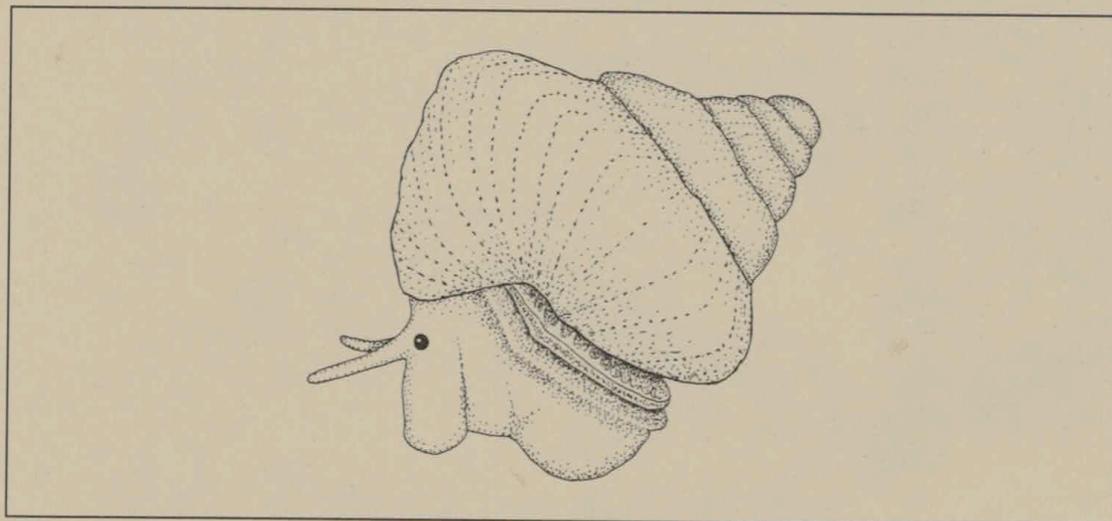


# Schriften zur Malakozoologie

aus dem Haus der Natur - Cismar

## Heft 23



- NAGEL, K.-O., SCHWARZER, A., FETTHAUER, M. & SCHNEIDER, J.: Wiederentdeckung der Flussperlmuschel, *Margaritifera margaritifera* (L. 1758), im Westerwald (Rheinland-Pfalz). ..... 1
- SZEKERES, M.: Four new subspecies of *Alopiia* H. & A. ADAMS 1855 (Gastropoda, Pulmonata: Clausiliidae). ..... 7
- RICHLING, I., FRANKE, F., FERNÁNDEZ V., A. & SIGARRETA V., S.: New data on the micro-land snails *Eutrochatella (Microviana) spinopoma* AGUAYO 1943 and *Eutrochatella (Microviana) holguinensis* AGUAYO 1932 (Neritopsina: Helicinidae) in the province of Holguín, eastern Cuba). ..... 19
- STRATMANN, D. & SCHWABE, E.: Description of a new *Calliostoma* species from Samoan Islands (Mollusca, Gastropoda: Calliostomatidae). ..... 25
- WIESE, V. & RICHLING, I.: *Pyrulofusus deformis* in Nordostgrönland (Gastropoda: Buccinidae). ..... 30
- MIFSUD, C.: On the identity of *Mitra exigua* VON MALTZAN 1884 (Mollusca: Gastropoda). ..... 31
- ÖRSTAN, A. & WELTER-SCHULTES, F. W.: Reproductive isolation between two *Albinaria* species in a contact zone (Gastropoda: Clausiliidae). ..... 33
- LORENZ, F. & CHIAPPONI, M.: The deep water subspecies of *Zoila friendii* GRAY 1831 (Gastropoda: Cypraeidae). ..... 39
- DHARMA, B.: Report on fossil *Amphidromus* and description of new species and new subspecies of recent and fossil *Amphidromus* from Indonesia (Gastropoda, Pulmonata: Camaenidae). ..... 45
- FRANKE, S. & FERNÁNDEZ V., A.: A new land snail of the genus *Idiostemma* PILSBRY et VANATTA 1898 (Gastropoda: Urocoptidae) from Eastern Cuba. .... 79
- WELTER-SCHULTES, F. W.: The gender of *Metafruticicola* is feminine. .... 87

## The deep water subspecies of *Zoila friendii* GRAY 1831 (Gastropoda: Cypraeidae).

By FELIX LORENZ and MARCO CHIAPPONI,  
Buseck-Beuern and Lecco.

**Keywords:** Cypraeidae, *Zoila friendii*, deep water subspecies

**Abstract:** A deep water subspecies of *Zoila friendii* GRAY 1831 is described as *Zoila friendii kostini* n. ssp. based on shell morphology, bathymetry and geography.

**Introduction:** No other group of cowries (Gastropoda: Cypraeidae) has been given as much attention in past years as the genus *Zoila*, whose living members inhabit a large area along the southern half and the west of the Australian continent. This paper describes and discusses a well known, yet taxonomically orphaned deep-water subspecies of the widespread *Zoila friendii*.

### *Zoila friendii kostini* n. sp.

#### Material studied:

(data enumerated: shell's length x width x height in mm, labral: columellar teeth counted, Collecting data, depository, illustration herein).

Holotype: 67,5 x 42,7 x 34,7 (24:19). Collected between Fremantle and Geraldton at approx. 150 m in 1912 by FIS "Endeavour" Cruise. WAM S33040. Plate 7 fig. 1

Paratype 1: 85,7 x 51,4 x 42,9 (30:24). Collected off Green Head, Western Australia at approx. 120 m in 1967 by M. Sertori. WAM S12878. Plate 7 fig. 2

Paratype 2: 70,9 x 44,2 x 36,8 (26: 26). Collected "about 77 km southwest of Dongara", Western Australia at 146 m in 1976. WAM S12877.

Paratype 3: 85,7 x 52,1 x 41,7 (28:21). Collected off Green Head, Western Australia at 60 fms in 1967 by M. Sertori. WAM S33041.

Paratype 4: 80,7 x 52,1 x 42,2 (31:27). Collected off Jurien Bay, Western Australia, off 61 fms in 1968 by B. Parkins. WAM S33042

Paratype 5: 78,9 x 53,0 x 43,2 (27:22). Collected 72 km west of Dongara, Western Australia, at 164 m in 1976. WAM S12876

Paratype 6: 67,8 x 44,9 x 35,7 (25:22). Collected off Rottneest Island, Western Australia, at 200 m in 1992. Coll. F. Lorenz, Plate 8 fig. 3

Paratype 7: 73,9 x 45,8 x 37,0 (30:27). Collected off Perth, Western Australia, crabbed in crayfish pot at 75 m. Coll. F. Lorenz, Plate 8 fig. 5

Plus two further paratypes in coll. A. KOSTIN and three in coll. F. LORENZ.

For comparison, the following shells of the *friendii*-complex in the collections F. LORENZ, M. CHIAPPONI and A. KOSTIN were available for study: 288 *Z. friendii friendii* GRAY 1831, 41 *Z. friendii marina* KOSTIN 2005, over 300 *Z. friendii vercoi* SCHILDER 1930 and its numerous color variations, 152 *Z. jeaniana jeaniana* CATE 1968 and its shallow water variations, 66 *Z. jeaniana aurata* RAYBAUDI 1979, 20 *Z. jeaniana thalamega* Lorenz 2002, 170 *Z. thersites thersites* GASKOIN 1849 and 68 *Z. thersites contraria* IREDALE 1935.

**Description:** The shell is rather large and heavy. The general outline is elongate-oval, tapering equally on either end. The posterior extremity is hardly rostrate, with thin edges. There is a slight callus-ridge along the labral side of the posterior extremity. On the columellar side, the extremity covers the large, conspicuously projecting spire. The anterior canal is slightly rostrate. The dorsal dome

is not humped, almost depressed. The base is callused and convex. The aperture is moderately narrow throughout. Labral and columellar teeth are well produced. The columellar teeth are strongest in the anterior third, becoming less distinct towards the posterior. The ground colour is bright white, the extremities are stained with orange. The base is of a faint orange color. The dorsum and the margins are sparsely spotted with small, distant orange spots.

The paratypes studied agree with this description. There is slight variability in the degree of rostration and shape. In one shell (Paratype No. 2) the columellar teeth are rather weak in the posterior half. In all shells, the base is convex. Two paratypes from depth around 60 to 75 m show darker dorsal spotting but otherwise agree in all structural features.

**Type locality, distribution and habitat:** *Zoila friendii kostini* n. ssp. was found by dredging or trawling at 90 to 200 m, offshore southwestern Australia, from the Geraldton area to Cape Leeuwin. Few specimens have been collected in crayfish pots or by divers, with the aid of rebreather technology, at 60 to 75 m around Rottnest Island and the Perth area. The holotype was collected between Fremantle and Geraldton at approx. 150 m.

**Etymology:** Named in honour of ANDREY KOSTIN of Moscow, a keen diver, collector and student of cowries.

**Discussion:** *Zoila friendii kostini* n. ssp. was the first of the deep water populations of *Zoila* that was discovered, in 1912, and is the last one to be named. This was mainly due to the scarcity of material. The Western Australian Museum possesses a series of six well preserved shells, but hardly more than a dozen further specimens subsequently made it into private collections.

A classic example of a deep water population, *Zoila friendii kostini* is of pale shell color and inflated shape. It differs from *Z. jeaniana aurata* by having a distinctly convex base, without a prominent angle along the left margin, by being more slender and not humped dorsally. The spire is larger and more distinctly projecting. Despite a certain variability, a combination of these features is only found in *Z. f. kostini*. In the shallow water along the southern coast of Australia, *Z. friendii vercoi* SCHILDER is found in the southwest (map 1 region d), *Zoila thersites* in the east of the Bight (map 1 region e). Few shells, conchologically resembling *Z. f. vercoi* on account of a more concave base and wide aperture, have been found inbetween, in shallower water off the central Bight.

The deep water populations in that area constitute a highly variable complex of pale shelled morphs which are generally called *Z. thersites contraria*. Conchologically similar shells even occur among shallow water populations of either *Z. f. vercoi* and *Z. thersites*. All of these differ from *Z. f. kostini* by the absence of teeth in the posterior half of the columellar side, by being more humped dorsally, and by mostly having a wider aperture. Despite the variability in coloration, these features are consistent in more than 90% of the shells studied.

Along the distribution of the shallow water populations (from 1 to approximately 60 m depth) of the members of the *Zoila friendii* species-complex (map 1 regions a-e) there are populations in deep water (map 1 regions 1-3), two of which have been given the status of a bathymetric subspecies: The northern *Z. jeaniana aurata* (North West Shelf to Abrolhos, map 1 region 1) and the southern *Z. thersites contraria* (Great Australian Bight to the Ceduna area, map 1 region 3) from depths of 90 to 200 m. Interestingly, few shells of *jeaniana* are available from the depth range between 60 and 90 m, and very few conchological intermediates between the deep water and the shallow water populations are known.

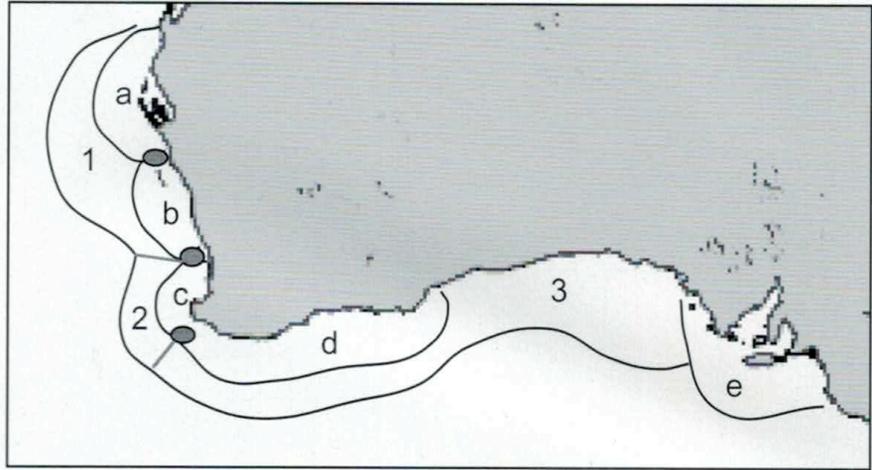
Geographically, *Zoila friendii kostini* n. ssp. takes an intermediate position between *jeaniana aurata* and *thersites contraria*, in the area between Geraldton and the south of the Cape Leeuwin Peninsula (map 1 region 2).

Conchologically, however, *Zoila friendii kostini* is not intermediate between the southern *Z. thersites contraria* and the northern *jeaniana aurata*: the characteristic convex base and rather depressed dorsum are not shared with either taxon. Furthermore, *Z. f. kostini* does not seem to represent an "inflated pale deep water form" of the shallow water populations of *Z. friendii friendii* (map 1 region c): these have no teeth along the posterior half of the columella, which is a very important structural feature in *Zoila* taxonomy: In region 1 and a, all, and in b, most shells of the complex have distinct columellar teeth throughout, whereas in region c and all southern areas, the columellar dentition fades posteriorly (see below). Typical *Z. friendii friendii* are usually found at depth between 8 and 30 m, rarely deeper, but is some places as shallow as half a meter of water.

Few *Z. friendii kostini* have been collected at the 50-75 m mark off Rottnest Island and the Perth area. These shells have a darker spotted dorsum than the trawled shells, but a similar pale cream base and distinct columellar teeth. In that regard, *Z. f. kostini* is closer to *Z. f. marina* (map 1 region b) than the adjacent shallow water *friendii friendii*. *Z. f. marina* represents a widespread but uncommon member of the group, connecting the northern shallow water *jeaniana jeaniana*, existing sympatrically

with an isolate slender population known as *jeaniana thalamega* from Kalbarri (sharing a distinct columellar dentition, map 1 region a) and the southern *friendii friendii* (sharing a more slender shape and darker coloration of the margins, map 1 region c).

Map 1:  
Distributions of  
the members of  
the *Z. friendii*-  
group.



**Explanations of Plate 7 (p. 42):**

Fig. 1. *Zoila friendii kostini* Holotype.

Collected between Fremantle and Geraldton at approx. 150 m in 1912 by FIS "Endeavour" Cruise. WAM S33040

Fig. 2. *Zoila friendii kostini* Paratype 1.

Collected off Green Head, Western Australia at approx. 120 m in 1967 by M. Sertori. WAM S12878

**Explanations of Plate 8 (p. 43):**

Fig. 3. *Zoila friendii kostini* Paratype 6.

Collected off Rottnest Island, Western Australia, at 200 m in 1992. Coll. F. Lorenz

Fig. 4. *Zoila jeaniana aurata*. 69,7 mm.

Collected offshore Point Maud, Western Australia, off approximately 150 m.  
Note the flattened base in comparison to fig. 1

Fig. 5. *Zoila friendii kostini* Paratype 7.

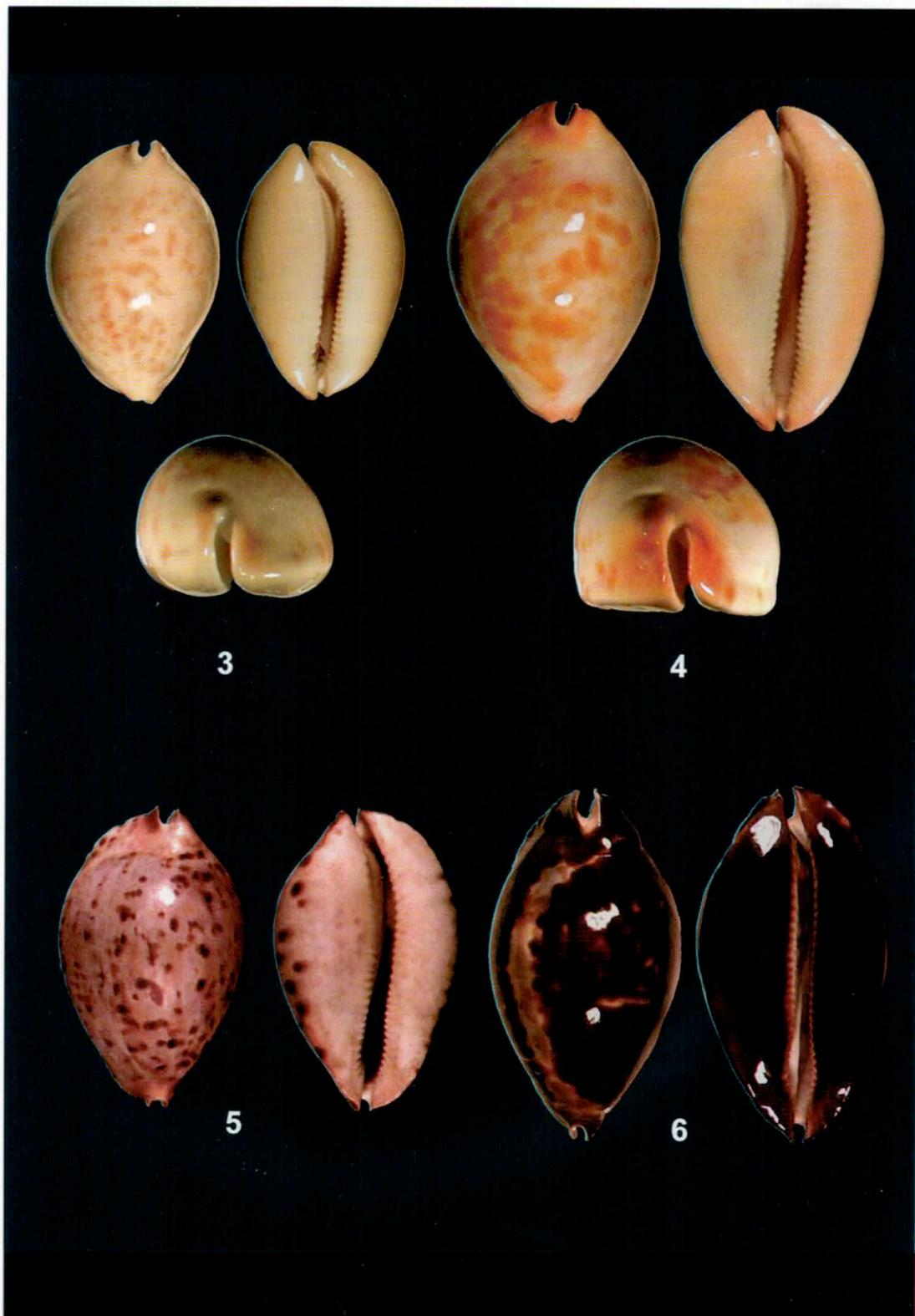
Collected off Perth, Western Australia, crabbed in crayfish pot at 75 m. Coll. F. LORENZ

Fig. 6. *Zoila friendii marina* Paratype 7.

92,9 mm, Collected in the Middle Group, Abrolhos Is., Western Australia at 40 m. Coll. F. LORENZ.  
Note the distinct columellar teeth in the posterior half.



F. LORENZ & M. CHIAPPONI: The deep water subspecies of *Zoila friendii* GRAY 1831.



F. LORENZ & M. CHIAPPONI: The deep water subspecies of *Zoila friendii* GRAY 1831.

So far, little is known about the population dynamics and the recent evolution of the complex. DNA studies show little differences between the various taxa, and all concepts presented to explain the patterns of distribution, possible interbreeding zones and migration along the Australian coast (e.g. those in WILSON & CLARKSON 2004) are based on guesses. *Zoila friendii kostini* is an example of a bathymetric subspecies that does not seem to be directly linked to the nearest shallow water relative, *friendii friendii*, as important aspects of its shell morphology differ (especially the columellar dentition). The evolution of such structural features as well as the composition of pigmentation is not continuous among the taxa of the *friendii*-complex, but each one varies in different ways along the distribution of the complex, in the deep water populations as well as in the shallow water ones. The range of variations is so great that a seemingly continuous set of shells can be presented, if one wishes to create this impression, and individual specimens not displaying all the criteria assigned to a taxon can be found within every population. Likewise, intermediate specimens conchologically linking one population with another occur, but not necessarily in geographically intermediate regions.

Taxonomists have dealt with these phenomena in different ways; the diversity of species-complexes, deep water populations, clinal subspecies, and the occurrence of hybrids. WILSON & CLARKSON (2004) correctly state that "ironically, as more material becomes available, (...) the taxonomy (...) has become more complicated and more controversial" - to us, it means attention to detail rather than irony: the more we know about a group as the *Zoilas*, the better we may interpret its complexity and provide a taxonomy that is appropriately comprehensive.

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