

New subspecies of *Albinaria contaminata* (Rossmässler, 1835) (Gastropoda Pulmonata: Clausiliidae) from the Ionian island of Kephallinia, Greece

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Detailed measurements of the shell and a study of the lamellae, revealed that *A. contaminata incommoda* (Boettger) and *A. c. liebetruti* (Charpentier), described from the Ionian island of Zakynthos, do not occur on the neighbouring island of Kephallinia. Two Kephallinian subspecies of *Albinaria contaminata* (Rossmässler), which were formerly tentatively identified as *A. c. incommoda* and *A. c. liebetruti*, are therefore described as new subspecies.

Key words: Gastropoda, Pulmonata, Clausiliidae, *Albinaria*, taxonomy, Greece, Kephallinia, Zakynthos.

INTRODUCTION

The representatives of the genus *Albinaria* Vest, 1867, on the Ionian islands of Kephallinia and Ithaka are one of the main topics within a multi-disciplinary study of the systematics and evolutionary history of the entire genus. For the three subspecies of *Albinaria contaminata* (Rossmässler, 1835) that are currently recognized on Kephallinia, Rähle (1980) proposed the following nomenclature: (1) *A. c. contaminata*, living in most of the central and the northern part of the island, (2) *A. c. incommoda* (Boettger, 1878), occurring in the southeastern part of Kephallinia, and (3) *A. c. liebetruti* (Charpentier, 1852), living in a very small range east of Sami. This implies that *A. c. incommoda* and *A. c. liebetruti*, both originally described from Zakynthos, are considered to occur in two groups of populations separated for at least 11.500 years by sea-water. Because assumedly a similarly long period of isolation has resulted in the diversification of *A. c. odysseus* from Ithaka and *A. c. contaminata* from Kephallinia (Kemperman & Degenars, in press) we have studied this interpretation with special interest.

MATERIALS AND METHODS

We studied qualitatively c. 100 specimens of *A. c. incommoda* from 21 localities and c. 80 specimens of *A. c. liebetruti* from 8 localities in Zakynthos. In addition the following material from Zakynthos (number of specimens between square brackets) was measured, using a binocular microscope with electronically readable stage, and computed (Kemperman, in prep.). *A. c. liebetruti*: W.-side Argasi (= 2 km SE. of Zakynthos-town), DG9380 [6]; between Agalas and Keri (= 4 km NW. of Keri), DG8272 [5]; c. 1.5 km N. of Kalamaki (= 4 km S. of Zakynthos-town), DG9278 [9]. *A. c. incommoda*: 1.5 km N. of Katastari, among large calcareous rocks and plants,

DG7888 [15]; Vrachionas (ex coll. Klemm) [5]. Unless stated otherwise this material was collected by the second author. The data concerning the *Albinaria* samples from Zakynthos were compared with the allegedly consubspecific material from Kephallinia at our disposal.

Collection numbers preceded by "A" refer to animals kept in 70% alcohol; the number of specimens is indicated after the slash. All material is deposited at the Nationaal Natuurhistorisch Museum (NNM), Leiden.

RESULTS AND DESCRIPTIONS

Most quantitative shell characters of *A. c. incommoda* and *A. c. liebetruiti* from Zakynthos differ significantly from the characters measured in the superficially similar populations from Kephallinia (see table 1). Differences in the qualitative shell features, viz. apertural lamellae and colour pattern, are also observed. It is concluded that neither *A. c. incommoda* nor *A. c. liebetruiti* occur in Kephallinia. As none of the available names (Boettger, 1878; Nordsieck, 1977) apply to the Kephallinian subspecies of *A. contaminata* under discussion, new names are introduced. In the following descriptions only conchological and biogeographical data are given.

Albinaria contaminata periporon subspec. nov. (figs. 1-4)

Diagnosis. — A large, tumid *A. contaminata*; the peristome is nearly always detached from the body whorl. The parietalis is low, whereas the columellaris is relatively high. The shell is not provided with a distinct colour pattern.

Description. — Shell tumid, with a ratio spiral width/shell height of c. 0.28; upper third almost straight to concave in outline. There are 9-11, somewhat globose whorls. The body whorl measures 0.42 of the shell height. Protoconch without sculpture. Teleoconch ribs very fine, generally crossing the whorl from suture to suture. Antepenultimate whorl with c. 5 ribs/mm. Growth lines running parallel to the ribs; no further microsculpture. Body whorl regularly rounded towards the shell base, which is provided with a basal keel; dorsal keel generally not distinguishable. Ribs on the cervix somewhat more prominent and more widely spaced than those on the penultimate whorl. The aperture is roundish, measuring 0.25 of the total shell height. Peristome detached from the penultimate whorl; apertural lip reflected (>0.64 mm) and somewhat thickened. Shell more or less shiny, light-blue-grey to light-greyish cream, sometimes with some irregular, brown speckles or vague blotches, otherwise without a clear colour pattern. Protoconch coloured as the teleoconch or more brown. Apertural lip whitish to cream; aperture cream inside.

Parietalis extending c. 1/4 whorl into the aperture, low and blunt; spiralis starting somewhat lateral near the inner end of the parietalis. Parallels absent. Columellaris relatively high; subcolumellaris visible in frontal view. Near the lunella the spiralis runs beyond the principalis; the palatalis is curved strongly downwards in front. Clausiliar style attached to the columella c. 1 1/4 whorl higher than the apertural lip.

For measurements see table 1.

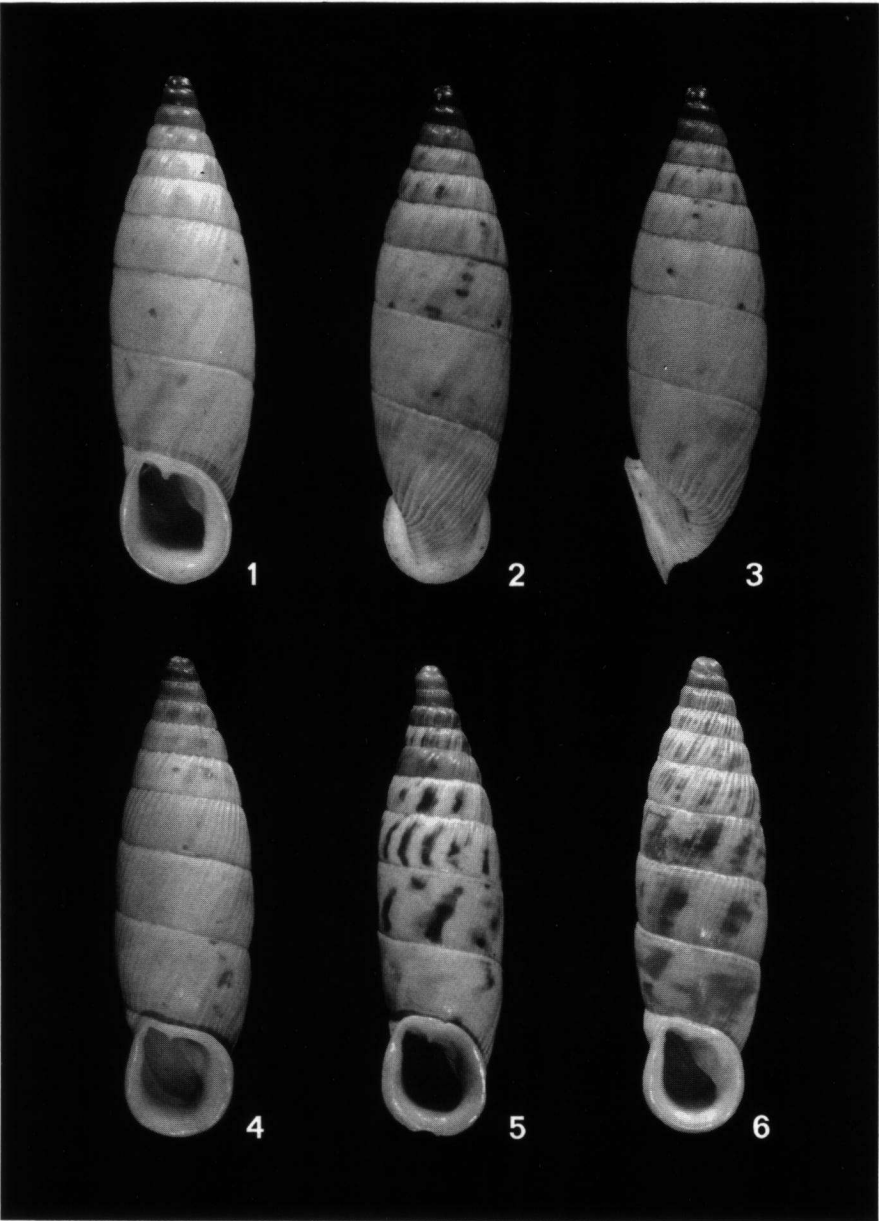
Differentiation. — *Albinaria c. periporon* can be distinguished from *A. c. incommoda* from Zakynthos (figs. 5-6) by a shell height of 15.4 (± 1.5) mm versus 12.7 (± 1.0)

Shell height				Apertural height/shell height			
p	12.15 - 15.39 - 19.23 (1.49)	·	+ - +	p	0.22 - 0.25 - 0.27 (0.01)	·	- + +
i	11.26 - 12.68 - 14.54 (1.02)	+	· + -	i	0.23 - 0.25 - 0.28 (0.01)	-	· + +
s	14.06 - 15.84 - 16.88 (0.73)	-	+ · +	s	0.21 - 0.23 - 0.25 (0.01)	+	+ · -
l	11.60 - 12.92 - 15.04 (0.93)	+	- + ·	l	0.21 - 0.23 - 0.25 (0.01)	+	+ - ·
Spiral width				Aperture exterior width			
p	3.59 - 4.37 - 5.54 (0.49)	·	+ - +	p	2.63 - 3.34 - 4.51 (0.40)	·	+ - +
i	3.27 - 3.69 - 4.17 (0.28)	+	· + -	i	2.62 - 2.87 - 3.37 (0.19)	+	· - +
s	3.71 - 4.14 - 4.60 (0.26)	-	+ · +	s	2.63 - 3.10 - 3.49 (0.25)	-	- · +
l	3.15 - 3.44 - 3.71 (0.15)	+	- + ·	l	2.30 - 2.55 - 2.85 (0.14)	+	+ + ·
Spiral width/shell height				Aperture interior width			
p	0.25 - 0.28 - 0.34 (0.02)	·	- + +	p	1.57 - 2.00 - 2.53 (0.24)	·	+ - +
i	0.27 - 0.29 - 0.32 (0.01)	-	· + +	i	1.61 - 1.80 - 2.18 (0.15)	+	· - +
s	0.24 - 0.26 - 0.28 (0.01)	+	+ · -	s	1.66 - 1.90 - 2.22 (0.16)	-	- · +
l	0.23 - 0.27 - 0.29 (0.01)	+	+ - ·	l	1.38 - 1.57 - 1.81 (0.12)	+	+ + ·
Body whorl height				Labial width			
p	5.21 - 6.52 - 8.34 (0.71)	·	+ - +	p	0.46 - 0.67 - 0.99 (0.13)	·	+ - +
i	4.74 - 5.39 - 5.99 (0.37)	+	· + -	i	0.43 - 0.53 - 0.61 (0.05)	+	· - -
s	5.67 - 6.37 - 6.96 (0.41)	-	+ · +	s	0.47 - 0.60 - 0.73 (0.08)	-	- · +
l	4.77 - 5.11 - 5.55 (0.24)	+	- + ·	l	0.38 - 0.49 - 0.57 (0.05)	+	- + ·
Body whorl height/shell height				Parietalis height			
p	0.40 - 0.42 - 0.46 (0.02)	·	- + +	p	0.04 - 0.34 - 0.58 (0.13)	·	+ + -
i	0.39 - 0.43 - 0.46 (0.02)	-	· + +	i	0.13 - 0.23 - 0.31 (0.05)	+	· + -
s	0.37 - 0.40 - 0.42 (0.02)	+	+ · -	s	0.37 - 0.50 - 0.87 (0.13)	+	+ · +
l	0.36 - 0.40 - 0.42 (0.02)	+	+ - ·	l	0.23 - 0.32 - 0.56 (0.09)	-	- + ·
Apertural height				Ribs/mm on antepenultimate whorl			
p	2.84 - 3.81 - 4.98 (0.47)	·	+ - +	p	2.82 - 5.00 - 7.14 (1.36)	·	- - -
i	2.77 - 3.16 - 3.63 (0.23)	+	· + -	i	3.82 - 4.71 - 5.64 (0.56)	-	· - -
s	3.23 - 3.70 - 4.15 (0.28)	-	+ · +	s	3.39 - 4.57 - 5.79 (0.70)	-	- · -
l	2.66 - 2.96 - 3.25 (0.19)	+	- + ·	l	3.31 - 5.26 - 6.83 (0.97)	-	- - ·

Table 1. Shell characters of *A. contaminata* ssp. from Kephallinia and Zakynthos (minimum, mean maximum and, between brackets, standard deviation; in mm). Abbreviations: i = *A. c. incommoda* [n = 32]; l = *A. c. liebetruiti* [n = 21]; p = *A. c. periporon* [n = 20]; s = *A. c. samiensis* [n = 20]; + = significantly different ($\alpha = 0.05$); - = not significantly different.

mm in the latter subspecies (table 1), the somewhat sharper parietalis and the absence of a distinct colour pattern of dark-brown longitudinal bands across the whorls. In *A. c. periporon* nearly all shells have a detached peristome, whereas in *A. c. incommoda* this varies among different populations between 50% and 85%.

Material (all samples from Kephallinia; unless stated otherwise collected by the first author). — Holotype (NNM 56398): 1 km NW. of Poros (= 24 km E. of Argostoli), 50 m alt., on coastal rocks, UTM DH8023 (loc. 054, E. Gittenberger c.s. leg.); 7-viii-1982. Paratypes: locus typicus (NNM 56399/29); 3.8 km SE. of Poros (= 28.3 km



ESE. of Argostoli), slope 100 m S. of gorge, 10 m alt., on the rocky bottom, UTM DH8220 (loc. 506) (NNM 56396, 56397/28, A9332/6); 3 km NW. of Tzanata (= 21.8 km E. of Argostoli), 130 m alt., on rocks, shrubs and young trees along road, UTM DH7623 (loc. 580) (NNM 56400/42, A9333/2); 2 km E. of Xenopoulon near Kampitsata (= 22.2 km ESE. of Argostoli), 200 m alt., on rocks along road, UTM DH7621 (loc. 573) (NNM 56641/18); southeastern tip of the Oros Aenos, Markopoulon (= 24 km SE. of Argostoli), 250 m alt., UTM DH7715 (loc. 076, E. Gittenberger c.s. leg.) (NNM 56642/46); 1 km S. of Charakti (= 18.5 km E. of Argostoli), 485 m alt., on rocks along road, UTM DH7324 (loc. 501) (NNM 56643/15).

Distribution and notes. — The range of *A. c. periporon* is confined to the area east and southeast of the Oros Aenos and vicariant with that of *A. c. contaminata* at the northern and western borders. Along the road from Tsakarisianos (between Sami and Poros) westwards to Ag. Eleftherios, the transition between *A. c. periporon* and *A. c. contaminata* was observed in populations in which the peristomes range from fully detached to completely attached to the body whorl.

Within the range of *A. c. periporon*, the endemic species *A. adrianae* Gittenberger, 1979, lives in two small ranges, viz., the nominate subspecies near Poros and *A. a. dubia* Gittenberger, 1979, in the valley of Arginia along the southern flanks of the Oros Aenos. Both species occur sympatrically although allotopically; *A. adrianae* inhabits high rocks and rock-faces, whereas in the areas of sympatry *A. c. periporon* lives only at the basis of such rocks and among rocks on the bottom. Morphologically intermediate specimens have been found between *A. c. periporon* and both subspecies of *A. adrianae* (Gittenberger, 1979: 84; Kemperman, in prep.). Shells of such specimens are more slender than those of *A. c. periporon*, have an intermediate rib density and often lack the microstriation which is characteristic for *A. adrianae* (s.l.).

South of the area of overlap with *A. a. dubia*, *A. c. incommoda* borders on *A. senilis senilis* (Rossmässler, 1836). Between Chionata and Markopoulon, where both species occur sympatrically, but live allotopically on different rocks, a few morphologically intermediate specimens have been found.

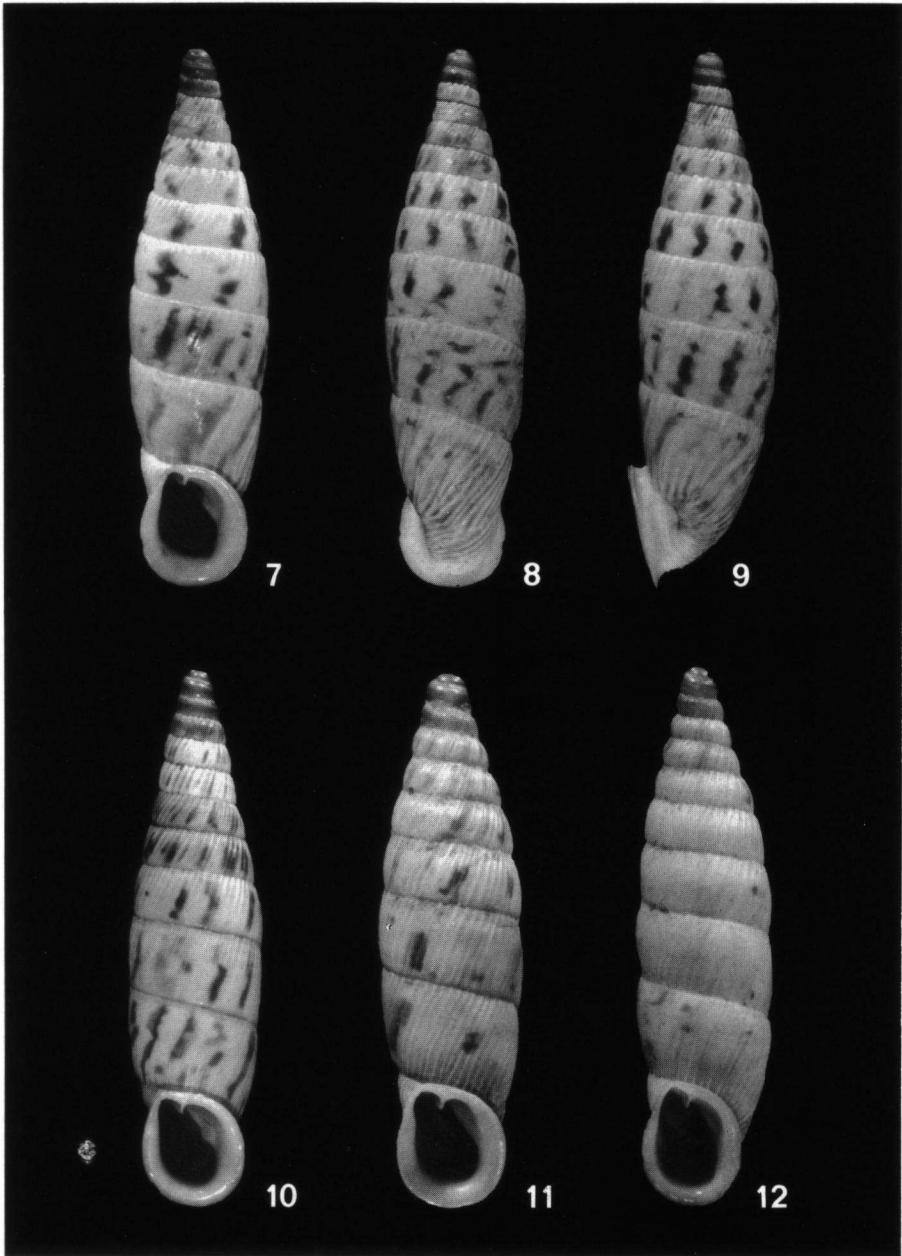
Derivatio nominis. — The epithet *periporon* refers to the region of Poros, the main village in the range of this subspecies.

Albinaria contaminata samiensis subsp. nov.

(figs. 7-10)

Diagnosis. — A large, slender *A. contaminata* with somewhat flattened whorls; peristome detached. The parietalis is long and high; the palatalis is short and running downwards. The shell has a distinct colour pattern of dark-brown stripes and waves.

Figs. 1-6. *Albinaria contaminata* subsp. 1-3, *Albinaria contaminata periporon* subsp. nov., holotype (NNM 56398), Kephallinia, 1 km NW. of Poros (= 24 km E. of Argostoli), 50 m alt., on coastal rocks (actual shell height 14.2 mm, spiral width 4.1 mm). 4, *A. c. periporon* subsp. nov., paratype (NNM 56396), Kephallinia, 3.8 km SE. of Poros (= 28.3 km ESE. of Argostoli), slope 100 m S. of gorge, 10 m alt., on the rocky bottom (actual shell height 14.9 mm, spiral width 4.3 mm). 5, *A. c. incommoda* (Boettger), Zakynthos, 2 km E. of Ag. Nikolaos (= 10 km WSW. of Zakynthos-town), N.-exposed rocks (actual shell height 14.0 mm, spiral width 3.9 mm). 6, *A. c. incommoda*, Zakynthos, viewpoint near Kampi (= 12 km S. of Volimais) (actual shell height 13.1 mm, spiral width 3.5 mm). Photographs A. 't Hoof (Leiden).



Description. — Shell relatively slender with a spiral width/shell height ratio of c. 0.25; the upper third of the spire is straight or slightly concave in outline. There are 10-11.5 relatively flat whorls. Body whorl relatively small, measuring 0.39 of the shell height. Protoconch without sculpture. Teleoconch ribs fine, oblique, sometimes only distinct near the sutures; on the antepenultimate whorl c. 4.8 ribs/mm. Body whorl slightly depressed dorsally near the shell base, which is provided with a vague basal keel; dorsal keel not present. The cervical ribs are somewhat more prominent than the ribs on the penultimate whorl, but hardly wider spaced. Growth lines running parallel to the ribs, no further microsculpture. Aperture roundish to oval, measuring 0.23 of the shell height. Peristome detached from the penultimate whorl; apertural lip reflected (>0.54 mm), slightly thickened. The more or less shiny shell is light-bluish grey, with a pattern of broad dark-brown lines which are sometimes wavy or interrupted, running parallel to the ribs; when ribs near sutures and on the cervix are crossed by a dark line or speckle they are often white; protoconch light-bluish grey. Aperture yellowish to light-brown inside; lip cream to whitish.

Parietalis high, sharp, extending for more than 1/4 whorl into the aperture. The spiralis starts before the inner end of the parietalis. Parallelis sometimes discernable. Columellaris low; subcolumellaris just visible in frontal view. Near the lunella, the spiralis runs beyond the principalis; principalis thickened apically. Palatalis very short, somewhat thickened apically, running downwards. Clausiliar style attached 1 1/4 whorl higher than the apertural lip.

For shell measurements see table 1.

Differentiation. — The Kephallinian *A. c. samiensis* has a much larger shell than *A. c. liebetruti* of Zakynthos and may be more slender (table 1). The distance between the parietalis and the palatal wall is relatively smaller in *A. c. samiensis*. The colour pattern on shells of *A. c. liebetruti* (figs. 11-12) is less distinct than in *A. c. samiensis*. Generally, the subcolumellaris is just visible in frontal view in *A. c. samiensis* and only in oblique view in *A. c. liebetruti*. In *A. c. samiensis* the palatalis is short and curved strongly downwards in front, whereas in *A. c. liebetruti* this lamella is almost straight and running more or less parallel with the principalis.

Material (all samples from Kephallinia; unless stated otherwise collected by the first author). — Holotype (NNM 56644): 1.5 km NE. of Sami (= 17.5 km NE. of Argostoli), 100 m alt., on rocks along road, UTM DH7035 (loc. 04, G.J.M. Visser leg.); 6-xi-1985. Paratypes: locus typicus (NNM 56645/41, A9328/19); 2 km NE. of Sami near junction for Moni Ag. Agrilion (= 18.3 km ENE. of Argostoli), 140 m alt., on rocks along road, UTM DH7035 (loc. 419) (NNM 56648/20, A9330/4); W. side of Ormos Antisamou (= 18.8 km ENE. of Argostoli), 1.5-3 m alt., on rocks, UTM

Figs. 7-12. *Albinaria contaminata* subsp. 7-9, *Albinaria contaminata samiensis* subsp. nov., holotype (NNM 56644), Kephallinia, 1.5 km NE. of Sami (= 17.5 km NE. of Argostoli), 100 m alt., on rocks along road (actual shell height 17.7 mm, spiral width 4.6 mm). 10, *A. c. samiensis* subsp. nov., paratype (NNM 56646), 3 km NE. of Sami (= 18.7 km NE. of Argostoli), 125 m alt., on rocks along road (actual shell height 16.2 mm, spiral width 3.9 mm). 11, *A. c. liebetruti* (Charpentier), Zakynthos, 1.5 km N. of Kalamaki (= 4 km S. of Zakynthos-town) (actual shell height 12.5 mm, spiral width 3.3 mm). 12, *A. c. liebetruti*, Zakynthos, N.-exposed rocks of the Oros Skopos and just below these rocks, ca. 450 m alt. (actual shell height 13.6 mm, spiral width 3.4 mm). Photographs A. 't Hooft (Leiden).

DH7135 (loc. 420) (NNM 56649/6, A9331/5); E. side of Ormos Antisamou (= 19.3 km ENE. of Argostoli), 1.5-3 m alt., on rocks, UTM DH7235 (loc. 421) (NNM 56650/12); 3 km NE. of Sami (= 18.7 km NE. of Argostoli), 125 m alt., on rocks along road, UTM DH7136 (loc. 422) (NNM 56646, 56647/15, A9329/5); Moni Ag. Agrilion (= 17.9 km ENE. of Argostoli), 75 m alt., on ruins and stones, UTM DH7035 (loc. 479) (NNM 56651/8).

Distribution and notes. — The range of *A. c. samiensis* comprises only 2-3 km² of the coastal area northeast of Sami and around the Ormos Antisamou, including the peninsula of Digalia. *Albinaria c. samiensis* is surrounded by *A. c. contaminata*. In the narrow contact zone between these subspecies, morphologically intermediate specimens occur, which combine the tumid shell and the attached peristome characteristic of *A. c. contaminata* with the somewhat more distinct ribs and the prominent colour pattern of *A. c. samiensis*.

Derivatio nominis. — The epithet *samiensis* refers to Sami in Kephallinia.

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