

The terrestrial snail family Streptaxidae J.Gray, 1860 (Gastropoda: Pulmonata) from Son La, Vietnam, with description of two new species

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ABSTRACT. The family Streptaxidae comprises 8 species and subspecies occurring in Son La, north-western Vietnam. The present paper provides data relevant to these species and the descriptions of two new species. *Stemmatopsis nangphaiensis* sp. nov. has an oblique-heliciform shell with elevated spire. The aperture is quadrangular with rounded angles, toothless, peristome is thick and slightly expanded. *Stemmatopsis vanhoensis* sp. nov. has a depressed-heliciform shell. The umbilicus is wide with long curvy furrow. The aperture is quadrangular and toothless, peristome is very thick and expanded.

Introduction

The Streptaxoidea is divided into two sister families, Streptaxidae and Diapheridae [Sutcharit *et al.*, 2010]. The family Streptaxidae Gray, 1860, has a wide distribution from South America to Africa and Asia [Bruggen, 1967, 1972; Schileyko, 2000; Siriboon *et al.*, 2014]. In Southeast Asia Streptaxidae consist of approximately 130 nominal species of 13 genera [Bruggen, 1967, 1972; Schileyko, 2000]. Most Streptaxids live in Thailand, Malaysia, Vietnam, and Laos.

In Vietnam Streptaxidae are currently the fourth largest pulmonate family with 42 species and subspecies, after the Camaenidae, Clausiliidae, and Ariophantidae [Schileyko, 2011]. To date, nine genera of Streptaxidae have been recorded from Vietnam: *Haploptychius* Möllendorff, 1901 (10 sp., 3 ssp.), *Perrottetia* Kobelt, 1905 (10 sp.), *Elma* Adams, 1866 (5 sp.), *Oophana* Ancey, 1884 (4 sp.), *Indoennea* Kobelt, 1904 (4 sp.), *Indoartemon* Forcart, 1946 (2 sp., 1 ssp.), *Discartemon* Pfeiffer, 1856 (1 sp.), *Stemmatopsis* Mabilie, 1887 (1 sp.), and *Huttonella* Pfeiffer, 1856 (1 sp.) [Schileyko, 2011; Andraïs, 2012; Siriboon *et al.*, 2013]. As in other Vietnam gastropoda, most of Streptaxidae were

described between 1852 and 1915 with poor locality data and based on shell characters only. Accordingly, the systematics of most Vietnamese terrestrial snails remains questionable. The present paper provides additional data on Streptaxidae and describes two new species, which were collected in limestone habitat from Son La, Vietnam.

Material and methods

Terrestrial snails were intensively surveyed throughout Son La province (Fig. 1), Vietnam during 2010-2014. Collecting was done in various habitats including forests on limestone, caves, and limestone karst. Shell height (H), shell width (W), shell angle (SA) were measured, and number of whorls (with accuracy to nearest 0.25) were counted according to the methods of Siriboon *et al.* [2013, 2014]. Shells were measured as indicated in Fig. 2. Identifications were provisionally based on Tryon [1885], Mabilie [1887b], Möllendorff [1881, 1901], Bavay, Dautzenberg [1903], and Benthem-Jutting [1954].

Material examined in this study is deposited in the following institutions: SORC, Soil Organism Research Center of Hanoi National University of Education (HNUE); VNMN, The Vietnam National Museum of Nature; HNUEM, Hanoi National University of Education Museum of Biology.

Systematic part

Family Streptaxidae J. Gray, 1860
Subfamily Streptaxinae J. Gray, 1860

Genus *Perrottetia* Kobelt, 1905

Kobelt, 1905 (1905-1906): 91, 108 (*Odontartemon* subgen.).

Type species: *Helix peroteti* Petit, 1841 (OD).

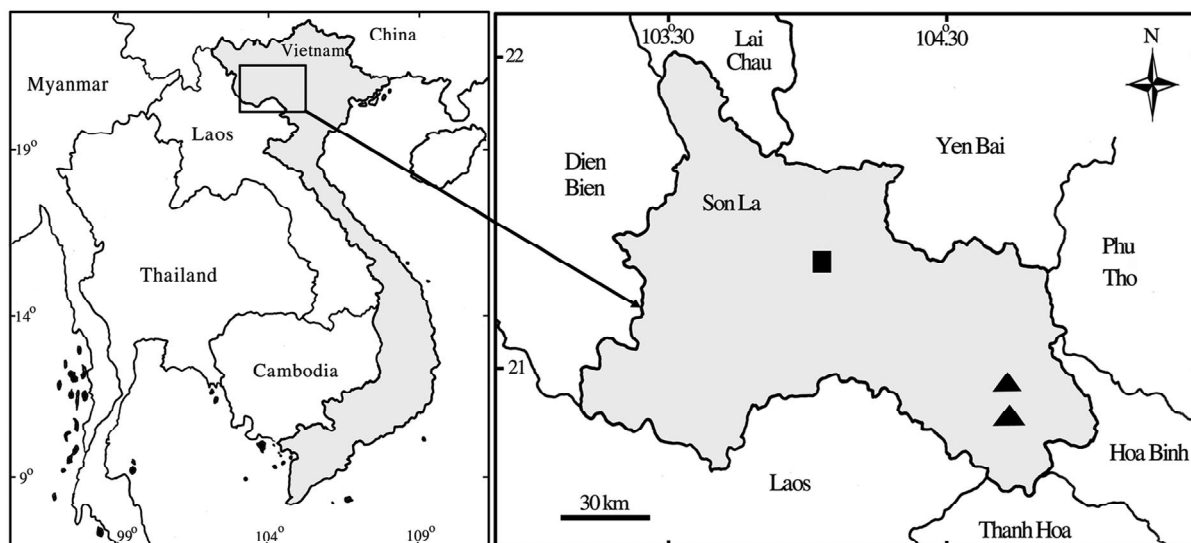


FIG. 1. Map showing the localities of *Stemmatopsis nangphaiensis* sp. n. (black square), and *Stemmatopsis vanhoensis* sp. n. (black triangles).

РИС. 1. Карта нахождения *Stemmatopsis nangphaiensis* sp. n. (черный квадрат) и *Stemmatopsis vanhoensis* sp. n. (черные треугольники).

1. *Perrottetia dugasti* (Morlet, 1892)
(Fig. 3A)

Morlet, 1892a: 82 (*Streptaxis*); 1892b: 315, pl. VII, fig. 5, 5a, 5b (*Streptaxis*); Fischer, Dautzenberg, 1904: 1 (*Streptaxis*); Gude, 1903: 225 (*Streptaxis*); Kobelt, 1906: 123, Taf. 61, Fig. 13 (*Odontartemon* subgen.); Schileyko, 2011: 23 (*Perrottetia*).

Type locality: Lai Chau, Vietnam.

Material examined. SORC 1389 (15 shells): Tham Bo, Muong Bu, Muong La (21°23'29"N; 104°02'26"E; 621 m), limestone mountain, 29 November 2013; SORC 1390 (7 shells): Na An, Xuan Nha, Van Ho (20°43'25"N, 104°47'44"E, 346 m), natural forest, 10 November 2013.

Remarks. Shell globose-heliciform, spire elevated, conical with distinct suture; shell surface smooth, with fine growth lines; last whorl oblique, regularly expanded; umbilicus narrow. Aperture subquadrangular; peristome discontinuous, thickened, expanded and reflected. Apertural dentition with one strong parietal, one palatal, one basal and one large columellar and one small supra-columellar lamella.

This species is similar to *Perrottetia messengeri* (Bavay et Dautzenberg, 1908), but has a smaller shell with flatter spire, narrow umbilicus, and thicker peristome with only one columellar tooth. Our specimens differ from specimens of Morlet [1892b] (of which a population was discovered at Lai Chau) by having a much larger shell height. *Perrottetia dugasti* is known only from the Northwestern Tonkin, Vietnam (Lai Chau, and Son La provinces).

Genus *Stemmatopsis* Mabilie, 1887

Mabilie, 1887a: 6 (*Stemmatopsis*); Mabilie, 1887b: 131 (*Stemmatopsis*); Schileyko, 2000: 777-778.

Type species: *Stemmatopsis poirieri* Mabilie, 1887 (by monotypy).

2. *Stemmatopsis nangphaiensis*

Do et Do, sp. nov.

(Fig. 3B)

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Type material. Holotype SORC 1391. Measurement: height 7.2 mm, width 10.3 mm, 6 whorls. 29 November 2013, coll. Do Duc Sang and Nguyen Thanh Lap. Paratypes SORC 1392 (3 shells), VNMN (3 shells), and HNUEM (2 shells), data as the holotype.

Type locality. Nang Phai, Muong Bu, Muong La, Son La, Vietnam (21°28'26"N; 104°01'34"E).

Etymology. The specific epithet is derived from the type locality of this new species, the Nang Phai

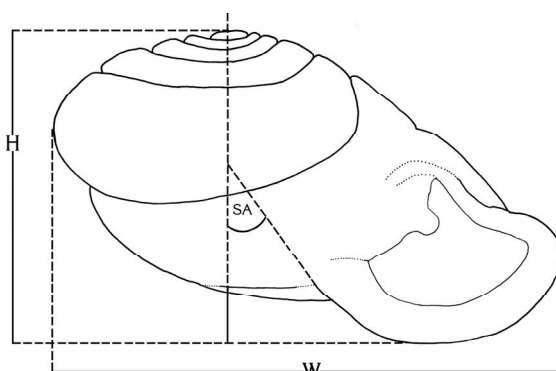


FIG. 2. Schematic diagram illustrating methods for measuring specimens: H, shell height; SA, shell angle; W, shell width.

РИС. 2. Схема измерения раковины: H, высота раковины; SA, угол раковины; W, ширина раковины.



FIG. 3. A, *Perrottetia dugasti*; B, *Stenmatopsis nangphaiensis* sp. n.; C, *Haploptychius blaisei*; D, *Stenmatopsis vanhoensis* sp. n.; E, *Haploptychius costulatus costulatus*; F, *Haploptychius costulatus subcostulatus*; G, *Haploptychius fischeri*; H, *Huttonella bicolor*.

PHC. 3. A, *Perrottetia dugasti*; B, *Stenmatopsis nangphaiensis* sp. n.; C, *Haploptychius blaisei*; D, *Stenmatopsis vanhoensis* sp. n.; E, *Haploptychius costulatus costulatus*; F, *Haploptychius costulatus subcostulatus*; G, *Haploptychius fischeri*; H, *Huttonella bicolor*.

Village, Muong Bu Commune, Muong La District, Son La Province.

Diagnosis. Shell small, oblique-heliciform with elevated spire; umbilicus wide and deep; aperture oblique, wide, quadrangular with rounded angles. Peristome discontinuous, thickened, and slightly expanded; aperture toothless.

[**Диагноз.** Раковина маленькая, скошенно-хеликоидная, с приподнятым завитком, пупок широкий и глубокий; устье скошенное, широкое, четырехугольное, с закругленными углами, без зубов. Перистом прерванный, утолщенный и слегка отвернутый.]

Description. Shell small, oblique-heliciform with elevated spire, creamy white and translucent. Whorls 6, spire conical with distinct suture. Shell surface glossy, with fine transverse ridges that decrease below the periphery. The first 3-4 whorls regularly coiled, last whorl axially deflected to the right, and regularly expanded. Umbilicus about 1.6-2.2 mm wide and deep. Aperture oblique, wide, oval or quadrangular with rounded angles. Peristome discontinuous, thickened, slightly expanded, glossy and whitish. At the upper parietal corner the upper lip forms a sinuous ridge. Aperture toothless.

Distribution. This species is known only from the type locality among limestone karst up to 800 meters above mean sea level (Fig. 1).

Remark. Shells of *Stemmatopsis* and *Haploptychius* are similar but there are differences in the aperture dentition. *Haploptychius* possesses only one parietal lamella, which is different in size. Aperture of *Stemmatopsis* usually toothless. *Stemmatopsis nangphaiensis* sp. nov. can be distinguished from *Stemmatopsis poirieri* Mabilie, 1887 in larger shell, the last whorl being less deviated from the vertical axis, the right periphery of the penultimate whorl being rounded, quadrangular aperture less horizontal. Intraspecific variability is low, shell characters are stable (Table 1).

3. *Stemmatopsis vanhoensis* Do et Do, sp. nov.
(Fig. 3D)

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Type material. Holotype SORC 1393. Measurements: height 5.9 mm, width 9.4 mm, 6S whorls. 26 October 2013, coll. Do Duc Sang and Nguyen Thanh Lap. Paratypes SORC 1394 (5 shells), VNMM (5 shells), and HNUEM (5 shells), data as the holotype.

Other material examined. Na An, Xuan Nha, Van Ho, Son La: SORC 1395 (10 shells).

Type locality. Pa Che, Van Ho, Van Ho, Son La, Vietnam (20°45'57"N; 104°44'53"E).

Etymology. The specific epithet is derived from the type locality of this new species, the Van Ho Commune, Van Ho District, Son La Province.

Diagnosis. Shell small, depressed-heliciform with slightly elevated spire; umbilicus widely open and

deep with long curvy furrow; aperture subhorizontal, wide, quadrangular, with rounded angles, very oblique; peristome discontinuous, very thickened and expanded; aperture toothless.

[**Диагноз.** Раковина маленькая, прижато-хеликоидная, со слабо приподнятым завитком, пупок широкий и глубокий с длинной изогнутой бороздой; устье очень скошенное, почти горизонтальное, четырехугольное, с закругленными углами, без зубов. Перистом прерванный, очень утолщенный и отвернутый.]

Description. Shell small, depressed-heliciform, creamy white and translucent, with slightly elevated spire. Whorls 6½, the first 3-4 regularly coiled, the last whorl axially deflected to the right. Shell surface glossy, with thin and fine transverse ridgelets, which disappears below periphery of penultimate whorl. Umbilicus widely open and deep with long curvy furrow, about 2.0-2.4 mm wide. Aperture subhorizontal, wide, oval or quadrangular with rounded angles, very oblique. Peristome discontinuous, thickened, expanded, glossy and whitish. At the upper parietal corner the upper lip forms a sinuous ridge. Aperture toothless.

Distribution. This species is known from limestone karst of Moc Chau Plateau reaching about 1.100 metres above mean sea level (Fig. 1).

Remark. *Stemmatopsis vanhoensis* sp. n. can be distinguished from *Stemmatopsis poirieri* in its larger shell, the last whorl being less deviated from the vertical axis, the quadrangular aperture being less horizontal, and broadly expanded peristome. *Stemmatopsis vanhoensis* sp. n. can be distinguished from *S. nangphaiensis* sp. n. by having a smaller shell, lower spire, and thicker peristome.

Subfamily Gibbinae Steenberg, 1936
Genus *Haploptychius* Möllendorff, 1905

Möllendorff in Kobelt, 1905 (1905-1906): 127.

Type species: *Streptaxis sinensis* Gould, 1858: 424 (OD).

4. *Haploptychius blaisei*
(Dautzenberg et Fischer, 1905)
(Fig. 3C)

Dautzenberg, Fischer, 1905: 86, pl. III, fig. 1-4 (*Streptaxis*); Schileyko, 2011: 24.

Type locality: Ha Long, Quang Ninh, Vietnam.

Material examined. SORC 1396 (2 shells): Tham Bo, Muong Bu, Muong La (21°23'29"N; 104°02'26"E; 621 m), limestone mountain, 29 November 2013.

Remarks. Shell depressed-globose heliciform with slightly elevated spire. The last whorl axially deflected, umbilicus open; aperture wide, sub-quadrangular, oblique; peristome discontinuous and expanded; parietal lamella small, entering the aperture about 2.0-2.5 mm.

Haploptychius blaisei can be distinguished from

Table 1. Shell measurements of Streptaxidae species.

Species and locality	No. of specimens	Measurements of the shell (in mm)				Number of whorls
		Shell height	Shell width	H/W ratio	Shell angle	
<i>Perrottetia dugasti</i>						
Muong Bu, Muong La	26	3.1-3.7	5.1-5.3	0.59-0.72	30-36	5½-6
Xuan Nha, Van Ho	7	3.5-3.9	5.0-5.3	0.69-0.75	26-34	5½-6
<i>Stemmatopsis nangphaiensis</i> sp. nov.						
Muong Bu, Muong La	9	6.8-7.2	9.8-10.3	0.69-0.72	19-25	6
<i>Stemmatopsis vanhoensis</i> sp. nov.						
Van Ho, Van Ho	20	5.7-6.0	9.0-9.4	0.62-0.65	29-35	6-6½
Xuan Nha, Van Ho	10	5.6-6.0	9.0-9.4	0.62-0.65	28-35	6-6½
<i>Haploptychius blaisei</i>						
Muong Bu, Muong La	2	7.7-7.8	11.1	0.69-0.70	39-41	6
<i>Haploptychius costulatus costulatus</i>						
Chiang Mung, Mai Son	16	5.5-5.8	7.0-7.6	0.75-0.80	28-35	6-6½
Tuong Thuong, Phu Yen	23	5.5-5.7	7.0-7.5	0.74-0.80	27-33	5¾-6
Muong Bu, Muong La	30	5.4-5.7	7.0-7.5	0.74-0.80	28-34	6-6½
<i>Haploptychius costulatus subcostulatus</i>						
Muong Bang, Mai Son	96	7.0-7.5	9.8-10.5	0.70-0.75	32-38	6-6½
Bo Muoi, Thuan Chau	13	6.8-7.4	9.5-10.3	0.67-0.74	30-35	6-6½
Chiang Bang, Quynh Nhai	11	6.8-7.4	9.6-10.3	0.67-0.74	30-35	6-6½
<i>Haploptychius fischeri</i>						
Pa Cop, Van Ho	6	11-12	11.5-13	0.84-1.02	13-18	7
Chiang Khoang, Quynh Nhai	11	10.8-12	11.5-13	0.83-1.02	12-18	7
<i>Huttonella bicolor</i>						
Bon Phang, Thuan Chau	7	6.5-6.9	1.8-2.0	3.4-3.7	-	7½-8
Muong Bu, Muong La	9	6.4-7.0	1.8-2.0	3.3-3.7	-	7½-8

H. anceyi (Mabille, 1887) by larger shell and a widely open umbilicus, and irregularly expanding last whorl. This species differs from *H. costulatus* in lower spire with deeper suture, and smaller parietal lamella. Shells from Son La differ from original description of Dautzenberg and Fischer (1905) by having a higher shell.

5. *Haploptychius costulatus costulatus*
(Möllerndorff, 1881)
(Fig. 3E)

Möllerndorff, 1881: 312 (*Streptaxis*); Möllerndorff, 1883: 275, Taf. 10, fig. 8 (*Streptaxis*); Tryon, 1885: 73, pl. 15, fig. 27, 28 (*Streptaxis*); Bavay, Dautzenberg, 1903: 201, pl. VII, fig. 4-6 [*Streptaxis (Eustreptaxis)*]; Gude, 1903: 214 (*Streptaxis*); Fischer, Dautzenberg, 1904: 390 (*Streptaxis*); Dautzenberg, Fischer, 1905a: 86 [*Streptaxis (Eustreptaxis)*]; 1906: 146 [*Streptaxis (Eustreptaxis)*]; 1908: 170 [*Streptaxis (Eustreptaxis)*]; Yen, 1939: 159, Taf. 16, Fig. 29; Zilch, 1961: 83, Tab. 5, Fig. 5; Schileyko, 2011: 24.

Type locality: Guang-dung, China.

Material examined. SORC 1397 (23 shells): Tuong Thuong, Phu Yen (21°10'36"N; 104°37'41"E; 683 m), limestone mountain, 7 November 2012; SORC 1398 (16 shells): Ban Xum, Chiang Mung, Mai Son (21°14'17"N; 104°01'06"E; 647 m), limestone mountain, 12 August 2012.

Remarks. Shell globose-heliciform, with elevated spire; umbilicus deep and wide; aperture wide, oval or subquadrangular, oblique; peristome discontinuous, thickened and reflected; parietal lamella small, oblique, entering the aperture about 1.5-2.0 mm.

This subspecies differs from *Haploptychius c. subcostulatus* by the following characters: smaller shell (see measurements); postembryonic whorls more coarsely ribbed; higher spire and more distinct suture. *Haploptychius c. costulatus* differs from *Haploptychius c. edentula* (Bavay et Dautzenberg, 1903) in larger shell. Shells from Son La differ from original description of Möllerndorff [1881] by having a wider shell.

6. *Haploptychius costulatus subcostulatus*
(Möllerndorff, 1901)
(Fig. 3F)

Möllerndorff, 1901: 65 [*Streptaxis (Eustreptaxis)*]; Bavay, Dautzenberg, 1903: 201, pl. VII, fig. 1-3 [*Streptaxis (Eustreptaxis)*]; Fischer, Dautzenberg, 1904: 390 (*Streptaxis*); Dautzenberg, Fischer, 1906: 146 [*Streptaxis (Eustreptaxis)*]; Zilch, 1961: 83, Tab. 5, fig. 6; Schileyko, 2011: 24. Type locality: Chi Lang, Lang Son, Vietnam.

Material examined. SORC 1399 (13 shells): Bo, Bo Muoi, Thuan Chau (21°27'49"N; 103°49'24"E; 606 m), forests on limestone, 15 July 2014; SORC 1400 (15 shells): Na Hoi, Muong Bang, Mai Son (21°18'11"N; 104°02'15"E; 779 m), limestone mountain, 24 November 2013; SORC 1401 (11 shells): Na Pat, Chiang Khoang, Quynh Nhai (21°33'03"N; 103°41'31"E; 407 m), natural forest, 27 August 2013.

Remarks. *Haploptychius c. subcostulatus* can be distinguished from *Haploptychius c. costulatus* and *Haploptychius c. edentula* in having a larger shell, a wider aperture, and a stronger parietal lamella. In Son La, intraspecific diversity is relatively high,

spire height, shell size and morphology of the aperture show considerable variability (see Table 1). In Vietnam, this subspecies is mainly distributed in Northern (Lang Son, Son La, Da River valley) [Möllendorff, 1901].

7. *Haploptychius fischeri* (Morlet, 1886) (Fig. 3G)

Morlet, 1886a: 2 (*Streptaxis*); Morlet, 1886b: 259, 274, pl. XII, fig. 1, 1a (*Streptaxis*); Mabilie, 1887b: 128 (*Streptaxis*); Gude, 1903: 212 (*Streptaxis*); Schileyko, 2011: 25.

Type locality: Quang Ninh, Vietnam.

Material examined. SORC 1404 (6 shells): Pa Cop, Van Ho, Van Ho (20°45'56"N; 104°44'30"E; 1,013 m), limestone mountain, 11 November 2013; SORC 1405 (11 shells): Na Pat, Chieng Khoang, Quynh Nhai (21°33'03"N; 103°41'30"E; 407 m), natural forest, 28 August 2013.

Remarks. Shell globose-heliciform, with a conical spire; shell surface glossy, with transverse ridges that decrease below periphery; all whorls evenly rounded, last whorl oblique and regularly expanded; aperture oblique, rounded-squarish; peristome discontinuous, thickened, expanded and reflected; parietal lamella almost straight, entering the aperture about 2.0 mm.

Haploptychius fischeri can be distinguished from *H. anceyi*, *H. blaisei*, and *H. diespiter* (Mabilie, 1887) by the conical spire with distinct suture, the larger shell with wider aperture; from *H. costulatus* and *H. sinensis*, this species differs by a larger shell, with higher spire, a wide aperture and a deep umbilicus. In Son La, intraspecific variability is low, shell characters are stable (see Table 1).

Subfamily Ptychotrematinae Pilsbry, 1919

Genus *Huttonella* Pfeiffer, 1856

Pfeiffer, 1856: 174.

Type species: *Pupa bicolor* Hutton, 1834: 93 (subsequent designation Stoliczka, 1871).

8. *Huttonella bicolor* (Hutton, 1834) (Fig. 3H)

Hutton, 1834: 86, 93 (*Pupa*); Pfeiffer, 1854 (1854-1879): 115, Taf. XXXII, fig. 15-17 (*Ennea*); Mörch, 1872: 315 (*Ennea*); Fischer P., 1891: 18 (*Ennea*); Fischer, Dautzenberg, 1904: 2 (*Ennea*); Benthem-Jutting, 1961: 8; Schileyko, 2000: 822, fig. 1075A; Schileyko, 2011: 27.

Type locality: Mirzapur, India.

Material examined. SORC 1406 (7 shells): Bon, Bon Phang, Thuan Chau (21°23'04"N; 103°46'39"E; 620 m), forest on limestone, 30 October 2013; SORC 1407 (9 shells): Tham Bo, Muong Bu, Muong La (21°23'29"N; 104°02'26"E; 621 m), limestone mountain, 29 November 2013; SORC 1408 (7 shells): Na Hoi, Muong Bang, Mai Son (21°18'11"N; 104°02'15"E; 779 m); limestone mountain, 24 November 2013.

Remarks. Shell cylindrical, small, rather thin, somewhat transparent. Whorls convex, suture rela-

tively deep. Shell surface mostly smooth, with irregular axial subsutural ribs. Aperture almost quadrate, height slightly exceeds width, with rounded base; aperture with four teeth: one simple lamella on parietal wall close to the peristome, a deeply situated columellar in the interior of the shell, a small blunt basal tooth and strong palatal one. Peristome white with thickened reflected lip, behind the peristome, there are two shallow pits on the outside of the last whorl.

Huttonella bicolor was described from Mirzapur, India [Hutton, 1834]. Nowadays, it has been introduced in several tropical areas of Africa, America, Australia and Central Pacific, China, Vietnam, India, Thailand, Malaysia [Benthem-Jutting, 1961; Schileyko, 2011].

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- Наземные брюхоногие моллюски семейства Streptaxidae J.Gray, 1860 (Gastropoda: Pulmonata) из Сон-Ла, Вьетнам, с описанием двух новых видов
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- РЕЗЮМЕ.** Семейство Streptaxidae в Сон-Ла, северо-западный Вьетнам, представлено 8 видами и подвидами. В статье приведены данные о этих видах и описано два новых для науки вида. *Stemmatopsis nangphaiensis* sp. nov. имеет скошенно-хелициформную раковину с приподнятым завитком. Устье четырехугольное с закругленными углами, без зубов, перистом утолщенный и слегка отвернутый. Раковина *Stemmatopsis vanhoensis* sp. nov. имеет прижато-хелициформную раковину. Пупок широкий, с длинной изогнутой бороздой. Устье четырехугольное, без зубов, перистом очень толстый и отвернутый.