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Authors: Nangammbi, T. C., and Herbert, D. G.

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A new species of pheasant shell from the south-western Indian Ocean (Mollusca: Gastropoda: Vetigastropoda: Phasianellidae: *Tricolia*)

T. C. Nangammbi* and **D. G. Herbert**

Natal Museum, P. Bag 9070, Pietermaritzburg, 3200 South Africa, and School of Biological & Conservation Sciences, University of KwaZulu-Natal, P. Bag X01, Scottsville, 3209 South Africa; dherbert@nmsa.org.za

*Current address: University of the Free State, P. Bag 13, Phuthaditjhaba, 9866 South Africa; nangammbiTC@qwa.uovs.ac.za

ABSTRACT

Tricolia retrolineata sp. n. is described from off-shore reef habitats in southern Mozambique and north-eastern South Africa. The smooth, glossy shell with bright, variegated colour pattern, as well as the convex, paucispiral, calcareous operculum and lack of interior nacre clearly place this species in the family Phasianellidae. The bulimoid shape of the shell, combined with its small size and lack of capillary lines in the colour pattern are typical of the genus *Tricolia s.l.*

KEY WORDS: Mollusca, Phasianellidae, *Tricolia*, pheasant shells, new species, subtropical, Indian Ocean, subtidal, coral reef.

INTRODUCTION

On-going research on phasianellid diversity and systematics in southern Africa has already brought to light two new species of the genus *Tricolia* from subtidal habitats off the east coast (Nangammbi & Herbert 2006). We here describe an additional species from southern Mozambique and north-eastern South Africa, which has recently been recognised amongst specimens previously identified as *T. alfredensis* (Turton, 1932), itself a junior synonym of *T. elongata* (Krauss, 1848) (Nangammbi unpubl. data), a species known only from the southern Cape.

MATERIAL AND METHODS

The material discussed was isolated during a re-evaluation of the phasianellid material in the Natal Museum Mollusca collection. Most of the specimens were obtained through the museum's SCUBA diving programme of the 1980s and 1990s. Additional material was obtained from dredge samples and beach-drift. Photographs of shells were taken using a Nikon D70 camera with 55 mm AF Micro Nikkor lens and extension tubes, or a Leica MZ16 stereomicroscope with auto-montage camera. The external surface of the operculum was examined at 15 kV accelerating voltage in a Philips XL30 Environmental Scanning Electron Microscope. The distribution map was plotted using ArcView GIS, Version 3.1.

The following acronyms are used:

NMDP – Natal Museum Dredging Programme;
NMSA – Natal Museum, Pietermaritzburg, South Africa;
NPB – Natal Parks Board (now Ezemvelo KwaZulu-Natal Wildlife).

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TAXONOMY

Family Phasianellidae Swainson, 1840

Genus *Tricolia* Risso, 1826

Tricolia retrolineata sp. n.

Figs 1–12, 15–17

Etymology: From Latin *retro* (backward) and *lineata* (lined), referring to the opisthocline lines which usually form a conspicuous element of the colour pattern.

Diagnosis: Shell small, bulimiform; whorls lacking distinct keel or angulation, but noticeably more strongly rounded below periphery; body whorl relatively large in proportion to the rest of shell; suture relatively shallow; surface smooth and somewhat glossy; fresh specimens translucent with variable coloration, but typically yellowish brown patterned with numerous, fine, close-set, sinuous, orange-red, opisthocline lines, and with bold, white, red or dark brown blotches or zigzag axial lines on adapical surface of each whorl; apical whorls lacking subsutural spots.

Description:

Shell small, bulimiform, with up to 3.5 teleoconch whorls; body whorl relatively large in proportion to the rest of shell (*ca* 80 % of total length); whorls lacking a distinct keel or angulation, but noticeably more strongly rounded below periphery; suture relatively shallow. Shell usually smooth and glossy, lacking spiral sculpture, marked only by fine growth-lines. Aperture ovate-circular, outer lip thin; interior without nacre and colour pattern visible internally; inner lip concave and slightly reflected over umbilical region; umbilicus closed in most specimens, but occasionally remaining as a narrow chink. Shell translucent with variable coloration; ground colour yellowish, typically patterned with numerous, fine, close-set, sinuous, orange-red, opisthocline lines, and commonly with bold white and red or dark brown blotches on adapical surface (Figs 1, 2, 7, 8), or with alternating darker orange-red and paler zigzag axial lines (Figs 3–6); in some specimens the opisthocline lines anastomose, creating a darker reddish network with yellowish orange spots (Figs 9, 10); umbilical region often bordered by a broad white band traversed by the red opisthocline lines which by this stage appear almost axial; apical whorls lacking white subsutural spots (Fig. 15).

Protoconch: Unknown (shell apex worn in all the material available, no specimens suitable for SEM).

Operculum (Fig. 16): Calcareous, thick and convex; paucispiral with eccentric nucleus; exterior somewhat eroded in the single operculum available, but clearly showing a narrow peripheral groove underlying labral margin.

Radula and external anatomy: Unknown.

Measurements (mm): Holotype (Figs 1, 2) – length 6.4, width 3.5; largest specimen – length 7.4, width 4.1. Length:width ratio 1.2–1.3 (N=10).

Habitat: On the available evidence, *T. retrolineata* is a subtidal species inhabiting offshore reefs; the bulk of material has been collected from swash accumulations of dead shells in coral reef gulleys, suggesting that the animals were living on the reefs themselves. The single live-collected specimen was found on a coral-dominated reef between 7 and 11 m. Empty shells have also been collected on more algae-dominated reefs and

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Figs 1–12. *Tricolia retrolineata* sp. n., variation in shell colour and pattern: (1, 2) holotype, length 6.5 mm, width 3.5 mm, NMSA L5938/T2238, Ponta do Ouro, Mozambique; (3–12) paratypes: (3, 4) length 5.8 mm, width 3.3 mm, NMSA S2851/T2242, between Bhanga Nek and Kosi Bay, KwaZulu-Natal; (5, 6) length 7.1 mm, width 3.8 mm, NMSA L7357/T3339, Ponta do Ouro, Mozambique; (7, 8) length 6.0 mm, width 3.4 mm, NMSA L6904/T2240, Malongane, Mozambique; (9, 10) length 6.5 mm, width 3.4 mm, NMSA W1935/T2243, Mzamba, Eastern Cape; (11, 12) length 7.4 mm, width 4.1 mm, NMSA E2476/T2241, Leadsman Shoal, KwaZulu-Natal.

this may be the principal habitat at southern localities where coral-dominated reefs are absent.

Comparison: The smooth, glossy shell with bright, variegated colour pattern, as well as the convex, paucispiral, calcareous operculum and lack of interior nacre clearly place this species in the family Phasianellidae. The bulimiform shape of the shell, combined

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Fig. 13. *Tricolia elongata* (Krauss, 1848), length 12.7 mm, width 6.9 mm, NMSA W4769, Cape Agulhas, Western Cape.

with its small size and lack of capillary lines in the colour pattern are typical of the genus *Tricolia s.l.* (Robertson 1985; Hickman & McLean 1990).

Specimens of this new taxon were previously identified under the name *Tricolia alfredensis* (Turton, 1932), primarily on account of their bulimiform shape and distinctive colour pattern of sinuous opisthocline lines. However, *T. alfredensis* is now considered to represent nothing more than a colour form of the variable *T. elongata* (Krauss, 1848) (Nangammbi unpubl. data). Although *T. retrolineata* resembles *T. elongata* more than it does any other southern African *Tricolia* species, it differs from this in attaining a smaller size (maximum length 7.4 mm *vs* 13.7 mm in *T. elongata*) and in having a thin, translucent shell. This species is represented by a sample size of more than 100 specimens in the Natal Museum collection, and the probability of adult shells being represented in this sample would be high. *Tricolia elongata* (Figs 13, 14) also differs from *T. retrolineata* (Fig. 15) in having a spiral row of white, subsutural spots on second teleoconch whorl. However, this is only visible in fresh specimens of this species.

Furthermore, the two species differ in their habitat preferences. *T. retrolineata* is a subtidal species, whereas *T. elongata* occurs commonly in the rocky intertidal zone, living among seaweed at low spring tide level. Unfortunately, prior to this species being identified as an undescribed taxon, the body of the single live-collected specimen was used for DNA extraction in relation to phylogenetic studies of the southern African *Tricolia* radiation. However, the DNA was not successfully extracted, possibly due to relaxation of the specimen in $MgCl_2$ prior to preservation. Comparative data on the radula and external anatomy are therefore not available.

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Figs 14, 15. Apices of *Tricolia elongata* (Krauss, 1848) and *T. retrolineata* sp. n.: (14) *T. elongata* showing white, subsutural spots on second teleoconch whorl, NMSA W4769, Cape Agulhas, Western Cape; (15) *T. retrolineata* sp. n. lacking spots on apical region, NMSA L5938/T2238, Ponta do Ouro, Mozambique.

Holotype: MOZAMBIQUE: Ponta do Ouro (26.850ºS:32.917ºE), subtidal reef, hand-dredged sand, *ca* 20 m, 14.iv.1997, dived D. Herbert (NMSA L5938/T2238).

Paratypes: MOZAMBIQUE: 25 specimens, same collection data as holotype (NMSA L7357/T3339); 15 specimens, Malongane (24.798ºS:32.890ºE), coral reef north, hand-dredged sand, 10–20 m, 16.iv.1997, dived D. Herbert (NMSA L6904/T2240). SOUTH AFRICA: *KwaZulu-Natal*: 2 specimens (one alive), Leadsman Shoal (27.800ºS:32.867ºE), main portion of coral reef, 7–11 m, 14.v.1988, dived D. Herbert & NPB (NMSA E2476/T2241, Figs 11, 12, 16); 1 specimen, between Bhanga Nek and Kosi Bay (26.433ºS: 32.900ºE), algal portion, 5–9 m, underwater pump, 03.v.1990, dived D. Herbert & K. Bloem (NMSA S2851/ T2242). *Eastern Cape*: 26 specimens, Mzamba (31.100ºS:30.183ºE), x.1979, J.P. Marais (NMSA W1935/ T2243).

Other material examined (all NMSA): MOZAMBIQUE: off Malongane, coral reef *ca* 5 km, north of Ponta do Ouro, hand-dredged sand, 15–20 m, v.1994, dived D. Herbert (V1501). SOUTH AFRICA: *KwaZulu-Natal*: between Bhanga Nek and Kosi Bay (26.433ºS:32.900ºE), reef off marker 13 north, near pinnacles, 10–12 m, hand-dredged sand, 12.v.1990, dived D. Herbert (S2427); same locality, *ca* 8 m, underwater pump, 06.v.1990, dived D. Herbert & K. Bloem (S2737); off Lala Nek (27.227ºS:32.822ºE), 75 m, coarse sand, sandstone, coral, dredged NMDP, Stn. ZDD4, 08.vi.1990 (S9014); "B.J.'s Reef", off Hibberdene (30.583ºS:30.600ºE), 18–26 m, 15.xi.1992, dived D. Herbert (V1833). *Eastern Cape*: Mzamba (31.100ºS: 30.183ºE), beach-drift, 12–30.v.1986, R. Kilburn & D. Herbert (D2933).

Distribution and Biogeography (Fig. 17): *T. retrolineata* is a subtropical species endemic to south-east Africa, ranging from just north of the South Africa–Mozambique border (Malongane) south to the extreme north-east of Eastern Cape Province, South Africa (Mzamba).

The southern distribution limit of *T. retrolineata* lies approximately 300 km to the north of the known range of *T. elongata*. However, a gap of similar extent occurs within the range of *T. retrolineata*, namely between Leadsman Shoal and Hibberdene. The significance of these gaps differs. The interval within the range of *T. retrolineata* occurs in the Natal Bight and is probably caused by lack of suitable habitat in this area. A number of large, sediment-laden rivers enter the sea here (Umfolosi, Thukela, Umgeni, Umkomaas) and rocky subtidal habitats are scarce in this region, re-appearing again in number only off the KwaZulu-Natal south coast, to the south of Scottburgh. Many subtropical reef species and tropical stragglers exhibit a similar hiatus in distribution records in this region and the shore at Mzamba is well known as a site where shells of

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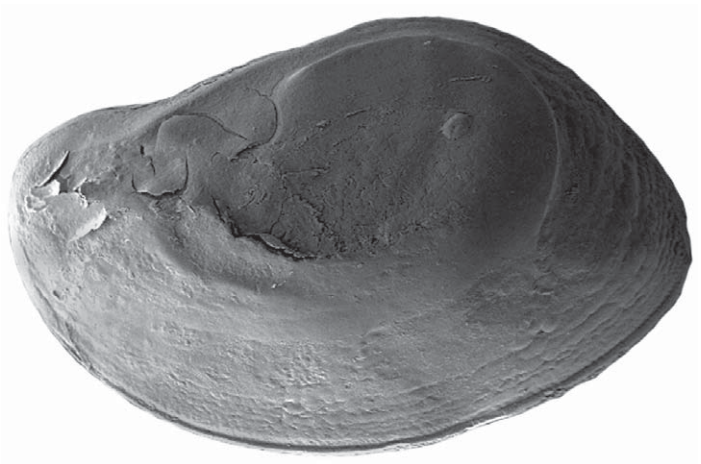


Fig. 16. Scanning electron micrographs of the external surface of operculum of *Tricolia retrolineata* sp. n., showing distinct peripheral groove underlying labral margin, paratype, maximum diameter 2.9 mm, NMSA E2476/T2241.

unusual tropical taxa regularly wash ashore, e.g. *Tonna perdix* (Linnaeus, 1758), *Agagus agagus* Jousseaume, 1894, *Strombus gibberulus* Linnaeus, 1758, *Conus obscurus* Sowerby, 1833, *Talparia talpa* (Linnaeus, 1758), and *Latirus turritus* (Gmelin, 1791). It is thus quite possible that shells of a species such as *T. retrolineata*, which is known from reefs off the KwaZulu-Natal south coast (as recorded at Hibberdene), could also wash ashore at Mzamba. The gap in its distribution in the Natal Bight is thus typical rather than exceptional for such warm-water taxa. Furthermore, the Natal Bight is also known to be impacted by the upwelling of cold, nutrient-rich water (Meyer *et al*. 2002), which may well be of significance to tropical/subtropical species accustomed to warmer water with lower nutrient content.

The similar sized gap between the southern population of *T. retrolineata* and the northern limit of *T. elongata* is of a very different nature. The southern African coastline is divided into three marine biogeographical provinces namely a subtropical east coast province, a warm-temperate south coast province and a cold-temperate west coast province (Stephenson & Stephenson 1972; Brown & Jarman 1978; Day & Grindley 1981; Emanuel *et al*. 1992; Bustamante 1994; Turpie *et al.* 2000; Harrison 2003). The boundaries between these provinces are defined by changes in species composition and water temperatures. The precise position of the interchange between the subtropical and the warm-temperate provinces on the east coast of South Africa appears to vary with the taxon under consideration and has been cited as Port St Johns (Stephenson & Stephenson 1972), Port Edward (Brown & Jarman 1978; Turpie *et al.* 2000), Great Kei River (Day & Grindley 1981), East London (Emanuel *et al*. 1992), and Mdumbi estuary (Harrison 2003). For the pheasant shells (Phasianellidae) of southern African this boundary lies between the Mbashe River and East London (Nangammbi unpubl. data). Thus the region separating the distributions of *T. retrolineata* and *T. elongata* has in many cases been identified as a region of major faunal turnover and biogeographic significance. In this context, *T. retrolineata* is a subtropical east coast species, whereas *T. elongata* is a warm-temperate south coast taxon.

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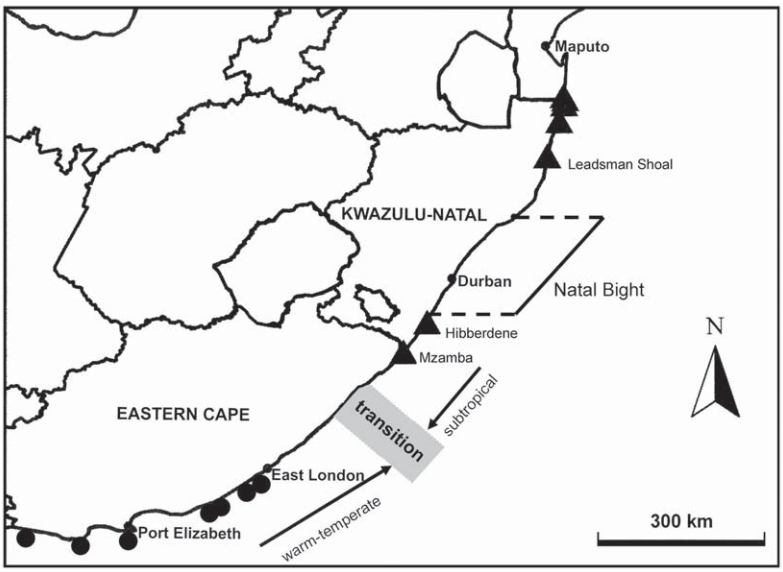


Fig. 17. Distribution of *T. retrolineata* sp. n. (▲) and *T. elongata* (●).

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