

One more Albinaria G&N-type species pair from the Peloponnese, once more dictating a revised definition of Albinaria and Isabellaria (Gastropoda Pulmonata: Clausiliidae)

E. GITTENBERGER

Nationaal Natuurhistorisch Museum, P.O. Box 9517, NL 2300 RA Leiden, The Netherlands and
Institute of Evolutionary and Ecological Sciences, Rijksuniversiteit Leiden, P.O. Box 9516, NL 2300 RA
Leiden, The Netherlands

Albinaria evelynae spec. nov. is described from the Peloponnese and classified next to *A. grayana* as its sister species on the basis of autapomorphies in shell shape and sculpture. Doing so, one more example is given of two conchologically very similar species, with a G-type and an N-type clausilial apparatus, respectively. Obviously, the clausilial apparatus cannot be used to distinguish the genera *Isabellaria* and *Albinaria*. In the former genus only the G-type occurs, whereas in the latter, both G- (rarely) and N-types are found. This has nomenclatorial consequences, which are summarized.

Key words: Gastropoda, Pulmonata, Clausiliidae, *Albinaria*, *Isabellaria*, taxonomy, parallelism, introgression, Greece.

INTRODUCTION

In line with the prevailing views of the time, Gittenberger (1987) classified some newly described clausiliid species with *Isabellaria* Vest, 1867, on the basis of their *Graciliaria*- or G-type (Nordsieck, 1978) clausilial apparatus (= CA). In doing so, some doubt about the correctness of this classification was expressed, however, by questioning the status of *Isabellaria* as a 'good' genus next to *Albinaria* Vest, 1867. Later on, referring to morphological, molecular and biogeographical data on a small group of species, various authors (Gittenberger, 1994; Schilthuizen et al., 1995; Gittenberger & Schilthuizen, 1996; Douris et al., 1998) argued that the two types of CA indicated as N- (= Normal) and G-type by Nordsieck (1978) are not diagnostic for separate genera per se. Using molecular data, i.e. sequences of ITS1&2 rDNA from many more species, Ms. C. van Moorsel (personal communication) largely confirmed these views in far more detail. Therefore, the so-called *Isabellaria* species of the Peloponnese which have vicariant, very similar, *Albinaria* counterparts should be classified with *Albinaria*. Only in the NE. Peloponnese the genus *Isabellaria*, in a revised sense, is represented indeed, without similar, N-type CA species. The consequences this should have for the nomenclature of the clausiliid species in question are summarized.

In this paper, one more clausiliid species from the SE. Peloponnese, with a G-type CA, is described as new to science. Exemplifying once more our views, it is classified with *Albinaria*, next to *A. grayana* (L. Pfeiffer, 1846), which is obviously its vicariant, very similar counterpart with an N-type CA. This species pair can easily be recognized by the presence of various characters which are unique among clausiliids from the Peloponnese.

For collections the following abbreviations are used: Neu, E. Neubert, Frankfurt am Main; NNM, Nationaal Natuurhistorisch Museum, Leiden; Nor, H. Nordsieck, Villingen-Schwenningen; SMF, Senckenberg Museum, Frankfurt am Main; Sub, P. Subai, Aachen.

ALBINARIA AND ISABELLARIA REVISED

Isabellaria Vest, 1867

In the course of the years, it became increasingly clear that the generic name *Isabellaria* denotes a polyphyletic group of species (Gittenberger, 1987, 1994; Schilthuizen et al., 1995; Gittenberger & Schilthuizen, 1996; Douris et al., 1998). These species share a G-type CA, but obviously not all of them are closely related. Some of them are, however, forming a monophyletic group, which can be clearly delimited biogeographically. The clade in question is known from the NE. part of the Peloponnese, from mainland Greece north of the Peloponnese, and from some nearby Aegean islands. The type species of the nominal taxon *Isabellaria* belongs to it, which gives the opportunity to adapt the nomenclature to the recent findings without frustrating nomenclatorial stability too much.

In line with the results referred to above, the generic name *Isabellaria* has to be used for a restricted number of species, i.e. those belonging to a single clade. Inevitably, this will make the name somewhat ambiguous in the near future. On the one hand, *Isabellaria* will be used in this revised sense. On the other hand, the name might still be used for both the true *Isabellaria* species and for *Albinaria* species with a G-type CA.

Conchologically the genus *Isabellaria* cannot be characterized unequivocally. In general the shell is more pale greyish-brown instead of whitish as in *Albinaria*, and usually not provided with blotches or dark dots. In most species there is no prominent surface sculpture. There is always a G-type CA. The lamella spiralis is rudimentary and accompanied by a lamella parallela, or these lamellae are obsolete. There may be a prominent lamella fulcrans. The lamella principalis is rudimentary or obsolete as well; there may be one to three short but relatively prominent lamellae suturalis. In *Albinaria* species with a G-type CA there is a single lamella suturalis at most.

The following three nominal genus group taxa, listed with their type species, apply to *Isabellaria* as defined restrictively here:

Isabellaria Vest, 1867 [*I. isabellina* (L. Pfeiffer, 1842)].

Venusta Boettger, 1877 [*I. thermopylarum* (L. Pfeiffer, 1849) = *I. venusta* (A. Schmidt, 1868)]. See Nordsieck (1975).

Euclista Boettger, 1878 [*I. saxicola* (L. Pfeiffer, 1848)].

The following species are classified here with *Isabellaria*, which is not subdivided into subgenera: *I. almae* (Boettger, 1889), *I. chelidromia* (Boettger, 1889), *I. clandestina* (Ross-mässler, 1857), *I. isabellina* (L. Pfeiffer, 1842), *I. leucoraphe* (Boettger, 1878), *I. lophauchena* (Sturany, 1894), *I. perplana* (Boettger, 1877), *I. praecipua* Sajó, 1968, *I. praestans* (Westerlund, 1893), *I. riedeli* Brandt, 1961, *I. saxicola* (L. Pfeiffer, 1848), *I. thermopylarum* (L. Pfeiffer, 1850), *I. thessalonica* Nordsieck, 1972, and *I. vallata* (Mousson, 1859).

Albinaria Vest, 1867

The various G&N-type species pairs, characteristic for the Peloponnese only (Gittenberger & Schilthuizen, 1996), are considered to be composed of sister species. This hypothesis is based on morphological, distributional and molecular data (Gittenberger,

1994; Schilthuizen et al., 1995; Gittenberger & Schilthuizen, 1996; Douris et al., 1998). Nordsieck's (1997) view that there are separate origins of only two species groups, to be given the status of genera, i.e. *Isabellaria* with a G-type CA (distributed both in the Peloponnese and more to the North) and *Albinaria* with an N-type CA, is not accepted. It is unlikely that once in the past, in an initial phase, *Isabellaria* species moved southward into the range of the genus *Albinaria*, or, alternatively, that several species of these two genera evolved separately in the Peloponnese. It is equally improbable that in a second phase, many independent cases of hybridization between individual species of these alleged genera occurred, each time resulting in massive intergeneric introgression for a variety of characters in shell shape and sculpture.

It is considered more likely that the G-type CA species in the Peloponnese form a polyphyletic group. A strong selection pressure, probably predation by beetles (E. & A. Gittenberger, unpublished results), might have caused the parallel development of the G-type CA in several taxa in the area. The fact that this would have occurred in a series of more or less parapatrically distributed species, and not in other *Albinaria* species in the Peloponnese or elsewhere within the large range of the predators under the same selection pressure, remains unexplained then. Taking into account that incidental or locally more common hybridization has been observed frequently among many *Albinaria* species, the alternative hypothesis can be proposed that transspecific introgression of the genetic factor causing a change of N-type into G-type CA is going on in the Peloponnese. That factor might have entered the genus *Albinaria* just once by a single case of intergeneric introgression in the northern part of the Peloponnese, where the true *Isabellaria* reaches its geographic borderline. Subsequently it might have spread southwards, invading one *Albinaria* species after the other. The adaptive significance of a G-type CA is most probably an improved protection against predation by beetles of the genus *Dritus* (see Schilthuizen et al., 1994), which can use the bypass canal to enter N-type shells (E. & A. Gittenberger, unpublished results).

The following species group taxa with a G-type CA are now classified with *Albinaria*. Most of these taxa have originally been introduced in *Isabellaria*, despite of their striking conchological similarity (apart from the CA) to nearby *Albinaria* species. This concerns: *A. adriani* (Gittenberger, 1987), *A. butoti* (Nordsieck, 1984), *A. campylauchen* (Boettger, 1883), *A. discolor eureka* Gittenberger, 1994, *A. discolor haessleini* Fauer, 1978, *A. confusa* (Boettger, 1878), *A. edmundi* (Gittenberger, 1987), *A. evelynae* spec. nov., *A. idyllica* Gittenberger, 1987, and *A. vrondamasa* (Gittenberger, 1987).

ONE MORE G-TYPE *ALBINARIA* SPECIES FROM THE PELOPONNESE

Albinaria evelynae spec. nov. (figs. 1-3)

Material. — Holotype (NNM 58043) and 56 paratypes (Neu/2; NNM 58044/48; Nor/2; SMF 310386/2; Sub/2), all with the following data: Greece, Peloponnisos, Lakonia, 7 km NW. of Dhaimonia (= Daemonia); 100 m alt.; UTM FF6763; E. & E. J. Gittenberger leg., April 7th, 1994.

Diagnosis. — An *Albinaria* with a G-type clausilial apparatus. Whorls convex, but conspicuously flattened below the suture; with numerous sharp riblets. Basal keel very prominent but narrowly curved.

Description. — Shell moderately slender fusiform, with 8½-10 convex whorls. Upper part of the spire with straight sides; body whorl narrower than the penultimate one.



Figs. 1-3. *Albinaria evelynae* spec. nov., Greece, Peloponnisos, Lakonia, 7 km NW. of Dhaimonia (= Daemonia); 100 m alt.; UTM FF6763; E. & E. J. Gittenberger leg., April 7th, 1994. 1, holotype (NNM 58043), actual height 14.6 mm; 2, 3, paratypes (NNM 58044), actual width and height 3.5 mm and 12.2 mm, respectively. Abbreviations: c, clausilium; p, lamella parallela; s, lamella spiralis. Photographs: A. 't Hooft (EEW, Leiden).

Abapically, and most clearly so on the lower whorls, the whorls are flattened near the suture, where the riblets are slightly thickened to form a white, narrowly dotted, sutural line, as if the shell surface is pushed up here. Protoconch whorls smooth. Initial c. three teleoconch whorls with radial ribs that are clearly narrower than the interspaces; on the lower whorls, including the body whorl, there are numerous, sharper and more narrowly spaced ribs. The body whorl is provided with a very prominent, narrowly curved, basal keel, which is accentuated by an adapical furrow. Aperture bordered by a rather straight parietal lip and broadly rounded basally; with more or less parallel columellar and palatal sides. Peristome moderately broadly reflected, white, detached from the penultimate whorl. Background-colour of the shell light greyish cream; ribs whitish. Apical part of the shell light corneous brown. The aperture is whitish inside.

Parietalis more or less irregular, varying from very low to totally obsolete, not in line with the spiralis and often very short; when relatively long, still not reaching further inside than the anterior beginning of the spiralis. The spiralis is c. a half whorl long and runs about equally far or slightly further inside than the columellaris; it is most prominent close to both the inner and the outer end and relatively low in between. The low lamella parallela is slightly shorter than the spiralis and about equally prominent over its entire length. There is no lamella fulcrans. The columellaris is low and not clearly protruding into the aperture; its visible part in the aperture is rather straight. The spiralis reaches slightly deeper inside than the columellaris or equally deep; the lamella parallela is somewhat shorter. The subcolumellaris is only discernable in oblique view. There is no suturalis. Quickly diminishing in prominence, the principalis reaches less than 1/8 whorl from the lunella area towards the aperture. The prominent lunella is situated dorsally. It is straight, apart from a broad curve backward above, and a very short and inconspicuous twist below; a separate palatal lamella and a true basalis are lacking.

Clausilium blade simple; its tip regularly rounded.

Height 11.5-15.0 mm; width 3.2-3.7 mm.

Notes. — Conchologically this species is most similar, at first sight, to *Albinaria grayana* (L. Pfeiffer, 1846), known from the islands of Kithira and Elafonisos (Nordsieck, 1977: 291), the latter situated c. 25 km south of the type locality of *A. evelynae*. Both species have shells with convex whorls, the lower ones densely covered by sharp riblets, which make the impression of being pushed upwards at the suture. These character states are not known from other clausiliid species in the Peloponnese. In *A. grayana* the basal keel is less conspicuous than it is in *A. evelynae*. Apart from that, the type of clausilial apparatus differs in the two taxa. Obviously, *A. grayana* and *A. evelynae* form one more example of a couple of species differing mainly in the clausilial apparatus, which has an N- and a G-type, respectively (Gittenberger & Schilthuizen, 1996).

A. evelynae belongs with *A. grayana* to the 'Gruppe der *discolor*', as defined by Nordsieck (1977: 291), named after *Albinaria discolor* (L. Pfeiffer, 1846). Only 3 km SE. of the only known population of *A. evelynae*, on another isolated limestone cliff, *A. pelocarinata* Gittenberger, 1994, is found, in a mixed population with very few *A. discolor discolor*. These two taxa, considered specifically distinct because intermediate specimens were not observed, are characterized by an N-type CA. About 8 km NW. of the type locality of *A. evelynae*, at the other side of the plain south of Molai (without an *Albinaria* habitat), *A. discolor eureka* Gittenberger, 1994, occurs. Further north *A. discolor haessleini* Fauer, 1978, is found. These subspecies of *A. discolor* differ from the nominate subspecies by the presence of a G-type CA. Within a small area here, the *A. discolor* species group is surprisingly diverse, with both N- and G-type taxa.

Etymology. — Slightly latinized, after somebody called Evelien, at the request of E.J. Gittenberger, who assisted in collecting this species during field work in Greece.

REFERENCES

- DOURIS, V., S. GIOKAS, R. LECANIDOU, M. MYLONAS & G.C. RODAKIS, 1998. Phylogenetic analysis of mitochondrial DNA and morphological characters suggest a need for taxonomic re-evaluation within the Aloiinae (Gastropoda: Clausiliidae). — *J. Moll. Stud.* 64: 81-92.
- GITTENBERGER, E., 1987. Neue taxa der sogenannten Gattung Isabellaria (Gastropoda Pulmonata: Clausiliidae) vom Peloponnes. — *Basteria* 51: 79-84.
- , 1994. Five new Albinaria subspecies from the eastern Peloponnese, Greece; with notes on Isabellaria s.l. (Gastropoda Pulmonata: Clausiliidae). — *Basteria* 58: 55-62.
- , & M. SCHILTHUIZEN, 1996. Parallelism in the origin of the G-type clausilial apparatus (Gastropoda, Pulmonata, Clausiliidae). In: J. Taylor (Ed.), *Origin and evolutionary radiation of the Mollusca*: 295-300. Oxford, New York, Tokyo.
- NORDSIECK, H., 1975. Was ist Clausilia thermopylarum L. Pfeiffer?. — *Arch. Molluskenk.* 106: 109-113.
- , 1977. Zur Anatomie und Systematik der Clausilien, XVII. Taxonomische Revision des Genus Albinaria Vest. — *Arch. Molluskenk.* 107: 285-307.
- , 1978. Zur Anatomie und Systematik der Clausilien, XIX. Das System der Clausilien, I: Taxonomische Merkmale und Gliederung in Unterfamilien. — *Arch. Molluskenk.* 109: 67-89.
- , 1997. Phylogeny of and within the Albinaria-Isabellaria group (Gastropoda: Pulmonata: Clausiliidae). — *Heldia* 4 (Sonderheft 5): 53-61.
- SCHILTHUIZEN, M., E. GITTENBERGER & A.P. GULTYAEV, 1995. Phylogenetic relationships inferred from the sequence and secondary structure of ITS1 rRNA in Albinaria and putative Isabellaria species (Gastropoda, Pulmonata, Clausiliidae). — *Mol. Phylogenet. Evol.* 4: 457-462.
- SCHILTHUIZEN, M., Th.C.M. KEMPERMAN & E. GITTENBERGER, 1994. Parasites and predators in *Albinaria* (Gastropoda Pulmonata: Clausiliidae). [Proc. 6th Int. Congr. Zoogeogr. Ecol. Greece Adj. Reg., Thessaloniki]. — *Bios* (Macedonia, Greece) 2: 177-186.