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A Putative Inter-Generic Hybrid Between *Conomurex* Fischer and *Gibberulus* Jousseaume (Gastropoda: Strombidae) from South Africa

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ABSTRACT This paper highlights a putative inter-generic *Conomurex* x *Gibberulus* hybrid from the Sodwana Bay area, North Natal, Republic of South Africa. Putative hybridisation in the Strombidae is becoming ever more recognised at the intra-generic level. Much rarer are the inter-generic hybrids. The new putative hybrid indicates that inter-generic hybridisation may well be an evolutionary force in the radiation of Strombidae, facilitating both rapid reticulation and speciation.

KEY WORDS Hybrid, Reticulation, South Africa, Stromboidea.

INTRODUCTION

Reticulation is often overlooked as a means of speciation and extinction in evolutionary thinking. Hybrids are often treated with a Darwinian conceptualisation of impotence, and therefore, evolutionary dead ends (Darwin 1850). More modern theory, while anchored in sterility, accepts productive viability in hybrids can occur, and this may lead to the formation of new species (Mayr 1963). Reticulation, or the generation of species through a process of hybridisation, has long been overlooked in families with rapid patterns of radiation in the animal kingdom (Madison and McMahon 2000). Notwithstanding there has been increasing interest in the hybridisation within the tropical marine gastropod group Strombidae (Thach 2007; Dekkers 2010; Kronenberg 2013; Liverani & Wieneke 2016).

The Strombidae are gregarious herbivorous organisms that are known to live in large mixed species aggregations giving rise to potential for hybridisation (Abbott 1960). Putative intra-generic hybridisation is well documented in Strombidae with records from *Dolomena* Wenz 1940 (or *Ministrombus*; Dekkers 2010), *Doxander* Wenz 1940 (Man in 't Veld and Visser 1993), *Euprotomus* Gill 1870 (Kuroda 1942), *Lambis* Röding 1798 (Greene, 1978; De Turk *et al.* 1999), *Lentigo* Jousseaume 1886 (Kronenberg 2008), *Lobatus* Swainson 1837 (Kronenberg 2013; Liverani & Wieneke 2016) and *Sinistrombus* Bandel 2007 (Thach 2007). Inter-generic hybridisation is less reported with most falling within the *Lambis* after Abbott (1961) historical complex and not considered therefore previously as inter-generic. However, recent systematics has elevated many subgenera to genera and this taxonomic repositioning has resulted in the inter-generic hybrids: *Lambis* x *Harpago* (De Turk *et al.* 1999). More recently, further evidence for inter-generic hybridisation with the Strombidae with a *Lambis* x *Sinustrombus* reported (Kronenberg, 2008).

The increasing number of recognized hybrids in Strombidae might well reflect the selective capacities of shell tradesmen and collectors who learned to recognize the hybrids from the millions of shells that are caught each year. The herein discussed hybrid is no exception: bought by a collector and integrated into a large private Strombidae collection (of the first author) and only recently recognized as a potential hybrid,

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particularly given the sympatric nature of the two hypothesised parent species (Barnard 1951; Kensley 1973; Richards 1984; Steyn and Lussi 1998).

SYSTEMATICS

Mollusca Linnaeus 1758
Caenogastropoda Cuvier 1797
Sorbeoconcha Ponder and Linberg 1987
Stromboidea Rafinesque 1815
Strombidae Rafinesque 1815

Conomurex Fischer 1884

Diagnosis. The shell of this genus is cone-shaped, with a blunted spire and a long narrow aperture. The outer lip is not dilated and runs parallel to the inner body whorl. The spire is rarely with varices.

Discussion. The genus *Conomurex* is a widely spread genus with members in the Mediterranean Sea (introduced), Indian and Pacific Oceans. There is one species known from both the Mediterranean Sea and the Indian Ocean, *C. persicus* Swainson 1821 originally described as *C. raybauldi* Nicolay & Romagna-Manoja 1983 (Alyalrinskaya 2003), The north-western Indian Ocean contains both *C. coniformis* Sowerby I 1842 and *C. decorus* Röding, 1798 (Abbott, 1960; Moolenbeek and Dekker 1993). With *C. persicus* Swainson 1821 restricted to the Red Sea (Abbott 1960). Within South Africa only *C. decorus* is known from Durban, Kosi Bay and East London (Barnard 1951; Abbott 1960; Kensley 1973; Richards 1984; Steyn and Lussi 1998).

Gibberulus Jousseaume 1888

Diagnosis. The shell of this genus is distorted and asymmetrical. Varices on the spire which tend to be broad and flattened in the south Pacific. The aperture is fusiform in shape.

Discussion. The genus *Gibberulus* contains three species: the Indian Ocean *G. gibberulus* Linnaeus 1758 (Abbott, 1960); the Red Sea *G. albus* Mörch 1850 (Abbott 1960); and the Pacific *G. gibbosus* Röding, 1798 (Abbott 1960). While these three species have historically been hypothesised as subspecies of *G. gibberulus* (Abbott, 1960), this paper considers them full species based on distinctive morphology and distribution patterns. Records from South Africa indicate that *G. gibberulus* ranges north from Durban (Barnard 1951; Kensley 1973; Richards 1984; Steyn and Lussi 1998).

Conomurex decorus Röding 1798 × *Gibberulus gibberulus* Linnaeus 1758

Description. The shell has a length of 60.6 mm and a width of 31.2 mm. The shell is solid and heavy for the size with a flaring but recurved outer lip. The body whorl is smooth with a rounded shoulder and smooth with small growth and spiral lines towards the outer lip. The spire is moderately high, not shouldered on early whorls and with regular varices that are placed at 120°. The shell is dorsally depressed with asymmetrical whorls and a ventro-dorsal height of 23.5 mm. The columella is thickened and is off-white in colouration. Posterior sinus well developed and not reaching the penultimate whorl. The stromboid notch is well developed. The anterior canal is short and ovate. Aperture and labrum smooth except for fine lirae basally around the stromboid notch. The dorsal colouration is a white-cream ground colour scantily decorated by brown chevron like streaks that are seemingly arranged in spiral

bands. The inner aperture has an orange colouration. The operculum is brown with 8 serrations. The specimen was collected by Alan Secombe, diving in 10m in the Sodwana Bay area, Natal north coast, Taken Republic of South.

Discussion. The putative hybrid shared characteristics unique to each of its hypothesised parents (Figure 1, Table 1). Of particular note is the shape and coiling of the whorls leading to an irregularly depressed body typical in form to *Gibberulus*. In contrast, there are distinctive characteristics like the colour and decoration of the aperture, the overall shell colour and the strombid notch are typical for members of *Conomurex*.

CONCLUSION

The role of hybridisation in the evolutionary processes of reticulation and speciation are often over looked. However, as more hybrids are discovered and the extent and limitations of hybridisation in the Strombidae are explored, there will be a need to reconsider the validity of names attributed to hybrids that may now represent stable populations. This is particularly the case with the *Lambis*. The new putative hybrid highlights the need to explore and determine the limitations of hybridisation. Knowing these limitations might inform on fossil systematics providing insights to the rapid rise of novel taxa.

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Plate 1. Figure 1 = *Gibberulus gibberulus* Linnaeus 1758, Inhaca Island, Maputo Bay, South Mozambique. Snorkling 2-3 m. on sandy mud in sea grass. Length 45.5 mm. AMD STR3073. Figure 2 = *Conomurex decorus* Röding 1798 × *Gibberulus gibberulus* Linnaeus 1758, Natal north coast, Sodwana area, RSA. Dived in 10 m, 2009, Length 60.6 mm. AMD STR1639. Figure 3 = *Conomurex decorus* Röding 1798, Natal, RSA. On sand flats at low tide, 1969. Length 57.3 mm. AMD STR0490.

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Character	*Conomurex decorus*	hybrid	*Gibberulus gibberulus*
Size (Length)	30 - 70 mm	60.6 mm	30 -70 mm
Shell	Heavy and solid	Heavy and solid	Heavy and solid
Number of whorls	9 to 10	9 to 10	10
Spire	Spire depressed, coronated at first becoming less so with development, deep sutural groove, strongly shouldered at the commencement of the body whorl, no old varices.	Spire medium tall, early whorls with regular varices at 120°, deep suture as a groove, body whorl with round shoulder.	Spire moderate tall , with broad swollen former varices which are crossed by 6 to 8 spiral threads. The varices are sometimes more or less placed at 180° and sometimes regularly go at 120° . Often the pre-ultimate whorl very swollen.
Form of shell whorls seen from apex	Round	Depressed	Depressed
Aperture decoration	Smooth, often with small striae near the strombid notch.	Smooth, with small striae near the strombid notch.	Lirae on the full length of the labrum.
Aperture colour	White with light orange interior of labrum with white border.	White with orange interior of labrum with white border.	White-cream with on the inside tinted purplish to violet.
Stromboid notch	Small, deeper than width	Smaller and deeper	Broader than depth
Anterior canal	Small and high	Roundish	Broader than high
Colour dorsum	Basic colour white to cream. Body whorl with several variable bands of irregular light brown flecks.	Cream white with streaks forming chevron like signs, vaguely in bands.	Basic colour dark cream to light brown with brown bands and flecks.
Posterior sinus and canal	Shallow and not very thickened sinus, ending in a small posterior canal. Almost reaching previous whorl.	Well visible posterior sinus, ending in a small anterior canal. Not reaching previous whorl.	Posterior sinus is a hooked edge towards a deep posterior canal.
Serrations on operculum	6 to 7	8	7 to 8

Table 1. Comparison of *Conomurex decorus* Linnaeus 1758, and *Gibberulus gibberulus* (Linnaeus, 1758) and the putative hybrid specimen.