

A PRELIMINARY SURVEY OF *ALBINARIA* POPULATIONS AROUND KUŞADASI BAY, TURKEY

by Aydın Örstan*)

Abstract: Several records for *Albinaria caerulea maculata*, *A. caerulea calcarea*, *A. lerosiensis* and *A. puella* around Kuşadası Bay in western Turkey are given.

Key words: Mollusca, Pulmonata, Clausiliidae, distribution, Turkey.

Twenty-one species of the land snail genus *Albinaria* (Pulmonata: Clausiliidae) are known from the coastal areas of western and southern Turkey (Schütt, 1996; Neubert et al., 2000). The distribution range of none of these species is adequately known, because many areas have not been explored for land snails. For example, a review of the ranges of *Albinaria* species in Schütt (1996) gives the impression that only one taxon, *A. caerulea calcarea* in Ephesus (based on old dubious records), is present around Kuşadası Bay in western Turkey. I have been surveying the land snails of the mountains surrounding Kuşadası Bay. Here, I present the preliminary ranges of four taxa in this area (Fig. 1).



Fig 1.

The survey area as it would have appeared about 3000 years ago before the alluvium brought by the rivers, especially Küçük Menderes, filled up the various embayments (based on Kraft et al.,

1985). The letter symbols denote the stations where the following *Albinaria* were found: *A. caerulea maculata* (M), *A. caerulea calcarea* (C), *A. lerosiensis* (L) and *A. puella* (P). Question marks: uncertain identifications. Stations without *Albinaria*: calcareous rocks (open circles); non-calcareous rocks (triangles). Hatched areas: present day settlements; stars: ruins of ancient sites. The coordinates of one station are given as a reference point.

Methods and materials

I visited 44 stations in the study area in August 1998 and August 2000 (Fig. 1). Since *Albinaria* species are supposed to live exclusively on calcareous rocks, all but 5 of the stations had limestone or marble outcrops. Each station usually covered not more than about 10x10 m. Some of the stations were within a few hundred meters of each other, whereas others were separated by several kilometers. To avoid overcrowding of symbols, some closely located stations are represented by a single symbol in Fig. 1. The stations within the Küçük Menderes Delta are former islands. Detailed descriptions of the stations and their GPS coordinates are available by e-mail upon request. At the completion of the planned surveys in the area in the future, I will deposit voucher specimens in a public museum.

Results and discussion

During the survey four conchologically distinct *Albinaria* taxa were found around Kuşadası Bay (Fig. 2): *A. caerulea maculata* (Rossmässler 1836), *A. caerulea calcarea* Boettger, 1878, *A. lerosiensis* (Pfeiffer 1841) and *A. puella* (Pfeiffer 1850). The locations where each of these taxa were found are shown in Fig. 1. No *Albinaria* was found in 11 stations where rocks were calcareous and in 5 stations where rocks were not calcareous. *Albinaria* and other land snails were absent also at the ruins of Claros (Fig. 1), even though the building material was marble, probably because this site is on marsh-like ground and was almost totally buried under the alluvium before the 1950s (Bean, 1979). Another noteworthy area was located about 2 km to the west of Zeytin Köyü (Fig. 1). Here, despite the presence of calcareous rocks, a zone free of *Albinaria* seemed to exist between a station where *A. caerulea maculata* was found and another station about 1.5 km to the west where *A. lerosiensis* was found.

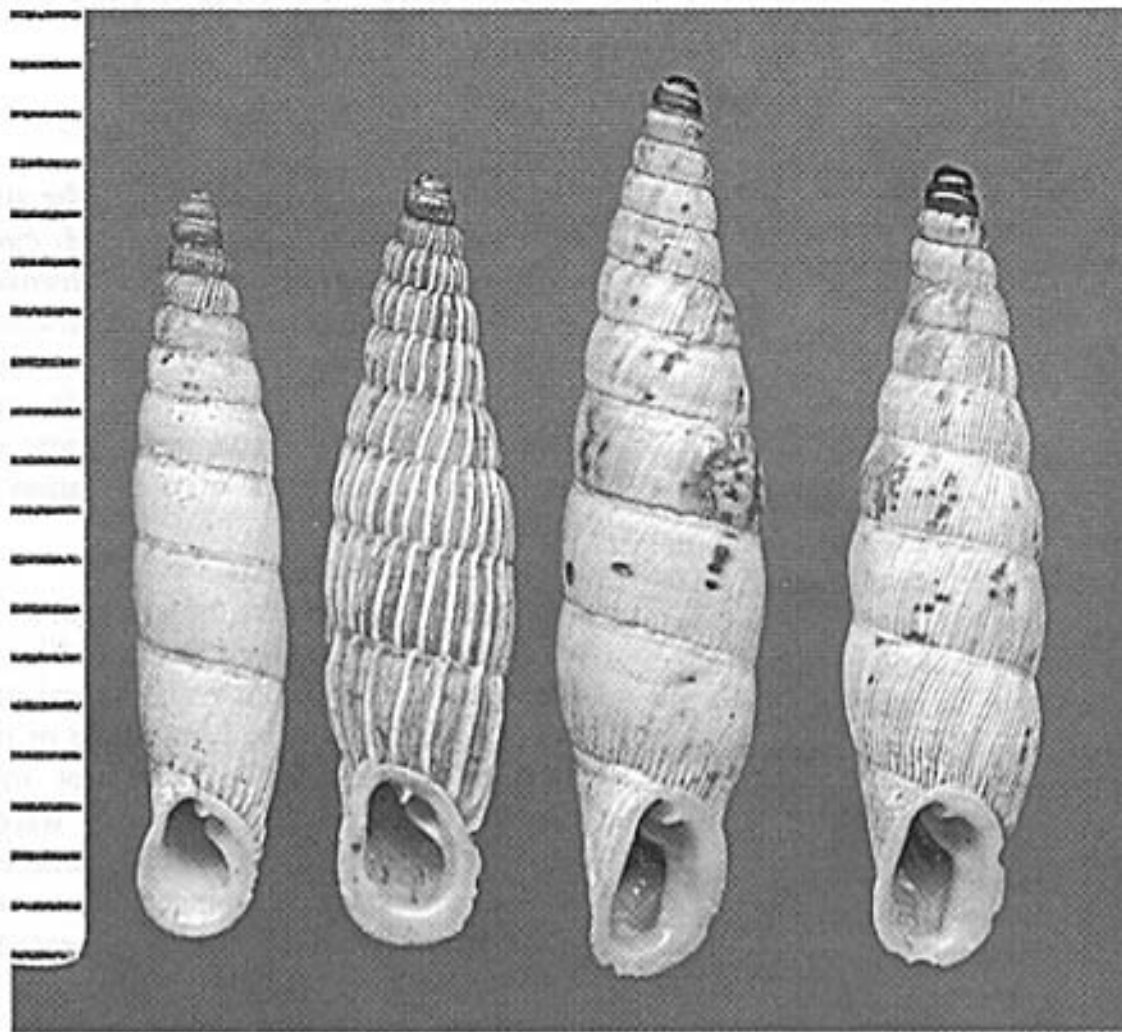


Fig. 2. Albinaria of Kuşadasi area (from left to right): *A. puella*, *A. lerosiensis*, *A. caerulea calcarea* and *A. caerulea maculata*. Scale is in millimeters.

Comparison of *A. caerulea maculata* and *A. caerulea calcarea*: I found *Albinaria* shells meeting the description of *A. caerulea calcarea* in Pfeiffer (1955) at several locations (Fig. 1). Fresh shells of *maculata* and *calcarea* are easily distinguished from each other. The whorls of *A. caerulea maculata* (except the protoconch) are covered by fine but well-defined and closely spaced ribs. The juvenile shells of *A. caerulea calcarea* have ribs similar to those of *A. caerulea maculata*, but usually after the penultimate interruption in growth, the ribs of *calcarea* become very weak and irregular (Fig. 2). The penultimate and antepenultimate whorls of some shells are almost totally smooth (the ribs become stouter in the second half of the last whorl). A comparison of the the mean size (\pm standard deviation) given below for the two most numerous lots, indicates that the mean height of the *A. caerulea calcarea* sample is larger than that of the *A. caerulea maculata* sample.

A. caerulea maculata from Ephesus, August 1998: N = 36, the mean height (H) = 16.1 ± 0.96

mm (range: 14.2 - 18.4 mm). The mean diameter (D) = 3.7 ± 0.2 mm, the mean H/D = 4.3.

A. caerulea calcarea from a hill 6.8 km southwest of Ephesus, August 2000 (station E6): N = 26, the mean height = 18.7 ± 1.1 mm (range: 16.4 - 21.5 mm). The mean diameter = 4.1 ± 0.2 mm, the mean H/D = 4.5.

At one station in Selçuk, the ruin of a small unidentified building, I found two shells and identified one as *A. caerulea calcarea* and the other one as *A. caerulea maculata*. At station E6, I identified 26 shells as *A. caerulea calcarea* and one worn shell tentatively as *A. caerulea maculata*. Besides these two instances, I did not find *A. caerulea maculata* and *A. caerulea calcarea* coexisting. At a station about 2 km north of Zeytin Köy (question mark in Fig. 1), I found only worn shells that I could not identify with certainty as either belonging to *A. caerulea calcarea* or *maculata*.

Albinaria lerosiensis: I first collected this species at the ruins of Notium (Notion) in 1998 (Örstan, 1999). More extensive collecting in August 2000 revealed that it is also present at a location to the north of Claros and at several stations along the road that passes through the area (Fig. 1). Prior to my 1998 record, this species had

been known only from Bodrum (ancient Halicarnassus) and several islands off Bodrum (Schütt, 1996). Notium is approximately 110 km to the north of Bodrum. The disjunct distribution of *A. lerosiensis* strongly suggests that it was introduced to either one or both of these areas by humans. I observed this species aestivating on rocks both at Notium and Bodrum. Welter-Schultes (1998) suggested that in Crete some *Albinaria* species that aestivate on rocks may have been inadvertently introduced to areas where they originally did not exist when humans transported rocks primarily for building purposes. However, it is unlikely that rocks were transported between Halicarnassus and Notium when local marble and limestone were available for each town (Higgins & Higgins, 1996). I have collected a small number of *A. lerosiensis* shells

on the slopes of the mountain behind Bodrum (Örstan, unpublished records). More extensive collecting further up on the same mountain and elsewhere on the Bodrum Peninsula is necessary to determine the range of *A. lerosiensis* in that area. The specimens from Notium appear to be conchologically identical to those from Bodrum. I will undertake a detailed comparison of *A. lerosiensis* from Notium and Bodrum after more specimens from the Bodrum area become available.

To determine the ranges of these *Albinaria* species more accurately, I am planning further expeditions to the Kuşadası area, especially to the mountainous districts at some distance from the coast.

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References

- Bean, G. E. 1979. Aegean Turkey. Ernest Benn, London.
- Higgins, M. D. & Higgins, R. 1996. A geological companion to Greece and the Aegean. Cornell University Press, Ithaca, New York.
- Kraft, J. C., Kayan I. & Aschenbrenner, S. E. 1985. Geological studies of coastal change applied to archaeological settings. Chapter 3 in Rapp, G. & Gifford, J. A., eds., Archaeological Geology, Yale University Press, New Haven.
- Neubert, E., Örstan A. & Welter-Schultes, F. 2000. The land snails of the area between Kaş and Demre, southwestern Turkey, with special reference to *Albinaria* (Gastropoda, Pulmonata, Clausiliidae). *Basteria* 64:105-123.
- Örstan, A. 1999. Drill holes in land snail shells from western Turkey. *Schriften zur Malakozoologie*, 3:31-36.
- Pfeiffer, K. L. 1955. Die Albinarien des Dodekanes (Moll., Clausiliidae). *Archiv für Molluskenkunde*, 84:109.
- Schütt, H. 1996. Landschnecken der Türkei. *Acta Biologica Benrodis*, Suppl. 4, 497 pp.
- Welter-Schultes, F. 1998. Human-dispersed land snails in Crete, with special reference to *Albinaria* (Gastropoda: Clausiliidae). *Biologica Gallo-hellenica*, 24:83-106.

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