

Four new species of *Amphidromus* Albers, 1850 (Gastropoda: Camaenidae) from Vietnam

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Abstract: Four new species of genus *Amphidromus* Albers, 1850 are described from Chư Păh District, Gia Lai Province and Nha Trang area, Khánh Hòa Province, Vietnam and compared to five other species of this genus: *Amphidromus baoi* Thach, 2017, *Amphidromus severnsi* Thach, 2017, *Amphidromus ledaoae* Thach, 2016, *Amphidromus janus* (Pfeiffer, 1854), and *Amphidromus hongdaoae* Thach, 2017.

Introduction: The genus *Amphidromus* Albers, 1850 belongs to the family **Camaenidae** and comprises many species known from Vietnam. At the beginning of 2017, four hitherto unknown camaenids were found. They were not listed in the works by Parkinson, Hemmen & Groh (1987), Abbott (1989), Dharma (2005), Stanisić, Shea, Potter & Griffiths (2010), Schileyko (2011), Raheem et al., 2014 and Thach (2005, 2007, 2012, 2016, 2017). They are therefore hereby described as new to science.

Abbreviations:

FMNH: Field Museum of Natural History, Chicago, USA
NHMUK: National History Museum London, UK
NNT: Collection Dr Thach
AH: Aperture height
SH: Shell height
SW: Shell width

Systematics:

Class **Gastropoda** Cuvier, 1797
Superfamily **Helicoidea** Rafinesque, 1815
Family **Camaenidae** Pilsbry, 1895
Genus *Amphidromus* Albers, 1850
Type species: *Helix perversus* Linnaeus, 1758

Amphidromus johnabbasi sp. nov.
Figs 1-4

Type material: **Holotype** 32.3 mm x 16.9 mm in FMNH (Figs 2-4); **Paratype 1:** 31.1 mm (Fig. 1) and **Paratype 2:** 30.3 mm (Fig. 4) in NNT. **Paratype 3:** 30.3 mm and **Paratype 4:** 29.2 mm not illustrated [All Paratypes from type locality].

Type locality: Chư Păh District, Gia Lai Province, Central Vietnam.

Description: Shell small for the genus (with average height range 30.3-32.3 mm), elongate-ovate in outline with usually dextral coiling (7/10 collected specimens are dextral). Shell width 54.6% of shell height (see table 1). Spire tall and broad, sutures shallow. Body whorl inflated and occupying 66.2% of shell height, periphery rounded. Apex black, umbilicus mostly covered by columella. Sculpture weak with oblique axial striae. Outer surface smooth and adorned with many axial lines that become widely-spaced on spire whorls. Aperture rounded in outline and occupying 48.8% of shell height, outer lip moderately thick, slightly reflected and flared anteriorly. Parietal wall yellow, columella white with pink stripe and bordered by carmine stripe.

Colour yellow with white aperture and outer lip, greenish axial lines and pink or brown subsutural bands

No	1	2	3	4	5
SH (mm)	32.3	31.1	30.3	29.2	30.3
SW (mm)	16.9	16.5	16.6	16.8	16.8
SW/SH	0.52	0.53	0.55	0.58	0.55
Mean SW/SH	0.546				
AH (mm)	15.9	15.4	15.1	15.1	13.1
AH/SH	0.49	0.50	0.50	0.52	0.43
Mean AH/SH	0.488				
BH (mm)	21.5	20.6	20.3	20.1	18.7
BH/SH	0.67	0.66	0.67	0.69	0.62
Mean BH/SH	0.662				

Table 1

Comparison: *Amphidromus johnabbasi* sp. nov. is closest to *Amphidromus baoi* Thach, 2017 (Fig. 5) in small adult size, yellow background colour and black apex, but it is usually dextral (not always sinistral) in coiling, columella bordered by pink (not black) stripe, subsutural bands not always brown and axial lines are stronger, more numerous.

Etymology: This new species is named in honour of John Abbas from Hawaii for providing the type material.

Amphidromus liei sp. nov.

Figs 5-8

Type material: **Holotype** 27.1 mm x 13.7 mm in FMNH (Figs 6-7); **Paratype 1:** 30.7 mm (Fig. 8) and **Paratype 2:** 30.2 mm (not illustrated) in NNT. [All Paratypes from type locality].

Type locality: Chur Päh District, Gia Lai Province, Central Vietnam.

Description: Shell small for the genus (with average height range 27.1-30.7 mm) elongate-ovate in outline with dextral coiling (all three collected specimens are dextral). Shell width 52% of shell height (see table 2). Spire moderately tall and broad, sutures constricted. Body whorl inflated and occupying 68.3% of shell height, periphery rounded. Apex black, umbilicus mostly

covered by columella. Sculpture with weak axial striae. Outer surface smooth and adorned with widely-spaced spiral stripes on body whorl and axial stripes on spire whorls that are usually wavy and crossed by fine white spiral lines. Aperture wide and occupying 51% of shell height, outer lip thin.

Columella pinkish white and bordered by reddish-brown stripe. Colour yellow with whitish aperture and outer lip, carmine subsutural bands, blackish spiral and axial lines.

No	1	2	3
SH (mm)	27.1	30.7	30.2
SW (mm)	13.7	16.1	16.0
SW/SH	0.51	0.52	0.53
Mean SW/SH	0.520		
AH (mm)	13.8	15.2	15.8
AH/SH	0.51	0.50	0.52
Mean AH/SH	0.510		
BH (mm)	18.5	20.8	20.9
BH/SH	0.68	0.68	0.69
Mean BH/SH	0.683		

Table 2

Comparison: *Amphidromus liei* sp. nov. is close to *Amphidromus severnsi* Thach, 2017 (Fig. 9) in shell shape, small adult size and black apex, but differs in thinner shell, not calloused outer lip, more rounded aperture, presence of reddish-brown stripe around columella and broad axial stripes at spire whorls.

Amphidromus janus (Pfeiffer, 1854) (Fig. 10) resembles the new species in presence of widely-spaced spiral stripes on body whorl, but differs in more elongate shape, black parietal wall, black varix and lack of axial stripes on spire whorls and reddish-brown stripe around columella.

Etymology: This new species is named in honour of Steven Lie from Indonesia for providing the type material.

Amphidromus steveni sp. nov.

Figs 10-14

Type material: **Holotype** 41.3 mm x 21.2 mm in FMNH (Figs 12-14); **Paratype 1:** 45.5 mm (Figs 11, 14) in NNT; **Paratype 2:** 30.2 mm; **Paratype 3:** 37.4 mm and **Paratype 4:** 35.2 mm not illustrated. [All Paratypes from type locality].

Type locality: Suburb of Nha Trang area, Khánh Hòa Province, Central Vietnam.

Description: Shell medium-sized for the genus (with average height range 35.2-45.5 mm), elongately tapering in outline and thin with dextral coiling (all 5 collected specimens are dextral). Shell width 49% of shell height (see table 3). Spire tall and straight-sided, sutures distinct. Body whorl inflated and occupying 65.2% of shell height, periphery rounded. Apex black and bordered by red colour, umbilicus closed. Sculpture weak with oblique axial striae. Outer surface adorned with narrow spiral band and closely-spaced axial stripes on body whorl that become broader and more widely-spaced on spire whorls. Aperture elongate and occupying 45.6% of shell height, outer lip thin.

Parietal wall yellow, columella reddish brown. Background colour yellowish white with bluish aperture, orange subsutural bands and dark brown axial stripes.

No	1	2	3	4	5
SH (mm)	41.3	45.5	36.4	37.4	35.2
SW (mm)	21.2	20.5	17.9	18.0	17.8
SW/SH	0.51	0.46	0.49	0.48	0.51
Mean SW/SH	0.490				
AH (mm)	20.5	19.3	16.5	16.0	16.9
AH/SH	0.50	0.42	0.45	0.43	0.48
Mean AH/SH	0.456				
BH (mm)	28.1	28.1	23.4	23.9	24.0
BH/SH	0.68	0.62	0.64	0.64	0.68
Mean BH/SH	0.652				

Table 3

Comparison: *Amphidromus steveni* sp. nov. is close to *Amphidromus ledaoae* Thach, 2016 (Fig. 15), but the columella is not black, last whorl adorned with spiral band and axial stripes on body whorl much narrower and more closely spaced.

Etymology: This new species is named in honour of Steven Lie from Indonesia for providing the type material.

Amphidromus tedbaeri sp. nov.

Figs 16-18

Type material: Holotype 38.8 mm x 18.9 mm in FMNH (Figs. 16-18).

Type locality: Suburb of Nha Trang area, Khánh Hòa Province, Central Vietnam.

Description: Shell medium-sized for the genus and elongately tapering in outline with sinistral coiling. Shell width 48.7% of shell height. Spire tall and straight-sided, sutures distinct. Body whorl inflated and occupying 66.8% of shell height, periphery rounded. Apex whitish, umbilicus closed. Sculpture with weak axial striae. Outer surface adorned with broad subsutural bands and closely-spaced axial stripes on last whorl that become broader and more widely-spaced on spire whorls. Aperture elongate and occupying 45.9% of shell height, outer lip thin.

Parietal wall yellowish, columella bordered by a reddish-brown stripe. Background chocolate-coloured with bluish aperture, reddish columella, carmine and yellowish subsutural bands.

Comparison: *Amphidromus tedbaeri* sp. nov. is close to *Amphidromus hongdaoae* Thach, 2017 (Figs 19-20), but not slender in shape, columella not white, axial stripes more oblique, subsutural bands more distinct and colourful.

Etymology: This new species is named in honour of Dr Ted Baer of Switzerland for his interest in Vietnamese terrestrial snails.

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PLATE

1-4: *Amphidromus johnabbasi* sp.nov.

Chư Păh District, Gia Lai Province, Vietnam

1: Paratype 1 (31.1 mm) in NNT

2-4 (top): Holotype (32.3 mm) in FMNH

4 (bottom): Paratype 2 (30.3 mm) in NNT

5: *Amphidromus baoi* Thach, 2017, 26.5mm

6-8: *Amphidromus liei* sp.nov.

Chư Păh District, Gia Lai Province, Vietnam

6-8 (bottom): Holotype (27.1 mm) in FMNH

8 (top): Paratype 1 (30.7 mm)

9: *Amphidromus severnsi* Thach, 2017, 33.2 mm

10: *Amphidromus janus* (Pfeiffer, 1854)

by courtesy of NHMUK

11-14: *Amphidromus steveni* sp.nov.

Nha Trang, Khánh Hòa Province, Vietnam

11,14 (top): Paratype 1 (45.5 mm)

12-14 (bottom): Holotype (41.3 mm) in FMNH

15: *Amphidromus ledaoae* Thach, 2016, 33.1 mm

16-18: *Amphidromus tedbaeri* sp.nov.

Nha Trang, Khánh Hòa Province, Vietnam,

Holotype (38.8mm) in FMNH

19-20: *Amphidromus hongdaoae* Thach, 2017, 38.9 mm

