

**TWO NEW SPECIES AND ONE NEW SUBSPECIES OF
AMPHIDROMUS (GASTROPODA: CAMAENIDAE)
FROM THAILAND**

Chorchat Gra-tes

28/110 Mu.4, Ramintra 5 Yak 18, Taraeng, Bangkhen, Bangkok 10220, Thailand.
chorchatshells@yahoo.com

ABSTRACT Two new species and one new subspecies of genus *Amphidromus* are described from Chumphon and Prachuab Khiri Khan Province (i), Peninsular Thailand (ii). The first species and the new subspecies are from the small island of Talu Island (iii) off Chumphon in the Gulf of Thailand and the second species is from Kui Buri National Park (iv). *Amphidromus taluensis* sp. nov. and *Amphidromus luangensis* sp. nov. are conchologically differentiated from *Amphidromus atricallosus* (Gould 1843) and other *Amphidromus atricallosus* complex and *Amphidromus taluensi borealis*. spp. nov. is differentiated from *Amphidromus taluensis* sp. nov.

KEY WORDS Gastropoda, Camaenidae, *Amphidromus*, *taluensis*, *luangensis*, Thailand.

INTRODUCTION

The genus *Amphidromus* Albers, 1850 is a very attractive and colorful member of family Camaenidae Pilsbry, 1850, and one of the most attractive genera of terrestrial mollusca. *Amphidromus* can be found in dry, moist or wet broadleaf forests and in primary, secondary and re-growth forests from the central parts to the fringes. The distribution ranging from eastern India and southern China to South East Asia and northern Australia (v). In Thailand, there are about 16 described species of *Amphidromus* and *Amphidromus (Syndromus)* (vi). *Amphidromus* species in Thailand are distributed in small patches of forest but in a very limited numbers. Expansion of agricultural land and the use of chemicals destroyed critical habitat which may lead to extinction. Other factors include drought, fire and predators, such as primates and snakes. Nevertheless, there are still some unaffected areas that have not yet been explored or recently explored, such as Talu Island and Kui Buri National Park. Exploration of these two sites resulted in the discovery of two new species and one subspecies described herein.

Talu Island is a very small island in the Gulf of Thailand about 10 kilometers from the mainland. It was a hill that was isolated as sea levels rose in the early Holocene. It has an area of about 1.6 square kilometers covered tropical dense forest. *A. taluensis* sp. nov. and *A. taluensis borealis* spp. nov. were separated from related species since the island was formed and evolved for hundreds of years under the different environment from the mainland.

MATERIAL AND METHODS

The types are deposited in the Chulalongkorn University, Museum of Zoology, Bangkok, Thailand.

The description of shell characters and morphological analyses were obtained from dry empty shells. The *A. atricallosus* (Gould 1843) specimens that are used for comparison with new taxa are from my private collection. The specimens collected from Kui Buri National Park, were in the vicinity of Latitude 12° 3' 0" North, Longitude 99° 34' 19.2" East.

Abbreviations:*A.* = *Amphidromus*

CA = Columella Angle

CD = Columella Deviation

CGSC = Chorchat Gra-tes Shell Collection

CNHM = Chicago Natural History Museum

Colabial = Parallel to the lip

Coll. = Collected by

CUMZ = Chulalongkorn University, Museum of Zoology

D = Dextral

H = Shell Height

Lat. = Latitude

Long. = Longitude

Microthreads = very fine raised lines

N = Number of whorls

S = Sinistral

W = Shell Width

SYSTEMATICS

Family Camaenidae Pilsbry, 1895

Genus *Amphidromus* Albers, 1850Subgenus *Amphidromus* Albers, 1850***Amphidromus taluensis*, sp. nov.**

(Plate:1 Fig.1, Plate:3 Fig.1, Plate:13, Plate:16 Fig.1-12, Plate:17 Fig.1-12, Plate:22 Fig.1-4, Plate:23 Fig.1-3)

Type Locality.

Southern end of Talu Island, Gulf of Thailand off Chumphon Province, peninsular Thailand. Collected live on leaves of trees in damp dense forest during light rain about 39 meters above sea level.

Material and Methods.

Holotype: 1 D, H 44.74 x W 23.01 mm. (CUMZ 3169). Coll. Chorchat Gra-tes, March 2012 (Plate:16 Fig.1, Plate:17 Fig.1, Plate:22 Fig.1).

Paratypes: 41 specimens (D-21, S-20) (15 specimens are shown here) in CGSC. Coll. Chorchat Gra-tes.

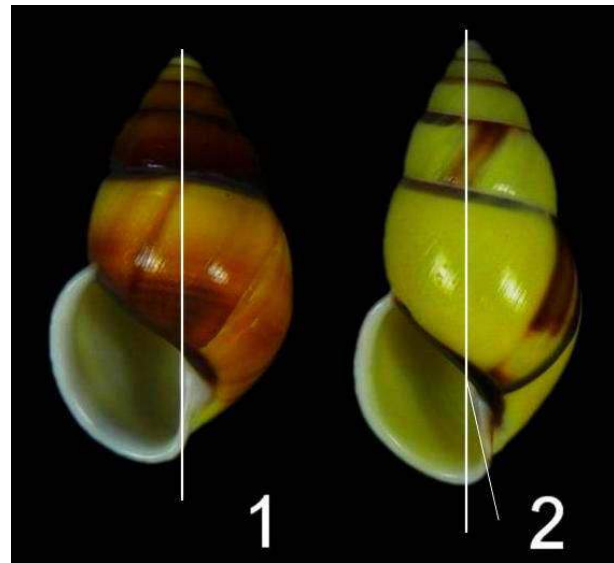


Plate 1: The Columella Deviation or the angle between parietal wall and columella measures the angle between parietal wall and shell axis. The deviation of *A. taluensis* sp. nov. (1) has no deviation but *A. taluensis borealis* spp. nov. (2) has deviation to the right.

Description.

Shell dextral or sinistral. Shell small, thin and light. Surface glossy. Aperture lip reflected and thin. It has Aperture tinted yellow to yellow-white. Parietal dark brown to black. Basic coloration is brownish yellow to brown suffusion on the last whorl with irregular brown longitudinal streaks. Brownish yellow zone below a narrow dark subsutural band with broad brown band on the lower part of the last whorl. Upper whorls differ from the last whorl, some specimens have dark brown spiral band (as in the Holotype) or dark brown suffusion (as in Paratypes). Adult size range of 34 to 47 mm.

Distribution.

This species is endemic to Talu Island.

Etymology.

This species is named after the type locality Talu Island, with Latin suffix *-ensis* denoting place.

Comparison.

Shells of *A. taluensis* sp. nov. on average are smaller, thinner, glossy and more slender when compare to *A. atricallosus* (Gould, 1843). The aperture lip of *A. taluensis* sp. nov. is thin, while that of *A. atricallosus* is thick. The aperture color of *A. taluensis* sp. nov. is tinted yellow to yellow-white, while that of *A. atricallosus* is white. Both species a dark brown to black parietal callus but *A. taluensis* sp. nov. is brownish yellow with brown markings compared with uniform greenish yellow to white in *A. atricallosus*. *A. taluensis* sp. nov. has narrow dark brown subsutural band, which is absent in *A. atricallosus*.

***Amphidromus taluensis borealis*, spp. nov.**

(Plate:1 Fig.2, Plate:3 Fig.2, Plate:18 Fig.1-6, Plate:19 Fig.1-6, Plate:22 Fig.5-8, Plate:23 Fig.4-6)

Type Locality.

Northern end of Talu Island, Gulf of Thailand off Chumphon Province, peninsular Thailand.

Material and Methods.

Holotype: 1 D, H 44.44 x W 23.43 mm. (CUMZ-3170). Collected live on the leaves of trees in a damp forest located in the northern part of Talu Island, about 39.6 meters above sea level during light rain. Coll. Chorchat Gra-tes, March 2012 (Plate:18 Fig.1, Plate:19 Fig.1, Plate:22 Fig.5).

Paratypes: 47 specimens (D-23, S-24) (8 are shown here) in CGSC. Coll. Chorchat Gra-tes.

Description.

Shell dextral or sinistral, small, rather thin and light. Surface glossy. Aperture lip is rather thin. Aperture yellow-white to yellow. Parietal callus dark brown to black. Shell bright yellow to greenish yellow. Dark brown peripheral band sometimes present on the spire, extending partially onto the last whorl. Narrow dark brown

band below the suture. Adult size range is 36.5 to 41.5 mm.



Plate 2: *A. janus* (Pfeiffer, 1854) from Mergui Islands, Myanmar (vii). When comparing *A. taluensis* sp. nov. (Plate:16 Fig. 1,3,9 and Plate:17 Fig 1,3,9) and *A. taluensis borealis* ssp. nov. (Plate:18 Fig. 1,2,3 and Plate:19 Fig 1,2,3) with *A. janus* (Pfeiffer, 1854) in Plate:2, they seem to be very close in size, pattern and shape. They have the same dark brown to black parietal callus but distinctly different in pattern, and coloration - the body and aperture.

Comparison.

A. taluensis borealis spp. nov. on average is smaller, thinner, and more slender compared to *A. atricallosus* (Gould, 1843). *A. taluensis borealis* spp. nov. has a yellow-white to yellow aperture with a dark brown to black parietal callus same as *A. atricallosus* (Gould, 1843) but has a brighter yellow to greenish yellow shell that seems luminous, and is never white. *A. taluensis borealis* spp. nov. has a narrow dark brown subsutural band which is absent in *A. atricallosus* (Gould, 1843). *A. taluensis borealis* spp. nov. when compare with *A. taluensis* sp. nov. is conchologically the same. Both may have a brown peripheral band on the spire that may extend partially onto the last whorl, and one or more brown and/or black varices, except they differ in basic coloration. The coloration of *A. taluensis borealis* spp. nov. differs from *A. taluensis* sp. nov. being bright yellow to greenish yellow and brownish yellow with brown markings respectively. Coloration

around the umbilicus in adult whitish-brown (some specimens completely brown; Plate:18 Figs.2 & 3) while *A. taluensis* sp. nov. is white. The coloration of *A. taluensis borealis* spp. nov. and *A. taluensis* sp. nov. is consistent within their own population.

Distribution.

This species is endemic to Talu Island.

Etymology.

This subspecies is named after the “Northern end” of Talu Island where it was found; *borealis* is the Latin for “northern”.



Plate 3: Fig.1: *A. taluensis* sp. nov., 2. *A. taluensis borealis* spp. nov., 3. *A. atricallosus* (Gould, 1843) and 4. *A. luangensis* sp. nov., all from CGSC. Figs. 1 and 2 are from Talu Island, Gulf of Thailand off Chumphon Province, peninsular Thailand. Figs. 3 and 4 are from Kui Buri National Park Prachuap Khiri Khan Province, peninsular Thailand.

Amphidromus luangensis, sp. nov.

(Plate:3 Fig.4, Plate:5, Plate:6 Fig.2, Plate:7 Fig.2, Plate:20 Fig.1-9, Plate:21 Fig.1-9, Plate:22 Fig.13-16, Plate:23 Fig.10-12, Plate:24 Figs.1 & 5)

Type Locality.

Khao Luang at 11° 40' N, 99° 35' E on the Thailand-Burmese border, Prachuap Khiri Khan (west of Ban Huai Yang). Endemic, only known from the type locality and Kui Buri National Park, Prachuap Khiri Khan in a very small area.

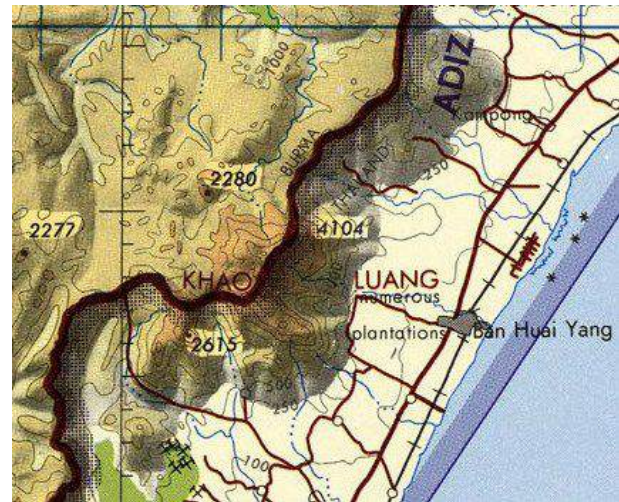


Plate 4: Khao Luang where Hugh M. Smith found the Holotype of *A. luangensis*, sp. nov.

Material and Methods.

Holotype: 1 D (CNHM 109473) Plate:5. This specimen was first found by Hugh M. Smith before 1940 (4 shells, 2 D & 2 S) and discussed as a variant form of *A. atricallosus* with slight brownish suffusion from Khao Luang west of Prachuap Khiri Khan (west of Ban Huai Yang) (viii).



Plate 5: Holotype of *A. luangensis*, sp. nov. (CNHM 109473) (Solem, 1965; Plate:1, Fig. 2) (ix) Paratypes: 50 specimens (D-24, S-26) (12 shown here) in CGSC. They were collected in damp sparse forest in Kui Buri National Park, Prachuap Khiri Khan Province, about 231 meters above sea level. Coll. Chorchat Gra-tes, August 2013.

Description.

Shell dextral or sinistral, small to medium, thick and heavy. Surface glossy. Aperture lip thick. Aperture white to light lavender. Parietal callus dark brown to black. Shell rosy brown with a

wide light rosy brown subsutural band. Upper whorls light yellowish brown to rosy brown but gradually gets darker on the lower whorl. Narrow yellow or white peripheral band sometime present on the spire and last whorl. Adult size range of 39 to 54.5 mm.

Distribution.

Endemic, only known from the type locality in a very small area.

Etymology.

This species is named after the type locality Khao “Luang” where it was first found by Hugh M. Smith before 1940, with Latin suffix *-ensis* denoting place.

Comparison.

Laidlaw & Solem (1961) and Solem (1965) were “very conservative” declaring this brown snail, *leucoxanthus* and *peraknesis* as color forms of *A. atricallosus*. Solem (1965) stated typical *atricallosus* are found at Koh Lak (Prachuap Bay), Prachuap Khiri Khan (p.621 and Table 2, USNM 427292, 5 shells).

Laidlaw and Solem also commented (x);

A. atricallosus (Gould, 1843) has a dark-brown or black callus and varix and a relatively broad white subsutural zone. The shells are generally rather large (50-55 mm. in height). *Bulimus eques* Pfeiffer, 1857, has long been recognized as a synonym. Described from coastal Burma.

A. leucoxanthus (von Martens, 1864) has a white subsutural zone and dark varix of *atricallosus* but lacks the darkened parietal callus. Some examples have a dark apex and various dark markings on the upper whorls. Described from Thailand.

A. perakensis Fulton, 1901, has the white subsutural zone but lacks the varix and darkened callus. It differs from *A. leucoxanthus* in having the columella with distinct twisted plait. Described from Perak.

A. luangensis sp. nov. on average has shell of the same size and characteristics as *A. atricallosus* but it is distinguishable by its rosy brown color, apex, whorl count and columella deviation. It also has its coloration closely related to *A. inversus annamiticus* (Crosse and Fischer, 1863) but *A. luangensis* sp. nov. has a dark-brown or black callus while *A. inversus annamiticus* (Crosse and Fischer, 1863) has white callus.



Plate 6: The apex and whorl count of 1; *A. atricallosus* (Gould, 1843) is 7.25 and 2; *A. luangensis*, sp. nov. is 7

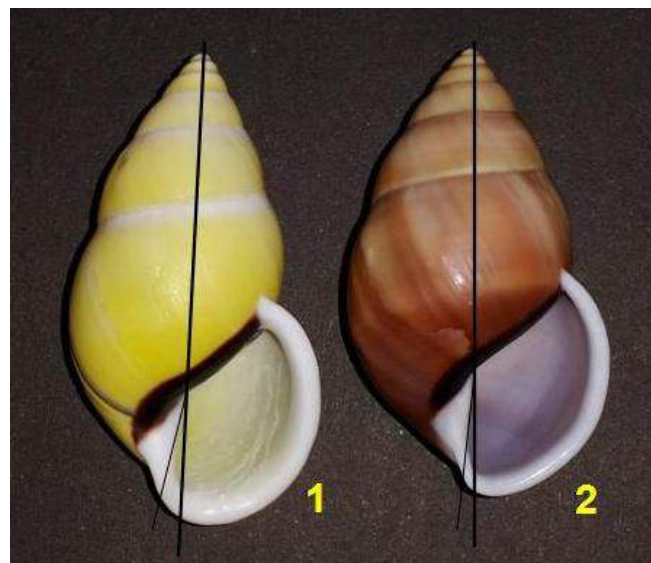


Plate 7: The CD of 1; *A. atricallosus* (Gould, 1843) is larger than 2; *A. luangensis*, sp. nov.



Plate 8: *A. inversus annamiticus* (Crosse and Fischer, 1863) (xi).

A. luangensis sp. nov. has lavender-white aperture and is lavender-white from the lip to deep inside the shell. The color becomes white as the result of increased calcification of the aperture as the snails ages (e.g. Plate:3 Figs.1 & 3, Plate:18 Fig.1, and Plate:22 Fig.10).

There are some streaks on some *A. luangensis* sp. nov. shells (e.g. Plate:3 Fig.4, Plate:21 Figs. 2 & 9) thus making them comparable to *A. comes* (Pfeiffer, 1861), which is said to be from “Siam” in Pilsbry (1900) (Plate 9) (banded shell, Plate:57, Fig.3) and he showed a shell of *comes* that is similar my findings (Plate:57, Fig.3) with the differences in that shell being a yellow band behind the lip, white parietal callus, whitish or flesh colored early whorls usually with a faint or dark brown band above the suture, and the streaks are intensified below the suture to create dark spots; usually *comes* variously banded, streaked or clouded with green or brown and a yellow “varix”. But the most distinct characteristic between the two species is the color of parietal callus; *A. comes* (Pfeiffer, 1861) is white while *A. luangensis* sp. nov. is dark brown to black.

There is a yellow or white peripheral band on the ventral side of some *A. luangensis* sp. nov. shells (yellow in Plate:20 Figs.7 & 9; and white, being very faint in Plate:22 Fig.14 and more distinct in Plate:23 Figs.11 & 12), which is clear on the penultimate whorl and fades away on the last whorl; this is called a “girdle” by some authors, and is seen in some *A. comes* (Pfeiffer, 1861) shells.

There is a difference in what is generally called the base or “ground color” of the main body whorl in the *A. luangensis* sp. nov. shells (Plate:20, yellow in Figs.7, 8 & 9; and white in Fig.5); Laidlaw & Solem (1961) and repeated in Solem, (1965) described the overall coloration as a brownish color suffusion on the body whorl that is intensified into vague radial streaks and partially interrupted by a submedian spiral yellow band.



Plate 9: *A. comes* (L. Pfeiffer, 1861) from Laidlaw and Solem: Genus Amphidromus, Fieldiana: Zoology, Volume 41, Plate:57 Fig.3.



Plate 10: *A. comes* (L. Pfeiffer, 1861) from Vietnam (xii).



Plate 11: Extract from Figure 3, Sutcharit C. & S. Panha, 2006 ; Shells of some *Amphidromus* species **Fig. I–N.** *A. atricallosus atricallosus*, (**I, K, L**) from Ban Takhun, Suratthani (CUMZ 2019), (**J**) from Khao Sok, Suratthani (CUMZ 2021), and (**M, N**) from Ban Takhun, Suratthani, showing the juveniles specimens with reddish brown spiral band (CUMZ 2191). **O.** *A. atricallosus*, an uncertain status subspecies from Wat Suwannakhuha, Pangnga (CUMZ 2220). **P.** *A. atricallosus leucoxanthus* Makok waterfall, Chantaburi (CUMZ 2162) (xiii).

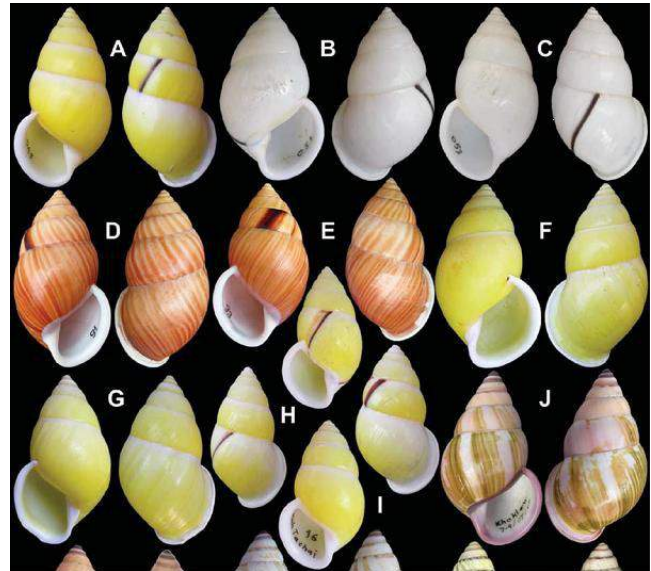


Plate 12: Extract from Figure 4, Sutcharit C. & S. Panha, 2006 ; Shells of some *Amphidromus* species. **A–E.** *A. atricallosus leucoxanthus*, (**A–C**) from Makok waterfall, Chantaburi (CUMZ 2162), and (**D, E**) from Makhm District, Chantaburi (CUMZ 2214). **F, G.** *A. atricallosus perakensis* from Nee Soon, Singapore (CUMZ 2282). **H, I.** *A. (A.) atricallosus classarius* n. ssp., Koh Tachai, Pangnga, (**H**) Holotype (CUMZ 2215), and (**I**) Paratype (CUMZ 2011) (xiv).

Observations of other authors about variation in ‘yellow’ *A. atricallosus* complex for comparison with new taxa.

Holotype of *A. atricallosus* (Gould, 1843) from Tavoy, British Burma:

- shell imperforate, elongated ovate and sulfur yellow;
- columella white;
- aperture ovate-lunate and slightly effuse (*i.e.* lip is curved dorsally/inward near the columella);
- black band showing the termination of a former stage of growth (*i.e.* ‘varix’ of authors);
- lip widely revolute, not flattened (*i.e.* face of lip rounded and edge recurved);
- nodules may form on the lip of very mature shells; and
- columella white or variously stained with brown and/or black.

Sutcharit C. & S. Panha 2006 have observed variations in yellow *Amphidromus* complex that can be discussed as follows:

A. Yellow shells of *A. atricallosus* (Gould, 1843) can be put into 2 distinct groups based on the width of the white subsutural band, with similar/the same secondary and tertiary variations; and a rare modification of one of these groups (without a **lobe** on the columella).

Group 1; last whorl and spire whorl yellow with a narrow white subsutural band

- yellow is of one tone (as per holotype) (e.g. Ranong Province)
- yellow is of two tones
 - distinctly darker base or
 - becomes gradually darker anteriorly; darker toward the umbilicus on the last whorl and darker near the suture on the spire.

Group 2; yellow shells with a wide white subsutural band (*A. leucoxanthus* (von Martens, 1854) has this coloration)

- yellow is of one tone
- yellow is of two tones
 - distinct darker base or
 - gradually darker toward the umbilicus (darker anteriorly).

Group 3; Modification of Group 2; rarely the white zone extends down to the periphery (e.g. from Suratthani, Sutcharit C. & S. Panha, 2006 Plate 11: Fig. 3I)

- spire appears white, and
- base is distinctly bipartite, white above the periphery and yellow below.

Group 4; Yellow or white shells may have a reddish brown peripheral band in juveniles (e.g. from Suratthani, Sutcharit C. & S. Panha, 2006 Plate 11: Figs. 3M & 3N).

Group 5; Shallow/appressed suture.

Group 6; Slightly flattened whorls.

B. Shells of a unique color pattern = subspecies of uncertain status with a white parietal callus from Pangnga.

Last whorl yellow with a wide white zone below the suture or reaches the periphery

- yellow zone separated from the umbilicus and columella by a very narrow white zone (white umbilical zone is equivalent to white basal patch in Pilsbry, 1900) (Tan, Chan & Panha, 2011 call this a white zone bordering the columella) (Wat Suwannakhuha in Sutcharit C. & S. Panha, 2006 Plate 11: Fig. 3O)
- yellow zone narrows and/or fades toward the lip, while the white umbilical zone appears to widen a little (near Kasom)
- wide yellow peripheral or basal band narrows toward the lip and may fade as well, while the white umbilical zone appears to widen (near Kasom).

Spire whorls

- white
- white above the periphery, yellow below
- yellow with a narrow white subsutural band; yellow is of one or two tones
- as per 3, but a white zone develops above the periphery toward the last whorl.

C. Shells with a black or white parietal callus (one subspecies)

- yellow shells of *A. classarius* Sutcharit & Panha, 2006 have a narrow to wide white subsutural band
 - shells always sinistral
 - with or without a very narrow white umbilical zone
 - have one or more brown or black 'varices' occurring in pairs or groups (plural form of 'varix')
 - with or without brown spots or short brown lines just below the suture
 - shells never white or streaked with brown.

D. Shells without a black parietal callus (three subspecies)

shells perforate or not, with or without a lobe on the columella

- yellow shells of *A. leucoxanthus* (von Martens, 1854) have a wide white subsutural band
 - with a white parietal callus
 - shells may be white and rarely white with narrow, rather crowded brown streaks
 - generally have one or two brown or black ‘varices’ (*i.e.* rarely absent).
- pale to dark yellow shells of *A. perakensis* (Fulton, 1901) (shells from Chumporn, Thailand show both types of subsutural band)
 - with a white parietal callus
 - generally have a narrow white subsutural band (*e.g.* Malaysia), or
 - sometimes have a wide white subsutural band
 - with or without a brown line bordering the columella (*e.g.* Chumporn, Thailand)
 - have a very narrow white umbilical zone
 - generally lack a brown or black ‘varix’ (*i.e.* rarely present, some shells with a brown ‘varix’ are from North Perak, Malaysia)
 - white shells possible, but never streaked with brown.
- pale yellow to orange shells of *A. temasek* Tan, Chan and Panha, 2011 have a very narrow white subsutural band
 - parietal callus usually inconspicuous, rarely calcified and colorless or white
 - some shells have narrow, rather crowded brown streaks

- brown or black ‘varices’ always absent
- shells never white or streaked with brown.

All new species (*A. taluensis* sp. nov. and *A. luangensis* sp. nov.) and subspecies (*A. taluensis borealis* spp. nov.) described herein are all differs in shells characteristics and morphometric to all variations of *A. atricallosus* complex described above.



Plate 13: Live animal coloration: *A. taluensis* sp. nov. (xv).



Plate 14: Live animal coloration of *A. atricallosus temasek* holotype (ZRC.MOL.3058) Pulau Tulai, West Malaysia (xvi).



Plate 15: Live animal coloration of *A. atricallosus perakensis* (Fulton, 1901), Pulau Tulai, West Malaysia (xvii).

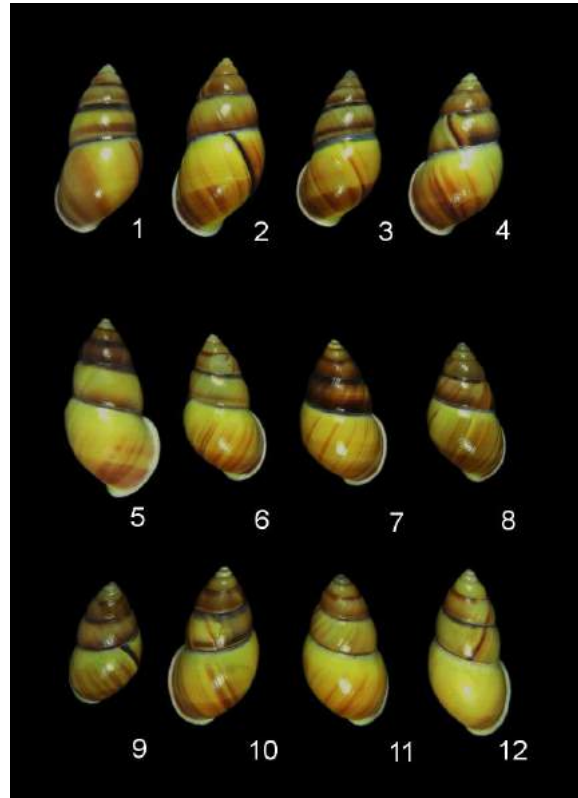


Plate 17: *A. taluensis*, sp. nov.
Fig.1: Holotype; Fig.2-12: Paratype.

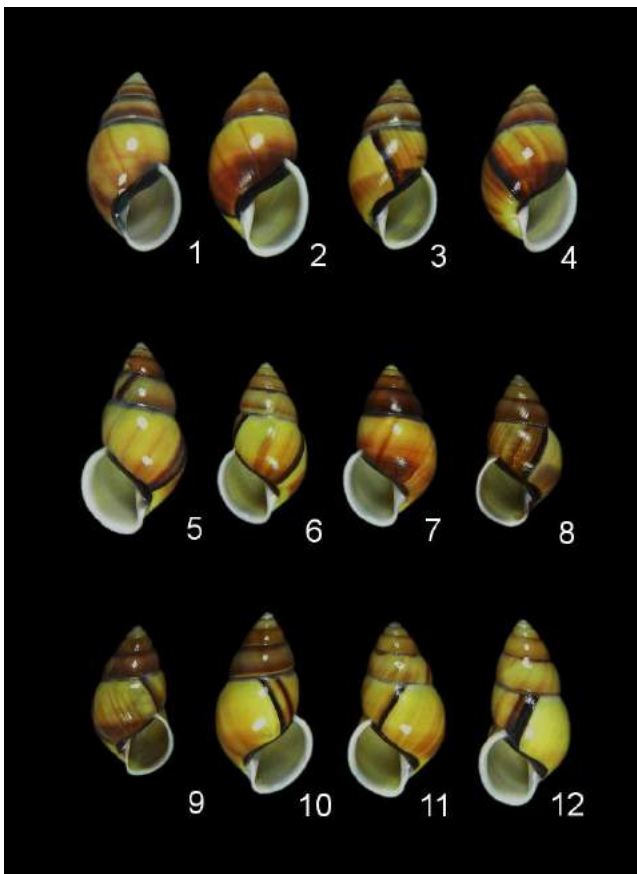


Plate 16: *A. taluensis*, sp. nov.
Fig.1: Holotype; Fig.2-12: Paratype.

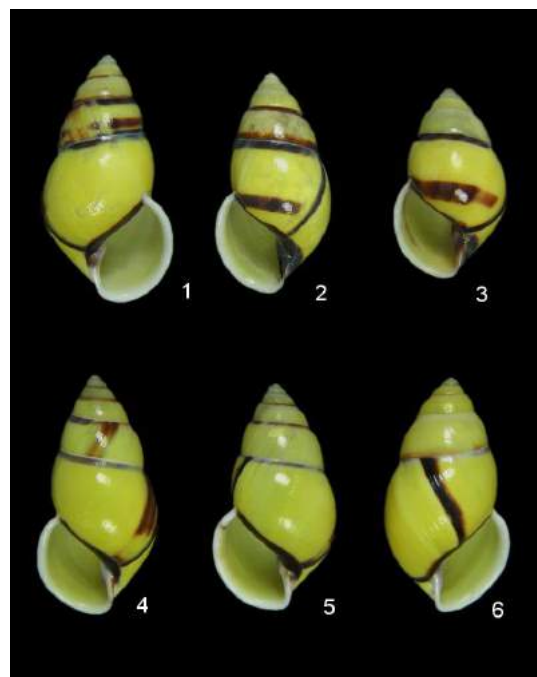


Plate 18: *A. taluensis borealis*, spp. nov.
Fig.1: Holotype; Fig.2-6: Paratype.



Plate 19: *A. taluensis borealis*, spp. nov. Fig.1: Holotype; Fig. 2-6: Paratype.

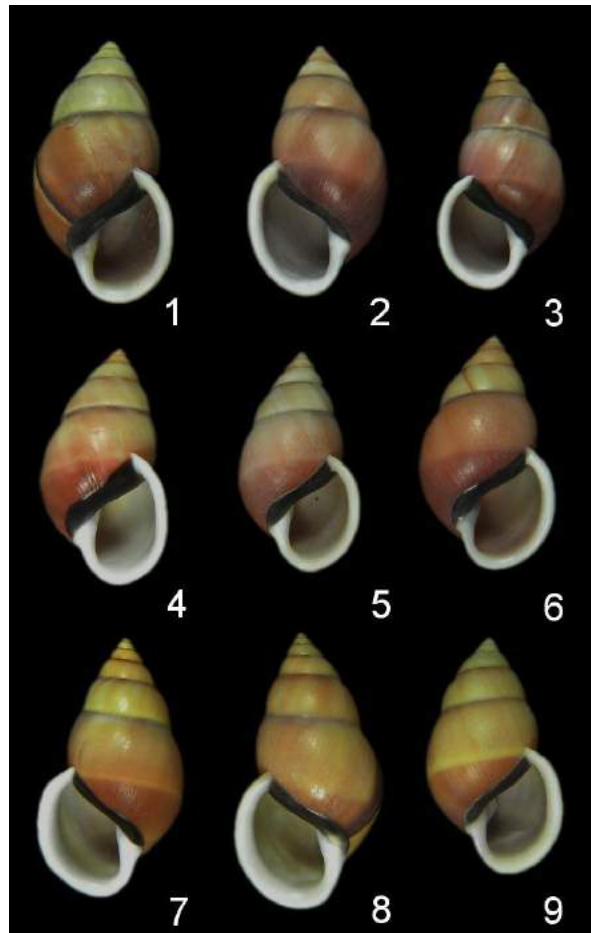


Plate 20: *A. luangensis*, sp. nov. Fig.1-9: Paratype.

Table 1: Average size H/W of *A. taluensis* sp. nov.

Plate: 16	H	W	H/W
Fig. 1	44.74	23.01	1.944
Fig. 2	46.06	24.99	1.843
Fig. 3	41.05	21.83	1.880
Fig. 4	42.01	23.81	1.764
Fig. 5	47.37	25.06	1.890
Fig. 6	40.13	22.02	1.822
Fig. 7	39.93	23.05	1.732
Fig. 8	37.54	21.37	1.756
Fig. 9	36.81	20.10	1.831
Fig. 10	44.35	23.97	1.850
Fig. 11	42.73	24.31	1.757
Fig. 12	46.04	23.09	1.993
Average			1.838

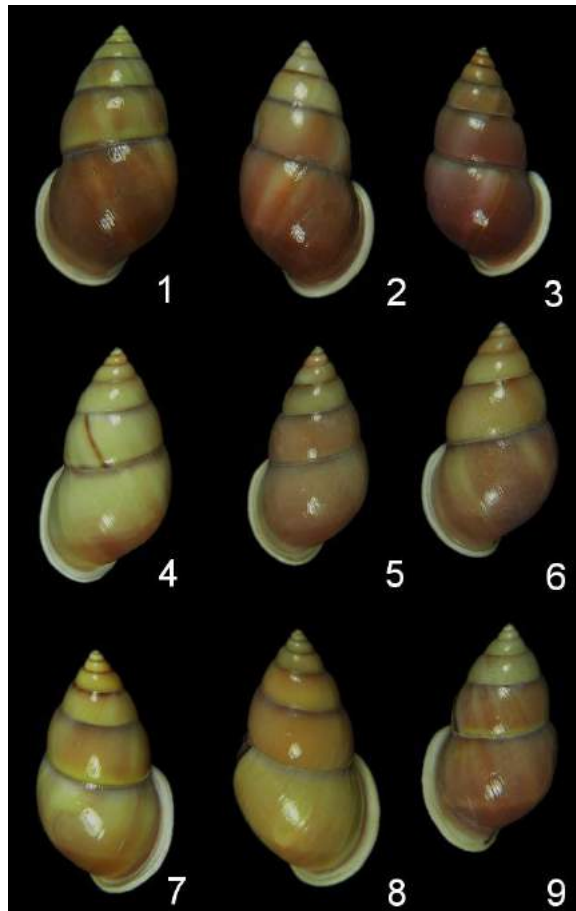


Plate 21: *A. luangensis*, sp. nov. Fig. 1-9 Paratype.

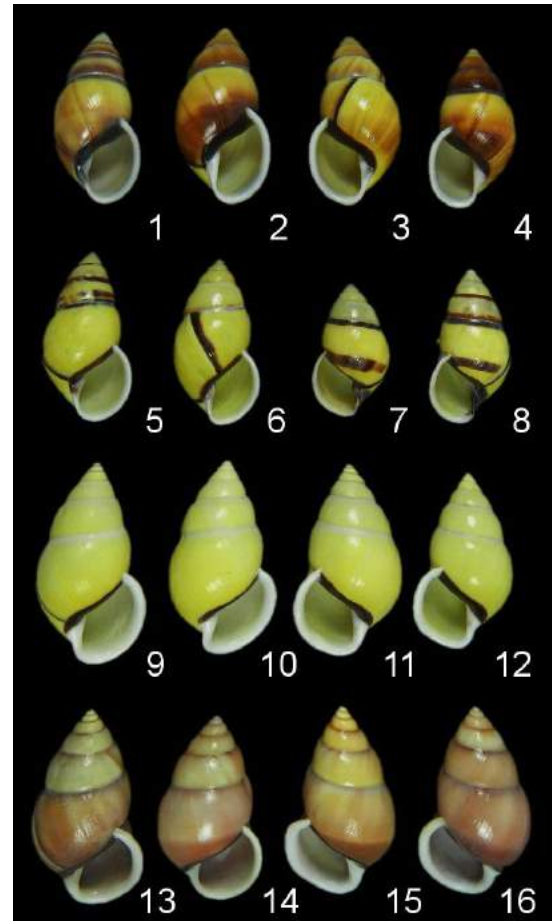


Plate 22: Comparison on shape and color of adult species.
Figs. 1-4: *A. taluensis* sp. nov. Figs. 5-8:
A. taluensis borealis spp. nov. Figs. 9-12: *A. atricallosus*
(Gould, 1843) Figs. 13-16: *A. luangensis* sp. nov.

Table 2: Average size H/W of *A. taluensis borealis* ssp. nov.

Plate:18	H	W	H/W
Fig. 1	44.44	23.43	1.896
Fig. 2	39.73	20.83	1.907
Fig. 3	34.38	20.42	1.683
Fig. 4	43.52	21.65	2.010
Fig. 5	41.05	22.51	1.823
Fig. 6	42.65	22.44	1.900
Average			1.870



Plate 23: Comparison on shape and color of juvenile species

Figs. 1-3: *A. taluensis* sp. nov.

Figs. 4-6: *A. taluensis borealis* spp.nov.

Figs. 7-9: *A. atricallosus* (Gould, 1843)

Figs. 10-12: *A. luangensis* sp. nov.



Plate 24: Comparison between *A. luangensis* sp. nov. (with dark brown to black Parietal callus) and other *Amphidromus* sp. (with white parietal callus) (xviii). All from CGSC.

1. *A. luangensis* sp. nov. Kui Buri Elephant Park, Lat. 12° 08' 42.25" North, Long. 99° 38' 00.97" East.

2. *A. enganoensis* Fulton, 1897. Enggaro Island, Sumatra Island, Indonesia.

3. *A. heerianus poecillus* Jutting, 1941. Bangar, West Java, Indonesia.

4. *A. inversus inversus* (Muller, 1774). Mount Rajabasa, South Lampung, Sumatra, Indonesia.

5. *A. luangensis* sp. nov. Kui Buri National Park, Lat. 12° 03' 00.00" North, Long. 99° 34' 19.20" East.

Table 3: Average size H/W of *A. luangensis* sp. nov.

Plate:20	H	W	H/W
Fig. 1	52.86	29.10	1.816
Fig. 2	51.71	28.35	1.823
Fig. 3	46.23	26.42	1.749
Fig. 4	49.66	27.24	1.823
Fig. 5	46.71	25.30	1.846
Fig. 6	49.24	27.88	1.766
Fig. 7	51.62	28.24	1.827
Fig. 8	54.99	30.50	1.802
Fig. 9	47.66	27.45	1.736
Average			1.799

Table 4: Comparison between *A. taluensis* sp. nov., *A. taluensis borealis* spp. nov. and *A. luangensis*, sp. nov.

	<i>A. taluensis</i> sp. nov.	<i>A. taluensis borealis</i> spp. nov.	<i>A. luangensis</i> , sp. nov.
Aperture size	narrow	more narrow	wide
Aperture coloration	tinted yellow to yellow- white	yellow- white to yellow	white to light lavender
Apex coloration	yellow	yellow	white to yellow
CD	nil	to the right on S specimens	to the left on D specimens
Coloration (base or “ground color” of main body whorl)	brownish yellow to brown suffusion on the last whorl with irregular brown longitudinal streaks	bright yellow to greenish yellow	rosy brown with a wide light rosy brown subsutural band
Coloration around the umbilicus in adult	white	whitish-brown (some specimens completely brown; Plate: 18 Fig 2 & 3)	white
Coloration around the umbilicus in juvenile	white	whitish-brown	white
Lip width	narrow	narrow	wide
Lip thickness	thin	thin	thick
Lobe	nil	nil	present on some specimens
Microsculpture	colabial, microthreads	colabial, microthreads	colabial, microthreads
Parietal callus coloration	dark brown to black	dark brown to black	dark brown to black
Shape	slender	more slender	slender
Shell orientation (sinstral / dextral)	D and S	D and S	D and S
Subsutural band coloration	dark brown	dark brown	dark brown
Thickness of shell body	very narrow	very narrow	thick
Umbilicus in juveniles	open	open	open
Weight	light	light	heavy

Table 5: Comparison between *A. luangensis*, sp. nov., *A. enganoensis* Fulton, 1897, *A. heerianus poecillus* Jutting, 1941 and *A. inversus inversus* (Muller, 1774).

	<i>A. luangensis</i> , sp. nov.	<i>A. enganoensis</i> Fulton, 1897	<i>A. heerianus poecillus</i> Jutting, 1941	<i>A. inversus inversus</i> (Muller, 1774)
Aperture size	wide	narrow	wide	medium
Aperture coloration	white to light lavender	white and translucent	white	white to light brown
Apex coloration	white to yellow	yellow	yellow	white
CD	to the left on D specimens	to the left on D specimens	nil	to the right on S specimens
Coloration (base or “ground color” of main body whorl)	rosy brown with a wide light rosy brown subsutural band	rosy brown on last whorl and yellow on upper whorl	light yellow base with variation of brown tone growth lines colabially	brown streaks and brown basal band
Coloration around the umbilicus in adult	white	white	white	white to light brown
Coloration around the umbilicus in juvenile	white	no data	no data	no data
Lip width	wide	narrow	wide	wide
Lip thickness	thick	medium	thick	medium
Lobe	Present on some specimens	present	nil	nil
Microsculpture	colabial, microthreads	colabial, microthreads	colabial, microthreads	colabial, microthreads
Parietal callus coloration	dark brown to black	white	white	white to light brown
Shape	slender	medium	medium	medium
Shell orientation (sinstral / dextral)	D and S	D and S	D and S	D and S
Thickness of shell body	thick	medium	thick	medium
Umbilicus in juveniles	open	no data	no data	no data
Weight	heavy	light	heavy	medium

REFERENCES

- Sutcharit, C., P. Tongkerd and S. Panha, 2013.** First Record on Chiral Dimorphic Population of *Amphidromus inversus annamiticus* (Crosse and Fischer, 1863) from Thailand. *Tropical Natural History*. April 2013. Chulalongkorn University.
- Dharma, B., 2007.** Report on fossil *Amphidromus* and description of new species and new subspecies of recent and fossil *Amphidromus* from Indonesia (Gastropoda, Pulmonata: Camaenidae), *Schriften zur Malakozoologie*, 23: 45–78.
- Nabhitabhata, J., 2009.** Checklist of Mollusca Fauna in Thailand, Office of Natural Resources and Environmental Policy and Planning.
- Laidlaw, F. F. & A. Solem, 1961.** The land snail genus *Amphidromus*: a synoptic catalogue, *Fieldiana (Zoology)*, 41: pp. 505–677.
- Pilsbry, H. A., 1900.** *Manual of Conchology, Structural and Systematic, with Illustrations of the Species, Series 2, Volume 13*; Conchological Section, Academy of Natural Sciences of Philadelphia, Philadelphia; *Amphidromus*: pp. 127–234, Plate: 46–71.
- Tan, S. K., S. Y. Chan, S. Panha, 2011.** A New Subspecies of *Amphidromus (Amphidromus atricallosus)* from Singapore (Mollusca: Gastropoda: Camaenidae). *The Raffles Bulletin of Zoology*.
- Solem A., 1965.** Land snails of the genus *Amphidromus* from Thailand (Mollusca: Pulmonata: Camaenidae), *Proceedings of the United States National Museum*, 117 (3519): pp. 615–627, Plate: 1–2.
- Sutcharit, C. & S. Panha, 2006.** Taxonomic review of the tree snail, *Amphidromus* Albers, 1850 (Pulmonata: Camaenidae) in Thailand and adjacent areas: Subgenus *Amphidromus*. <http://mollusc.oxfordjournals.org/content/72/1/1/F3.expansion>

End Notes:

1. Tourism Authority of Thailand.
2. Zoogeographical divisions of Rile (1938).
3. Tourism Authority of Thailand.
4. Tourism Authority of Thailand.
5. Sutcharit, C. & S. Panha 2006. Taxonomic review of the tree snail, *Amphidromus* Albers, 1850 (Pulmonata: Camaenidae) in Thailand and adjacent areas: Subgenus *Amphidromus*.
6. Nabhitabhata, J. 2009. Checklist of Mollusca Fauna in Thailand, Office of Natural Resources and Environmental Policy and Planning.
7. Worldwide Conchology Inc. at http://www.worldwideconchology.com/fam/camaenid_ae.shtml.
8. Laidlaw & Solem (1961; p. 531) and Solem (1965; p. 622, Hugh M. Smith as collector; Plate: 1, Fig. 2 = CNHM 109473, 1 dextral shell).
9. Laidlaw & Solem (1961; p. 531) and Solem (1965; p. 622, Hugh M. Smith as collector; Plate: 1, Fig. 2 = CNHM 109473, 1 dextral shell).
10. Laidlaw and Solem: Genus *Amphidromus*, *Fieldiana: Zoology*, Volume 41, page 530.
11. Chirasak Sutcharit*, Piyoros Tongkerd and Somsak Panha. First Record on Chiral Dimorphic Population of *Amphidromus inversus annamiticus* (Crosse and Fischer, 1863) from Thailand. *Tropical Natural History* 13(1): 53-57, April 2013. ©2013 by Chulalongkorn University.
12. Jaxshells. <http://www.jaxshells.org/petek3370.htm>
13. Sutcharit, C. & S. Panha 2006. Taxonomic review of the tree snail, *Amphidromus* Albers, 1850 (Pulmonata: Camaenidae) in Thailand and adjacent areas: Subgenus *Amphidromus*.
14. Sutcharit, C. & S. Panha 2006. Taxonomic review of the tree snail, *Amphidromus* Albers, 1850 (Pulmonata: Camaenidae) in Thailand and adjacent areas: Subgenus *Amphidromus*. <http://mollus.oxfordjournals.org/content/72/1/1/F3.expansion>
15. Chorchat Gra-tes.
16. Siong Kiat Tan, Sow Yan Chan, Somsak Panha. A New Subspecies of *Amphidromus (Amphidromus atricallosus)* from Singapore (Mollusca: Gastropoda: Camaenidae). *The Raffles Bulletin of Zoology* 2011 59(1): 39–46. 28 Feb. 2011.
17. Siong Kiat Tan, Sow Yan Chan, Somsak Panha. A New Subspecies of *Amphidromus (Amphidromus atricallosus)* from Singapore (Mollusca: Gastropoda: Camaenidae). *The Raffles Bulletin of Zoology* 2011 59(1): 39–46. 28 Feb. 2011.
18. Chorchat Gra-tes.