

A NEW GENUS AND SPECIES OF CAMAENID SNAIL (MOLLUSCA: PULMONATA) FROM TERENGGANU, PENINSULAR MALAYSIA

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ABSTRACT. — We describe a new genus and species of land snail belonging to the family Camaenidae. The specimens were found in forest reserves in the State of Terengganu, Peninsular Malaysia. *Kenyirus sodhii* new genus and species, is clearly distinct from its confamilials. This new genus is named after Lake Kenyir as it appears endemic to the forests adjacent to the lake, while this new species is named after the late Navjot Sodhi, an eminent professor in conservation biology whom this special issue is dedicated to.

KEY WORDS. — Camaenidae, *Kenyirus*, Malaysia, mollusc, new genus, new species, *sodhii*, systematics

INTRODUCTION

The Camaenidae, Pilsbry, 1895, is usually treated as a very large and diverse family, comprising more than a hundred genera (e.g., Vaught, 1989), and with a relatively wide and disjunct distribution encompassing Asia (from Sri Lanka to India through Southeast Asia up to Japan), Australasia (New Guinea to Australia and several Pacific islands), and Central and South America (from Costa Rica, the Greater and Lesser Antilles to Northern Argentina) across both hemispheres (Wurtz, 1955; Scott, 1996; Cuezco 2003; Wade et al., 2007). However, there is still no consensus on the classification of the Camaenidae sensu stricto (e.g., see Schileyko, 2003; Bouchet & Rocroi, 2005 and references therein). The shells of Camaenidae sensu lato are very variable in shape, size and colour, and there is no set of diagnosable morphological characters unique to the family. However, this polyphyletic land snail family has been traditionally distinguished from others by the absence of a dart sac and other secondary sexual characters in the animal (Pilsbry, 1895, 1939); this unique trait was corroborated by recent molecular phylogenetic data (Wade et al., 2007).

Camaenids are renowned for their remarkable radiation across regions such as Australia, where more than 400 species and 80 genera can be found from rainforest to desert ecosystems

(Hugall & Stansic, 2011). In Peninsular Malaysia, however, only four camaenid genera (i.e., *Amphidromus* Albers, 1850; *Chloritis* Beck, 1837; *Ganesella* Blanford, 1863; and *Trachia* Albers, 1860) are represented by less than 30 species and subspecies (Maassen, 2001; <http://malaypeninsularsnail.lifedesks.org>). To our knowledge, the last few camaenid species described from the mainland of the peninsula were two species of *Trachia* by de Morgan (1885), and an *Amphidromus* by Fulton (1901). Since then, there have only been descriptions of two new subspecies and a rediscovery of a species from islands off the peninsula (i.e., *Amphidromus inversus albulus* Sutcharit & Panha, 2006, *A. atricallosus temasek* Tan et al., 2011, and *A. mundus* (Pfeiffer, 1853; see Sutcharit & Panha, 2011).

Here, we describe a new genus and species of camaenid from hill dipterocarp forests neighbouring Lake Kenyir in the State of Terengganu, Peninsular Malaysia. It has been more than a century since the last camaenids were described from the peninsula mainland. However, this remarkable discovery is unsurprising given that contemporary malacological surveys have focused on limestone karst outcrops, where land snail species densities are higher (e.g., Clements et al., 2008a) and new karst-endemic species continue to be discovered (e.g., Clements et al., 2008b). Non-karstic forests in Peninsular Malaysia (and forests in the Indo-Malayan region for that

matter; Giam et al., 2012) should therefore not be overlooked by malacological surveys as they still hold tremendous potential for future discoveries of new land snail genera and species.

MATERIAL AND METHODS

Descriptions of *Kenyirus sodhii*, new genus and species, are based solely on conchological characters because no living individuals were found to date. After examining known camaenid genera within Sundaland, we believe a description of this new genus and species based on shell morphology is warranted given the lack of similarities with any confamilials. Measurements were taken in mm, shell height (SH) and shell diameter (SD) were measured to the nearest 0.1 mm; measurement of shell diameter includes the rostrum of the aperture. Specimens examined are deposited in: 1) the Zoological Reference Collection (ZRC), Raffles Museum of Biodiversity Research, National University of Singapore; and 2) the BORNEENSIS collection (BOR), Institute for Tropical Biology and Conservation, Universiti Malaya Sabah.

SYSTEMATICS

CAMAENIDAE, Pilsbry 1895

Kenyirus, new genus

Type species. — *Kenyirus sodhii*, new species. Gender: Masculine.

Diagnosis. — The key conchological characters distinguishing *Kenyirus*, new genus, from other camaenid genera from Sundaland include the peculiar subtriangular peristome, which, in mature individuals, is distinctly distended into a spout-like rostrum (corresponding to the peripheral keel), the depressed apical whorls, and the presence of a keel around the umbilicus. Spire low with depressed apex; embryonic and post nuclear whorls with microscopic malleate sculpture and axial striations; umbilicus distinct, bordered by a keel, and partially covered by the reflexed lower lip; profile of the ventral side smoothly convex, not sunken towards the umbilicus.

Etymology. — ‘*Kenyirus*’ from the forests around Lake Kenyir where the specimens were collected.

Remarks. — Within Sundaland, no comparable confamilials have been found, and *sodhii*, the species herein described as new, could not be comfortably placed in any known genus. We therefore propose this new genus to accommodate the type species.

The genus *Ganesella*, although not having a distinctly distended spout-like rostrum at the lip, appears closest to *Kenyirus* in shell morphology. *Ganesella* is generally diagnosed as being more or less trochiform, umbilicate (rarely closed), last whorl angulated or carinated, a little descending in front; aperture ovate, moderately oblique, with variously

reflexed margins (Richardson, 1985; Schileyko, 2003). *Kenyirus* differs mainly in that it is decidedly not trochiform, the apical whorls being flat. Nevertheless, the affinities of *Kenyirus* new genus, with other camaenid genera (particularly *Ganesella* Blanford, 1863) remain unclear. Therefore, the familial placement has to be regarded as provisional pending anatomical and genetic confirmation.

There are other Southeast Asian camaenid genera similar to *Kenyirus* in morphological aspects such as the shell form and an aperture that is abruptly deflected downwards at the last part of the body whorl. However, none share all the morphological characters of *Kenyirus* as described in the diagnosis (i.e., conspicuous rostrum at the outer lip, acutely keeled periphery, depressed spire, umbilicus bordered by a keel, and a ventral profile that is not sunken towards the umbilicus).

Members of other camaenid genera such as *Chloritis* Beck, 1837 (sensu lato; see Pilsbry, 1890), *Planispira* Beck, 1837, and *Trachia* Albers, 1860, for example, have similarly shaped shells with depressed apical whorls, but clearly differ in other morphological characteristics such as the more rounded periphery and aperture forms. Many species of *Obba*, Beck, 1837, have a similarly keeled periphery, but the aperture is more horizontal and the peristome continuous. *Obba* and *Planispira* are also allopatric to *Kenyirus* in distribution and generally occur in the region of the Philippines and Melanesia (Pilsbry, 1890, 1895; Schileyko, 2003). The presence of a conspicuous labial rostrum is well known in many camaenid genera of the subfamily Papuininae, which are restricted in distribution to the geographic region of Melanesia and northern Queensland, Australia. At least one papuinin genus (i.e., *Minacispira* Iredale, 1941) has a rather rostrate outer lip and is very similar to *Kenyirus* in shell shape. Some Australia endemic camaenids also bear resemblance to *Kenyirus*, but these genera are not represented in Southeast Asia.

Kenyirus sodhii, new species

(Fig. 1A–F)

Material examined. — Holotype – 1 ex. SH 13.2 × SD 26.8 (ZRC. MOL.3072), on leaf litter, 410 m elevation, Tembat Forest Reserve, (5°00'36.8"N, 102°20'22.9"E), Terengganu, Peninsular Malaysia, coll. R. Clements, 8 Sep.2006.

Paratype – 1 ex. SH 15.7 × SD 30.5 (BOR/MOL 5632), on leaf litter, 384 m elevation, Hulu Telemong Forest Reserve (5°11'55.7"N, 102°47'47.9"E), Terengganu, Peninsular Malaysia, coll. R. Clements, 6 Sep.2006.

Diagnosis. — Shell discoidal with a prominently keeled periphery, medium-sized, dextral. Whorls 3¼ – 4¼, apex depressed, and base smoothly convex in profile, slightly inflated; slightly concave on the body whorl near the periphery; last part of body whorl near the aperture, abruptly deflected; suture not distinctly grooved or channelled. Embryonic shell smoothish; malleate sculpture and axial striations visible only under high magnification, latter whorls with fine axial striations. Shell height ratio of dorsal and ventral

side about equal. Umbilicus small, bordered by a distinct keel; partially obscured by lower lip. Columella straight and distinct; thickened and shelf-like across the parietal side to the outer lip. Aperture relatively large, subtriangular, peristome margins expanded and reflected, distinctly thicker and more reflexed at ventral side; peculiarly angled where it meets the columella; extended into a spout-like rostrum at the periphery. Base colour white or cream-coloured, patterned with 3 to 4 concentric reddish-brown or dark brown lines or bands of variable thickness on the body whorl.

Etymology. — This new species is named in memory of the late Professor Navjot Sodhi, who was the former MSc supervisor of the first author. It is interesting to note that Sodhi visited Lake Kenyir a few years ago with some of his students and their research has contributed to a greater understanding of biogeographical patterns in Lake Kenyir (e.g., Qie et al., 2011). Sodhi will be fondly remembered for his role in highlighting the threats to Southeast Asian forests and the need to conserve them, as well as for his mentorship of young conservation biologists.

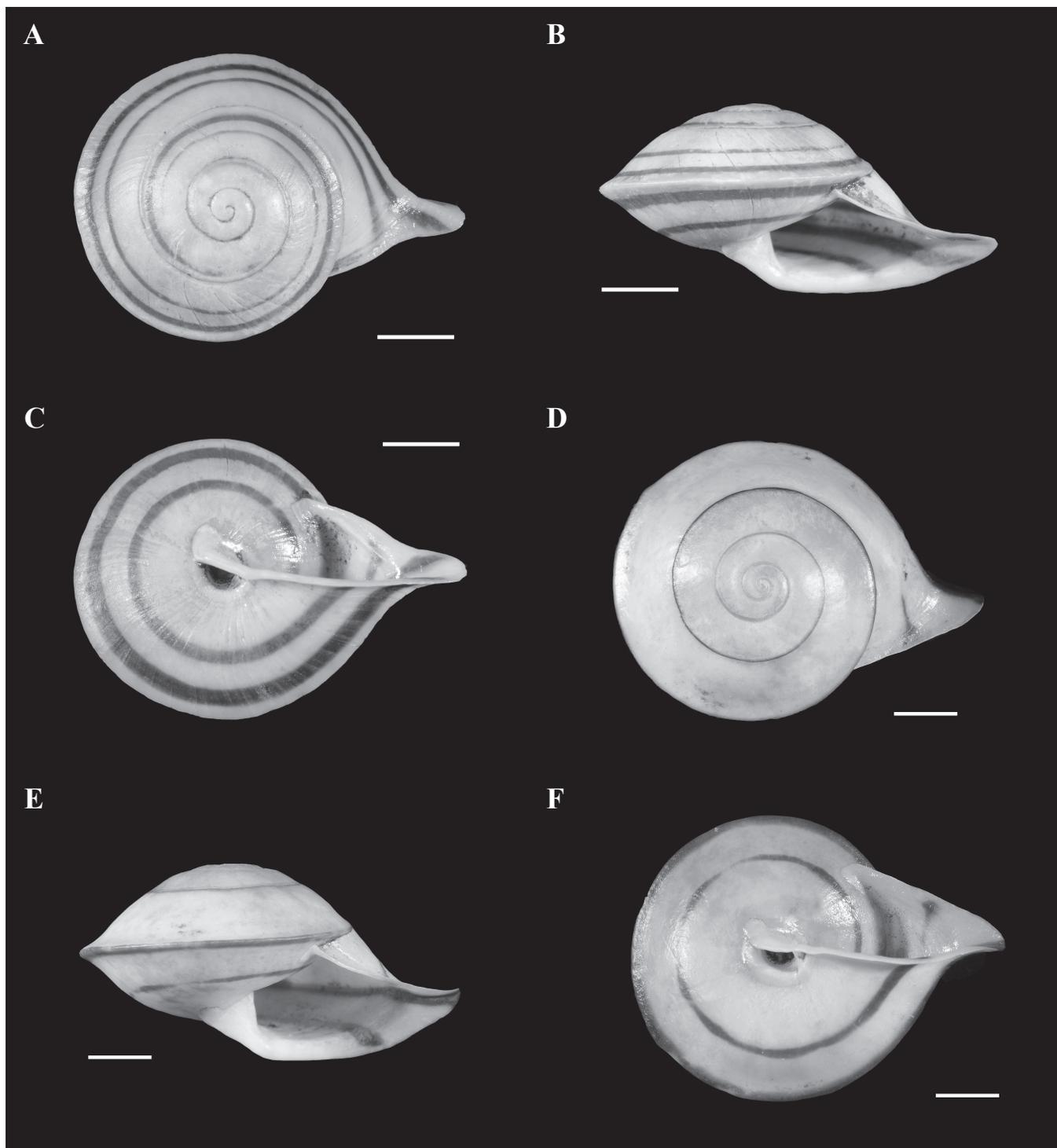


Fig. 1. *Kenyirus sodhii*, new genus and species, Terengganu, Peninsular Malaysia: A–C, holotype, SH 13.2 × SD 26.8 (ZRC.MOL.3072); D–F, paratype, SH 15.7 × SD 30.5 (BOR/MOL 5632). Scale bars = 5 mm.

Remarks. — This new species is at present monotypic in *Kenyirus*, new genus. Because of its peculiar appearance, *K. sodhii*, new species, cannot be confused with other morphologically similar species in the area.

The examined specimens show traces of what appears to be a thin epidermis, and it is very likely that a light brownish periostracum shrouds the shells of living or freshly dead specimens. Additionally, the shell would probably be more translucent when compared to the somewhat weathered specimens studied. From the small sample of specimens examined, the brown concentric spiral lines are evidently variable in number and position on the whorls, and in thickness (see Fig. 1).

Thus far, *K. sodhii* appears to be endemic to the relatively pristine forests around Lake Kenyir and similar specimens have not been found in past surveys of other locales throughout the peninsula. Regrettably, because living specimens have not been hitherto recovered, nothing is known about its ecology or biology. Many confamilials are known to be arboreal and a similar habitat preference is thought to be the main reason for the elusiveness of the living animals.

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