E)	Elevation (m)	<i>Pupoides coenopictus</i>	Unribbed shell fragments	<i>Truncatellina</i> (?) sp.
1	22.2835	36.3959	110	–	–	–
2	22.2674	36.3910	130	ZMH 119344	–	–
3	22.2297	36.3767	350	–	–	–
4	22.2297	36.3761	370	ZMH 119342	–	–
5	22.2298	36.3767	350	–	–	–
6	22.2443	36.3874	190	–	–	–
7	22.2409	36.3857	200	–	–	–
8	22.2405	36.3858	200	–	–	–
9	22.2402	36.3856	210	–	–	–
10	22.2404	36.3850	210	ZMH 119343	–	–
11	22.2416	36.3845	230	–	–	–
12	22.2395	36.3839	210	–	+	–
13	22.2388	36.3834	220	–	–	–
14	22.2385	36.3833	220	–	+	–
15	22.2390	36.3830	220	ZMH 119340	–	ZMH 119341

searched for ca. 30 min (0.5 person-hour) and a litter and soil sample (1–2 L) was taken. These samples were sieved and sorted in the laboratory. Identifications were made utilizing PILSBRY (1921) and SEDDON (1992). All material was deposited in the Zoological Museum of the University of Hamburg, Germany (Table 1).

RESULTS

No large snails were detected in the field. Only two species were found, both from the litter/soil samples (Table 1).

Family Pupillidae

Pupoides coenopictus (Hutton, 1834)

Figure 3

Pupa coenopicta HUTTON 1834: 85, 93.

Pupa sennaariensis L. PFEIFFER 1856: 177.

Leucochiloides sennaaricus [sic] — PALLARY 1909: 41, pl. 3 fig. 12.

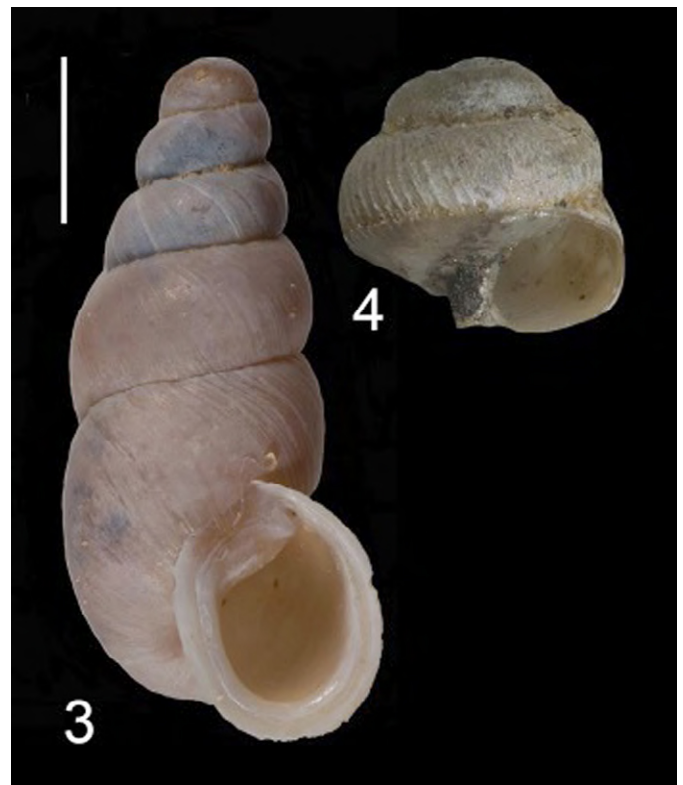
Pupoides coenopictus — PILSBRY 1921: 123, pl. 13 figs 1–3; SCHILEYKO 1984: 194, fig. 113; SEDDON 1992: 151, fig.; NEUBERT 1998: 364, figs 41–48, 53; VERDCOURT 2006: 16; RAMZY 2009: 14, map 1, pl. 1, fig. A, pl. 2.

Pupoides sennaariensis — PILSBRY 1921: 131, pl. 14, figs 1–2.

Pupoides coenopictus sennaariensis — VERDCOURT 2006: 16.

Diagnosis. Shell small (3.3 to 6 mm high), elongate conical-oval, finely striated, brownish, with a strongly thickened, anteriorly flat peristome, aperture toothless except for an angular tubercle, which is separated from the insertion of the peristome.

Pupoides coenopictus is the only species of the genus occurring in northern Africa. It was found at four of the 15 sites, although unribbed shell fragments that most probably are also this species, were recovered from samples taken from two additional sites (Table 1). Most of the shells were empty, but two specimens were collected alive.



Figures 3–4. Shells of snails from Gebel Elba. **3.** *Pupoides coenopictus* (Hutton, 1834), Wadi Aideib, 22.2674° N, 36.3910° E (ZMH 119344). **4.** *Truncatellina* (?) sp., Gebel Elba, 22.2390° N, 36.3830° E (ZMH 119341). Scale bar = 1 mm for Figure 3 and 0.5 mm for Figure 4.

Family Truncatellinidae

Truncatellina (?) sp.

Figure 4

One apical fragment of a ribbed pupilloid species was found (Table 1), which agrees with *Truncatellina* Lowe, 1852 with regard to size, form and sculpture.

DISCUSSION

Pupoides coenopictus is widespread in arid regions from the Cape Verde Islands in the west through northern and eastern Africa, the Middle East to Afghanistan, Tajikistan, Pakistan, India, and Sri Lanka (PILSBRY 1921; SCHILEYKO 1984; SEDDON 1992; VERDCOURT 2006). In Egypt the species has been recorded from Al Matariyah (Dakahlia governorate), Cairo, and Wadi Hawf near Helwan (Cairo governorate) in northern Egypt by PALLARY (1909) and from Sidfa and Abo-Tij (Asyut governorate) by RAMZY (2009). It is probably widespread in Egypt.

Truncatellina is widespread throughout both the Palearctic and the Ethiopian region. However, it has not been recorded from Egypt previously. The geographically closest occurrences of *Truncatellina* species are known from Eritrea, Saudi Arabia, and Israel (PILSBRY 1920–1921; HELLER 2009; HAUSDORF & WRONSKI 2011).

Although the discovery of *Pupoides coenopictus* and *Truncatellina* sp. in Gebel Elba is not surprising from a biogeographical perspective, it is the first evidence that the climatic conditions allow the existence of terrestrial snails in Gebel Elba. This raises hope that additional, ecologically more demanding snail species might be found in the moister zone at higher elevations of Gebel Elba analogous to the richer snail fauna that has been found at higher elevations of the escarpment of the mountains bordering the opposite coast of the Red Sea in Arabia (NEUBERT 1998; HAUSDORF & WRONSKI 2011).

ACKNOWLEDGEMENTS

We are grateful to F. Walther (Hamburg) for generating the map.

LITERATURE CITED

- ABD EL-GHANI, M.M. & K.N. ABDEL-KHALIK. 2006. Floristic diversity and phytogeography of the Gebel Elba National Park, south-east Egypt. *Turkish Journal of Botany* 30: 121–136. <http://journals.tubitak.gov.tr/botany/issues/bot-06-30-2/bot-30-2-6-0505-7.pdf>
- AL-GOHARY, I.H. 2008. Floristic composition of eleven wadis in Gebel Elba, Egypt. *International Journal of Agriculture & Biology* 10: 151–160.
- BAHA EL DIN, S. 2006. A guide to the reptiles and amphibians of Egypt. Cairo: The American University in Cairo Press. 382 pp.
- BASUONY, M.I., F. GILBERT & S. ZALAT. 2010. Mammals of Egypt. Atlas, Red Data listing and conservation. Cairo: Ministry of State for Environmental Affairs. viii + 275 pp.
- EL-GABBAS, A. & F. GILBERT. 2016. The Desert Beauty *Calopieris eulimene*: a butterfly new to Egypt (Insecta: Lepidoptera). *Zoology in the Middle East* 62: 279–281. [10.1080/09397140.2016.1202984](https://doi.org/10.1080/09397140.2016.1202984)
- EL-HAMOULY, H. & H.H. FADL. 2011. Checklist of order Neuroptera in Egypt, with a key to families. *African Journal of Biological Sciences* 7: 85–104. [http://www.aasd.byethost13.com/Volumes/aasdj7\(1\)2011/85-104.Hiam.pdf](http://www.aasd.byethost13.com/Volumes/aasdj7(1)2011/85-104.Hiam.pdf)

- EL-HENNAWY, H.K. 2007. Arachnids of Elba protected area in the southern part of the eastern desert of Egypt. *Revista Ibérica de Aracnología* 15: 115–121. http://www.sea-entomologia.org/gia/pdf/ECA_23/eca23-115-121.pdf
- FADL, H.H. & M.M. HASSAN. 1997. The coleopterous insect fauna of Gabal Elba and the Red Sea coast. *Bulletin of the Entomological Society of Egypt* 75: 82–93.
- GILBERT, F. & S. ZALAT. 2007. Butterflies of Egypt. Atlas, Red Data listing and conservation. Cairo: Ministry of State for Environmental Affairs. ix + 183 pp.
- HAUSDORF, B. & T. WRONSKI. 2011. First records of *Truncatellina* species from Arabia (Gastropoda: Vertiginidae). *Journal of Conchology* 40: 505–508.
- HELLER, J. 2009. Land snails of the land of Israel. Natural history and a field guide. Sofia: Pensoft. 360 pp.
- HUTTON, T. 1834. On the land shells of India. *Journal of the Asiatic Society of Bengal* 3: 81–93. <http://biodiversitylibrary.org/page/37177781>
- KASSAS, M. & M.A. ZAHRAN. 1971. Plant life on the coastal mountains of the Red Sea, Egypt. *Journal of Indian Botanical Society* 50a: 571–589.
- LOWE, R.T. 1852. Brief diagnostic notices of new Maderan land shells [concluded]. *The Annals and Magazine of Natural History (Series 2)* 9: 275–279. <http://biodiversitylibrary.org/page/22158449>
- MEININGER, L.P. & S.M. GOODMAN. 1996. From the verge of the Western Palearctic: birds of Gebel Elba area, Egypt. *Dutch Birding* 18: 285–292.
- NEUBERT, E. 1998. Annotated checklist of the terrestrial and freshwater molluscs of the Arabian Peninsula with descriptions of new species. *Fauna of Arabia* 17: 333–461.
- PALLARY, P. 1909. Catalogue de la faune malacologique de l'Égypte. Mémoires présentés à l'Institut Égyptien 6: 1–92, pl. 1–5. <http://biodiversitylibrary.org/page/47311807>
- PFEIFFER, L. 1855–1856. Versuch einer Anordnung der Heliceen nach natürlichen Gruppen. *Malakologische Blätter* 2: 112–144 (1855), 145–185 (1856). <http://biodiversitylibrary.org/page/15864853>
- PILSBRY, H.A. 1920–1921. Pupillidae (Vertigininae, Pupillinae). In: H.A. Pilsbry (ed.), *Manual of Conchology, Second Series: Pulmonata* 26(101): 1–64, pl. 1–8 (1920), (102): 65–128, pl. 9–13 (1921), (103): 129–192, pl. 14–18 (1921), (104): 193–254, I–IV, pl. 19–24 (1921). Philadelphia: Academy of natural Sciences of Philadelphia. <http://biodiversitylibrary.org/page/1295891>
- RAMZY, R.R. 2009. Biological and ecological studies on land snails at Assiut, Egypt [MSc thesis]. Assiut: Assiut University. vii + 167 pp.
- SCHILEYKO, A.A. 1984. Nazemnye mollyuski podotryada Pupillina fauny SSSR (Gastropoda, Pulmonata, Geophila). In: O.A. Skarlato (ed.). *Fauna SSSR. Mollyuski. III(3)*. Leningrad: Nauka. 399 pp.
- SEDDON, M.B. 1992. The distribution of *Pupoides coenopictus* (Hutton, 1834) in NW. Africa (Gastropoda: Pupillidae). *Journal of Conchology* 34: 149–158.
- VERDCOURT, B. 2006. A revised list of the non-marine Mollusca of East Africa (Kenya, Uganda, Tanzania, excluding Lake Malawi). Maidenhead, UK: published by the author. 75 pp.

Authors' contributions: RFA collected the data; BH determined the samples and wrote the text with contributions by RFA.

Received: 27 December 2015

Accepted: 12 January 2016

Academic editor: Robert G. Forsyth