

Family Cyclophoridae in Vietnam (Gastropoda: Cyclophoroidea): the genus *Cyclophorus* Montfort, 1810

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ABSTRACT. Vietnam with its limestone ranges that are concentrated mainly in northern, north-central and southern parts, and many different limestone islands running along the coastline, has a phylogenetically-diverse land snails fauna dominated by endemic species. The genus *Cyclophorus* (Cyclophoridae) in Vietnam is studied. Sixty species and subspecies from various habitats of limestone areas throughout Vietnam are confirmed and recorded. New species and subspecies, *Cyclophorus implicatus kanhoensis* ssp. nov., from Northwestern Vietnam, and *Cyclophorus tamdaoensis* sp. nov., from Northern Vietnam are described and discussed. In this paper, the *Cyclophorus courbeti* var. *leucostoma* Dautzenberg et Fischer, 1905, is elevated to subspecies.

Introduction

Cyclophoridae Gray, 1847 is the family of operculated land snails in tropical and subtropical regions of Asia, Africa and Australia [Pfeiffer, 1862a; Kobelt, 1902; Gude, 1921; Ho, 1995; Nantararat *et al.*, 2014b]. The *Cyclophorus* Montfort, 1810 is one of 35 genera of Cyclophoridae, with a wide distribution range that covers South Asia and South East Asia regions [Kobelt 1902, 1908; Gude, 1921; Pilsbry, 1926; van Benthem Jutting, 1949, 1959; Solem, 1959; Egorov, Greke, 2007]. Genus *Cyclophorus* is divided into five to eight subgenera basing on shell size, shell shape, features of the peristome, aperture, body whorl, umbilicus, and their geographical distribution [Kobelt, 1902, 1908: *Cyclohelix*, *Cyclophorus*, *Cricophorus*, *Glossostylus*, *Litostylus*, *Maizania*, *Papuocyclos*, and *Salpingophorus*; Gude, 1921: *Cyclohelix*, *Cyclophorus*, *Glossostylus*, *Litostylus*, and *Salpingophorus*; Egorov, Greke, 2007: *Cyclohelix*, *Cyclophorus*, *Cricophorus*, *Glossostylus*, and *Kobeltostylus*]. However, all of these subgenera remain inadequately diagnosed and will require extensive revision.

There are good reasons to suppose that the country of Vietnam, with a surface of 331,210 km², variety of habitats, with many limestone ranges that are concentrated mainly in north-western, north-eastern, north-central and southern parts, and many different limestone islands running along the coastline of Vietnam, will have a diverse land snail fauna with many endemic species.

The study of the land snails of Vietnam, has a long and rich history. Virtually all of our current knowledge of the diversity and distribution of the Vietnam land snail fauna is based on the publications and collections from the end of the 19th century to the early 20th century workers, particularly Bavay and Dautzenberg [1899–1909], Crosse and Fischer [1863], Crosse [1867], Fischer [1891–1898], Fischer and Dautzenberg [1904], Mabile [1887–1889], Möllendorff [1898–1901], Morlet [1886–1892].

In recent years work on the land snail fauna of Vietnam has concentrated on broad patterns of distribution and on highlighting the importance of land snails as a significant component of Vietnam biodiversity and in urgency need of research and conservation [Vermeulen, Maassen, 2003; Vermeulen *et al.*, 2008; Schileyko, 2011; Nordsieck, 2011; Páll-Gergely *et al.*, 2015, 2017; Thach, 2016, 2017; Oheimb *et al.*, 2018].

The aim of this paper is to provide a comprehensive and updated checklist of *Cyclophorus*, including diagnostic characters, photographs, distribution data of all species, in order to present a baseline species inventory for future *Cyclophorus* studies, particularly conservation and breeding.

Material and methods

The data included here are based on published records and field investigations from 2002–2018. Specimens and shells were collected by hand searching in the following regions in Vietnam: (1) North-

eastern, (2) North-western, (3) Coastal North-eastern, (4) Red river Delta, (5) North Central, (6) South Central and (7) Southern.

The exact descriptions of locations are given from province to village. The Vietnamese geographic names are presented in Romanized form. The exact GPS coordinates for each collection site was specified. If no exact GPS coordinates were available for a collection site, approximate coordinates were determined based on available locality information or map.

All species were identified by their shell characters. In addition to the shell size, shell shape and sculpture, features of the peristome and umbilicus as well as the periphery are important characters to diagnose species.

Shell measurements were made for the adult specimen using digital calipers. The specimen was measured with accuracy 0.1 mm, with expanded lip of aperture included. Shell height (H) was measured along the columellar axis passing through apex to apertural base. Shell width (D) is the maximum width perpendicular to columella axis. Shell whorls were counted according to Kerney and Cameron [1979] (precision 0.25). Differences in size are indicated in the diagnosis using the following terms: small-sized (<25 mm), medium (25–35 mm), large (35–45 mm), very large (>45 mm). Specimens were photographed showing peripheral, apertural, apical and umbilical views [Nantararat *et al.*, 2014b].

Considering the known ranges of the species, seven zoogeographical regions of Vietnam are recognizable as follows [Nordsieck, 2011; Schileyko, 2011]:

1. North-eastern: Lang Son, Ha Giang, Cao Bang, Bac Kan, Thai Nguyen, Tuyen Quang, Bac Ninh, Yen Bai (part)
2. North-western: Son La, Lai Chau, Dien Bien, Yen Bai, Lao Cai, Hoa Binh (part), Thanh Hoa (part)
3. Coastal North-eastern: Quang Ninh, Hai Phong
4. Red river Delta: Hanoi, Ninh Binh, Phu Tho, Vinh Phuc, Ha Nam, Hoa Binh (part)
5. North Central: Thanh Hoa, Quang Tri, Quang Binh, Thua Thien Hue
6. South Central: Gia Lai, Quang Nam, Binh Dinh, Khanh Hoa
7. Southern: Tay Ninh, Ba Ria–Vung Tau, Dong Nai, Kien Giang, An Giang

Collected material has been deposited in the Vietnam National Museum of Nature (VNMN_IZ), Biology Museum of Hanoi National University of Education (HNUEM_OC), Hanoi, Vietnam; Center for Biodiversity and Environment Research, Tay Bac University (CBER-TBU), Son La, Vietnam; Soil Organism Research Center of Hanoi National University of Education (SORC), Hanoi, Vietnam and private collections.

Additional abbreviations:

D – shell width;

DDS – private collection Do Duc Sang (Son La, Vietnam);

DVN – private collection Do Van Nhung (Hanoi, Vietnam);

H – shell height;

MNHN – Muséum National d'Histoire Naturelle, Paris, France;

NHMUK – Natural History Museum, London, UK;

RBINS – Royal Belgian Institute of Natural Sciences, Brussels, Belgium.

Systematic part

Class Gastropoda Cuvier, 1795

Clade Caenogastropoda Cox, 1960

Superfamily Cyclophoroidea J.E. Gray, 1847

Family CYCLOPHORIDAE J.E. Gray, 1847

Genus *Cyclophorus* Montfort, 1810

Montfort, 1810: 290–292.

Type species – *Helix volvulus* O.F. Müller, 1774; OD.

Cyclophorus affinis Theobald, 1858

Figs 1.1, 13A

Cyclophorus affinis Theobald, 1858: 246; Hanley, Theobald, 1876: 1, pl. 2, fig. 7, pl. 48, fig. 2, pl. 104, fig. 1; Pfeiffer, 1876: 405; Nevill, 1878: 270; Nantararat *et al.*, 2014a: 99–111, fig. 1A; Nantararat *et al.*, 2014b: 4, fig. 2C.

Cyclophorus haughtoni. – Stoliczka, 1871: 147 (not of Theobald, 1858).

Cyclophorus (Eucyclophorus) affinis. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (Cyclophorus) affinis. – Kobelt, 1902: 135.

Cyclophorus (Salpingophorus) affinis. – Kobelt, 1908: 654, Taf. 94, Fig. 6–7.

Cyclophorus affinis var. *picta* Gude, 1921: 88, fig. 15, 89.

Type locality: Maulmein, Myanmar.

Type material: Lectotype NHMUK 1903.7.1. 1454 [Nantararat *et al.*, 2014b: fig. 2C].

Material examined. **Hno2012/002** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, Small hill just behind of Trinh Temple, Exposed limestone with little soil and vegetation, 20°34.21'N, 105°46.37'E, 313 m, leg. V.N. Do, 15 June 2012; **Sla2013/011** Vietnam, Son La Province, Son La City, Chieng Ngan Commune, Khoang Village, 21°19.28'N, 103°58.55'E, 566 m, Limestone hill with regrowth, col. T.T. Nguyen, 26 October 2013; **Sla2013/005a** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Dom Huon Village, Limestone hills sparsely vegetated, 21°22.234'N, 103°46.190'E, 605 m, leg. D.S. Do and T.D. Luong, 02 November 2013; **Sla2014/011** Vietnam, Son La Province, Bac Yen District, Ta Khoa Commune, Sap Viet Village, Limestone outcrops with little soil and vegetation, 21°08.42'N, 104°25.03'E, 165 m, leg. D.S. Do, 13 July 2014.

Diagnosis. Shell medium in size, conical, with tall spire. Last whorl rounded, stout, with numer-

Table 1. Dimensions, diagnostic characters and distribution of Vietnamese *Cyclophorus* species.

No	Species	Dimensions (mm)		Diagnosis characters	Distribution
		D	H		
1.	<i>affinis</i>	29.6–34.0	24.0–28.3	Shell medium sized. Spire tall. Last whorl well-rounded. Peristome simple	Northern Vietnam: Hanoi, Son La Provinces. Elsewhere: Myanmar, Thailand
2.	<i>amoenus</i>	28.7–30.3	23.6–24.2	Shell medium sized. Spire tall. Periphery with a slight edge. Peristome double or simple, thick and reflected	Central and Southern Vietnam: Dong Nai, Kien Giang Provinces. Elsewhere: Thailand
3.	<i>aquilus</i>	36.1–43.0	31.2–35.2	Shell large sized. Spire tall. Last whorl well-rounded without edge. Peristome simple, thick and reflected	North-western Vietnam: Son La Province. Elsewhere: Thailand, Malaysia, China
4.	<i>aurantiacus pernobilis</i>	51.0–60.0	38.6–49.5	Shell very large. Spire medium. Periphery with a distinct edge. Peristome simple. Umbilicus open and very wide.	North-western Vietnam: Hoa Binh, Son La, Dien Bien Provinces. Elsewhere: Myanmar, Thailand, Malaysia
5.	<i>bensoni</i>	37.8	33.0	Shell large. Spire tall. Periphery with a slight edge. Peristome simple, thick and reflected	Southern Vietnam: Kien Giang Province. Elsewhere: Thailand, India, Cambodia
6.	<i>cambodgensis</i>	35.2–46.0	27.3–36.1	Shell large. Spire medium. Last whorl well-rounded without edge. Peristome simple, thick and reflected. Umbilicus wide.	Northern, Central and Southern Vietnam: Bac Kan, Lang Son, Quang Ninh, Hai Phong, Ha Noi, Ha Nam, Ninh Binh, Vinh Phuc, Phu Tho, Hoa Binh, Son La, Thanh Hoa, Thua Thien Hue, Dong Nai, Kien Giang Provinces. Elsewhere: Cambodia
7.	<i>cantori</i>	40.7–45.5	36.3–41.8	Shell from large to very large. Spire very tall. Periphery with a distinct edge. Peristome simple.	Northern Vietnam: Hoa Binh, Phu Tho Provinces. Elsewhere: Malaysia, Thailand, Cambodia
8.	<i>clouthianus</i>	37.4–45.0	32.5–38.0	Shell large. Spire very tall. Periphery usually a row of white spots, and a distinct edge. Peristome simple	North-eastern Vietnam: Lang Son, Tuyen Quang, Bac Kan Provinces. Elsewhere: China
9.	<i>consociatus</i>	31.7–40.7	28.0–34.6	Shell large. Spire tall. Last whorl well-rounded without edge. Peristome simple. Umbilicus narrow, always covered by peristome	Central and Southern Vietnam: Binh Dinh, Tay Ninh, Kien Giang Provinces. Elsewhere: Thailand
10.	<i>courbeti courbeti</i>	39.0–43.5	29.1–37.0	Shell large. Spire very tall. Periphery with a distinct keel. Peristome simple	Northern Vietnam: Ha Giang, Lang Son, Cao Bang, Bac Kan, Thai Nguyen, Tuyen Quang, Vinh Phuc, Ninh Binh, Hoa Binh, Son La, Lai Chau, Dien Bien, Thanh Hoa Provinces. Elsewhere: Thailand, Indonesia
11.	<i>courbeti leucostoma</i>	32.3–41.2	27.5–33.5	Shell from medium sized to large. Spire very tall. Periphery with a distinct keel. Peristome simple	Northern Vietnam: Ha Giang, Bac Kan, Hoa Binh Provinces
12.	<i>cryptomphalus</i>	31.1–34.2	23.6–25.8	Shell medium large. Spire medium. Periphery with a slight edge. Peristome simple and very thick	Northern Vietnam: Son La, Thanh Hoa Provinces Elsewhere: Thailand, India
13.	<i>dilatatus</i>	21.6–26.3	20.3–23.6	Shell from small to medium sized. Spire very tall. Periphery with a distinct keel. Peristome slightly thickened, double or simple	Northern Vietnam: Lang Son, Bac Kan, Hoa Binh, Son La Provinces. Elsewhere: China, Laos
14.	<i>dodrans dodrans</i>	53.6–64.3	37.0–46.8	Shell very large. Spire low. Shell covered with thin, fibrous periostracum. Last whorl rounded. Peristome very thick, simple	Northern Vietnam: Lang Son, Ha Giang, Thai Nguyen, Tuyen Quang, Hai Phong, Cao Bang, Hoa Binh Provinces. Elsewhere: China (?)
15.	<i>dodrans fasciatus</i>	42.0–48.1	35.3–40.2	Shell from large to very large. Spire very tall. Last whorl rounded or slightly edged. Peristome very thick, simple	North-western and Central Vietnam: Hoa Binh, Son La, Thanh Hoa Provinces
16.	<i>donghoiensis</i>	55.0–58.7	40.0–43.4	Shell very large. Spire tall. Last whorl rounded. Peristome simple	North Central Vietnam: Quang Binh Province
17.	<i>eudeli</i>	30.2–33.6	29.7–33.1	Shell medium sized. Spire tall. Last whorl well-rounded without edge. Peristome very thick, double	Central and Southern Vietnam: Binh Dinh, Kien Giang Provinces

Table 1. Continued

No	Species	Dimensions (mm)		Diagnosis characters	Distribution
		D	H		
18.	<i>expansus</i>	26.2–33.0	21.3–28.0	Shell medium sized. Spire tall. Periphery with a distinct keel. Peristome thick and expanded	North-western Vietnam: Hoa Binh, Son La, Thanh Hoa Provinces. Elsewhere: Thailand, Malaysia, Myanmar
19.	<i>fargesianus</i>	29.2–33.1	24.4–29.3	Shell medium sized. Spire very tall. Periphery usually with a row of white spots, and a distinct edge. Peristome simple or double	Northern Vietnam: Tuyen Quang, Phu Tho, Hoa Binh, Son La Provinces. Elsewhere: China
20.	<i>floridus</i>	28.7–29.6	27.1–28.4	Shell medium sized. Spire very tall. Last whorl well-rounded. Peristome slightly thickened, simple	Central and Southern Vietnam: An Giang, Gia Lai Provinces. Elsewhere: Thailand, Laos
21.	<i>fruhstorferi</i> <i>fruhstorferi</i>	51.3–62.0	34.1–42.0	Shell very large. Spire low. Shell covered with thin, fibrous periostracum. Periphery with a distinct keel. Peristome thick, simple, sometimes discontinuous	Northern Vietnam: Lang Son, Tuyen Quang, Bac Kan, Ninh Binh Provinces
22.	<i>fruhstorferi</i> <i>langsonensis</i>	47.0–47.7	35.7–36.5	Shell very large. Spire low. Shell covered with thin, fibrous periostracum. Periphery with a slight keel. Peristome thick, simple	North-eastern Vietnam: Lang Son, Hai Phong Provinces
23.	<i>fulguratus</i>	29.7–37.5	20.6–29.5	Shell medium sized to large. Spire tall. Last whorl well-rounded without edge. Peristome thick, simple	Northern and Central Vietnam: Tuyen Quang, Lang Son, Thai Nguyen, Bac Kan, Cao Bang, Ha Noi, Ninh Binh, Vinh Phuc, Hoa Binh, Son La, Thanh Hoa, Quang Binh, Khanh Hoa Provinces. Elsewhere: Thailand, Myanmar, Nepal, Cambodia
24.	<i>haughtoni</i>	38.1	33.7	Shell large. Spire very tall. Last whorl well-rounded, stout without edge. Peristome simple. Umbilicus wide	Central Vietnam: Gia Lai Province. Elsewhere: Myanmar, Thailand
25.	<i>herklotsi</i>	18.9–22.1	19.1–25.0	Shell small. Spire very tall. Last whorl well-rounded, stout without edge. Peristome slightly thickened, simple, sometimes discontinuous. Umbilicus narrow	Vietnam: Dong Nai, An Giang Provinces. Elsewhere: Japan, South Korea, Thailand
26.	<i>huberi</i>	49.5–55.9	33.5–38.6	Shell very large. Spire tall. Last whorl rounded. Peristome simple	South Central Vietnam: Quang Nam Province
27.	<i>ignilabris</i>	47.2–52.7	33.2–39.8	Shell very large. Spire tall. Shell covered with thin, fibrous periostracum. Periphery with a distinct keel. Peristome very thick, simple	North-eastern and Coastal North-eastern Vietnam: Quang Ninh, Lang Son Provinces
28.	<i>implicatus</i> <i>implicatus</i>	28.1–37.4	21.3–25.5	Shell medium sized. Last whorl well-rounded. Umbilicus wide. Peristome slightly thickened, simple	Northern Vietnam: Ha Giang, Lang Son, Lai Chau, Son La Provinces
29.	<i>implicatus</i> <i>kanhoensis</i> subsp. nov.	25.2–27.1	20.1–21.0	Shell medium sized. Last whorl flattened and with a distinct keel	North-western Vietnam: Lai Chau Province
30.	<i>jourdyi</i>	28.2–33.4	24.2–28.6	Shell medium sized. Spire very tall. Last whorl well-rounded, stout without edge. Umbilicus narrow, 1/2 covered by the peristome	Northern to Southern Vietnam: Lang Son, Thai Nguyen, Tuyen Quang, Quang Ninh, Hai Phong, Ha Noi, Vinh Phuc, Ninh Binh, Hoa Binh, Son La, Thanh Hoa, Quang Tri, Kien Giang Provinces
31.	<i>labiosus</i>	38.3–42.2	29.8–30.4	Shell large. Spire slightly low. Last whorl well-rounded without edge. Peristome very thick, simple	Northern Vietnam: Lang Son, Son La Provinces. Elsewhere: Thailand
32.	<i>malayanus</i>	37.3–50.2	29.3–41.2	Shell large to very large. Spire tall. Last whorl well-rounded, stout and expanded. Aperture very wide	Northern Vietnam: Hanoi, Ninh Binh, Hoa Binh, Son La, Thanh Hoa Provinces. Elsewhere: Malaysia, Thailand, Indonesia, India
33.	<i>mansuyi</i>	35.0–40.7	23.9–28.3	Shell large. Spire low. Last whorl well-rounded and expanded. Peristome slightly thickened, simple. Umbilicus very wide, not covered by the peristome	Northern Vietnam: Cao Bang, Quang Ninh, Hai Phong, Son La, Lai Chau Provinces

Table 1. Continued

No	Species	Dimensions (mm)		Diagnosis characters	Distribution
		D	H		
34.	<i>martensianus</i>	31.2–39.0	28.5–34.6	Shell medium sized to large. Spire very tall. Periphery usually a row of white spots, and a distinct edge. Peristome simple	North-eastern to North Central Vietnam: Bac Kan, Lang Son, Tuyen Quang, Quang Ninh, Hanoi, Thanh Hoa Provinces. Elsewhere: China
35.	<i>massiei</i>	17.1–21.3	15.2–18.4	Shell small. Spire tall. Periphery with a distinct keel. Peristome thin and slightly expanded. Umbilicus narrow.	North-western Vietnam: Lai Chau, Son La Provinces
36.	<i>monachus</i>	39.3–40.4	20.5–21.1	Shell large. Spire very low. Last whorl rounded without edge. Umbilicus very wide	Southern Vietnam: Tay Ninh Province
37.	<i>muspratti</i>	43.8–51.3	36.8–41.7	Shell large to very large. Spire very tall. Periphery with a distinct keel. Peristome thick, simple and expanded. Umbilicus very wide	Red river Delta Vietnam: Hanoi Province. Elsewhere: India
38.	<i>orthostylus</i>	37.5	26.5	Shell large. Spire tall. Umbilicus wide	Central Vietnam
39.	<i>paviei</i>	32.4–35.5	26.1–32.0	Shell medium sized. Spire tall. Last whorl well-rounded with slight edge. Peristome slightly thick, simple and slightly expanded	Southern Vietnam: Dong Nai Province. Elsewhere: Cambodia
40.	<i>pfeifferi</i>	41.1–46.3	32.0–36.7	Shell large to very large. Spire tall. Last whorl well-rounded with a distinct keel. Aperture very wide. Peristome thick, simple and expanded	North-western and Southern Vietnam: Son La, Dien Bien, Ba Ria–Vung Tau Provinces. Elsewhere: Malaysia, Cambodia, Thailand
41.	<i>polystictus</i>	34.7–37.2	31.2–33.5	Shell large. Spire very tall. Last whorl well-rounded with a distinct edge. Peristome slightly thickened, simple and slightly expanded	Northern Vietnam: Lang Son, Son La Provinces
42.	<i>pyrostoma</i>	30.3–36.8	26.3–31.2	Shell medium sized. Spire tall. whorl well-rounded with slight edge. Peristome simple and very thick	North-eastern Vietnam: Tuyen Quang, Lang Son, Bac Kan Provinces. Elsewhere: China
43.	<i>saturnus</i>	54.1–55.2	44.3–45.0	Shell very large. Spire tall. Last whorl rounded without edge. Aperture very wide. Peristome very thick, simple and expanded	Vietnam: Lang Son Province (?) and Sounthern. Elsewhere: Cambodia, Thailand
44.	<i>siamensis</i>	37.1–40.8	29.3–32.7	Shell large. Spire medium tall. Last whorl well-rounded without edge. Aperture very wide. Peristome slightly thick, simple and expanded	Northern Vietnam: Lang Son, Ninh Binh, Hoa Binh, Son La Provinces. Elsewhere: Thailand, India
45.	<i>songmaensis</i>	48.5–56.2	35.7–47.0	Shell very large. Spire tall. Last whorl well-rounded with a distinct keel. Umbilicus wide	North-western Vietnam: Ninh Binh, Hoa Binh, Son La, Dien Bien, Thanh Hoa Provinces Elsewhere: Thailand
46.	<i>speciosus</i>	42.0–49.5	34.5–41.2	Shell large to very large. Spire tall. Last whorl well-rounded with a distinct edge. Peristome thick, simple and expanded	Northern Vietnam: Ha Giang, Tuyen Quang, Ninh Binh, Hoa Binh, Son La, Thanh Hoa Provinces. Elsewhere: Thailand, Laos, Cambodia, Myanmar
47.	<i>subfloridus</i>	26.3–34.7	23.2–31.5	Shell medium sized. Spire tall. Last whorl well-rounded without edge. Umbilicus narrow, 1/2 covered by the peristome. Peristome simple, thick and expanded	Northern Vietnam: Lang Son, Thai Nguyen, Hoa Binh, Son La, Thanh Hoa Provinces Elsewhere: Thailand
48.	<i>tamdaoensis</i> sp. nov.	28.0–30.9	22.4–26.6	Shell medium sized. Spire low. Last whorl well-rounded without edge. Umbilicus narrow, 1/2 covered by the peristome. Peristome double or simple, thick and expanded	Red river Delta Vietnam: Vinh Phuc Province
49.	<i>tetrachrous</i>	27.0–34.0	17.0	Shell medium sized. Spire low. Shell pale brown, usually with an irregular zig-zag pattern of dark brown at the periphery; umbilical region whitish to pale yellowish.	Northern Vietnam

Table 1 (Finished)

No	Species	Dimensions (mm)		Diagnosis characters	Distribution
		D	H		
50	<i>theodori</i>	37.5– 39.3	27.2– 30.1	Shell large. Spire tall. Last whorl well-rounded with a slightly edge. Umbilicus wide, 1/3 covered by the peristome. Peristome simple or double, thick and expanded	North-eastern Vietnam: Thai Nguyen, Lang Son, Tuyen Quang, Hoa Binh Provinces
51.	<i>tornatus</i>	21.7	18.6	Shell small. Spire tall. Last whorl well-rounded with a slight edge. Peristome thin and slightly expanded. Umbilicus narrow	North-western Vietnam: Ha Giang, Lai Chau Provinces
52.	<i>trouiensis trouiensis</i>	38.2– 48.3	26.5– 34.8	Shell from large to very large. Spire low. Shell covered with thin, fibrous periostracum. Periphery with a distinct keel. Peristome very thick, simple	Coastal North-eastern and Central Vietnam: Quang Ninh, Hai Phong, Thua Thien Hue Provinces
53.	<i>trouiensis bendei</i>	57.0– 59.0	36.0– 37.0	Shell very large. Spire low. Periphery with a distinct keel. Peristome very thick, simple	Northern Vietnam
54	<i>trouiensis omphalotropis</i>	41.0– 47.0	32.0– 35.0	Shell from large to very large. Spire low. Periphery with a distinct keel.	Central Vietnam: Da Nang Province
55.	<i>unicus</i>	32.3– 38.0	23.4– 26.5	Shell from medium sized to large. Spire moderately tall. Last whorl well-rounded with a slight edge. Peristome simple or double, thick and slightly expanded. Umbilicus wide	Northern Vietnam: Quang Ninh, Hoa Binh, Thanh Hoa Provinces
56.	<i>volvulus</i>	28.2– 35.0	20.9– 32.3	Shell medium sized. Spire very tall. Last whorl well-rounded without edge. Umbilicus narrow, always covered by the peristome. Peristome simple, very thick and expanded	Northern to Southern Vietnam: Lang Son, Thai Nguyen, Quang Ninh, Hai Phong, Hanoi, Hoa Binh, Son La, Thanh Hoa, An Giang, Ba Ria-Vung Tau, Kien Giang Provinces. Elsewhere: Malaysia, Thailand, Cambodia, China
57.	<i>zebrinus</i>	24.3	23.0	Shell small. Spire very tall. Last whorl well-rounded without or with a slight edge. Peristome slightly thickened, simple, sometimes discontinuous. Umbilicus narrow, 3/4 covered by the peristome	Southern Vietnam: Kien Giang Province. Elsewhere: India, Thailand, China and Myanmar
58.	<i>Cyclophorus</i> sp.1	29.9	26.0	Shell medium sized. Spire very tall. Last whorl well-rounded without edge. Peristome slightly thickened, simple, discontinuous. Umbilicus narrow, 3/4 covered by the peristome	Central Vietnam: Thanh Hoa Province
59.	<i>Cyclophorus</i> sp.2	47.0	35.0	Shell very large. Spire low. Periphery with a distinct keel. Aperture very wide. Peristome very thick, simple and very expanded	Red river Delta Vietnam: Hoa Binh Province
60.	<i>Cyclophorus</i> sp.3	29.2	22.6	Shell medium sized. Spire low. Last whorl well-rounded with a distinct edge. Umbilicus wide, 1/4 covered by the peristome. Peristome simple, thick and expanded	North-western Vietnam: Son La Province

ous narrow bands of brownish below the periphery and umbilical region. Peristome cream-coloured or white, thickened and expanded.

Dimensions: D 29.6–34.0, H 24.0–28.3 mm (n = 29).

Distribution. In Vietnam, known from Hanoi, Son La Provinces. Elsewhere, in Myanmar, Thailand [Theobald, 1858; Nantararat *et al.*, 2014a].

Cyclophorus amoenus (Pfeiffer, 1854)

Figs 1.2, 13B–C

Cyclostoma (*Cyclophorus*) *amoenum* Pfeiffer, 1852a [1854]: 62.

Cyclostoma amoenum. – Pfeiffer, 1852b: 66; Pfeiffer, 1854d: 346, Taf. XLV, Fig. 11, 12.

Cyclophorus (*Litostylus*) *amoenus*. – Kobelt, Möllendorff, 1897: 105; Kobelt, 1902: 97.

Cyclophorus amoenus. – Pfeiffer, 1858: 50; Reeve, 1861: species 40, pl. X, fig. 40a–b; Pfeiffer, 1865: 65; Möllendorff, 1900: 135; Möllendorff, 1901a: 50; Nantararat *et al.*, 2014a: 99–111, fig. 1B; Nantararat *et al.*, 2014b: 4, fig. 3A–B.

Type locality: Unknown.

Type material: Lectotype NHMUK 20130113/1, paralectotype NHMUK 20130113/2 [Nantararat *et al.*, 2014b: fig. 3A–B].

Material examined. **Dna2010/002** Vietnam, Dong Nai Province, Vinh Cuu District, Phu Ly Commune, Vinh An Forest Enterprise, near Central Agency of South, Limestone hill with depleted primary forest, 11°22.47'N, 107°03.37'E, 29 m, leg. V.N. Do, 22 May 2010; **Kgi2013/002** Vietnam, Kien Giang Province, Kien Luong District, Binh An Commune, Mo So mountain area, sparsely vegetated limestone rocks, 10°11.28'N, 104°39.12'E, 24 m, leg. V.B. Nguyen, 16 June 2013; **Kgi2014/005** Vietnam, Kien Giang Province, Kien Luong District, Binh An Commune, Nho mountain area, dry limestone scree slope with low woodland, 10°16.54'N, 104°34.00'E, 21 m, leg. V.B. Nguyen, 08 December 2014.

Diagnosis. Shell medium in size. Last whorl rounded and stout. Aperture rounded and expanded. Peristome white or cream-coloured, thickened and distinctly reflected, double or simple.

Dimensions: D 28.7–30.3, H 23.6–24.2 mm (n = 9).

Distribution. In Vietnam, known from Dong Nai, Kien Giang Provinces and Central (Insel Bay-min) (Möllendorff, 1900). Elsewhere, in Thailand [Nantararat *et al.*, 2014a].

Remark. This species was recorded from Bay-min Island by Möllendorff [1900: 135]. The discovery of *Cyclophorus amoenus* from Dong Nai and Kien Giang Provinces extends the range of this species for 1000 km and is the first record in Southern Vietnam.

Cyclophorus aquilus (Sowerby, 1843)

Figs 1.3, 13D

Cyclostoma aquilum Sowerby, 1843a: 61.

Cyclostoma perdix var. *aquilum*. – Sowerby, 1843b: 122, pl. 7, fig. 128, 131.

Cyclophorus (*Salpingophorus*) *aquilus*. – Kobelt, Möllendorff, 1897: 108; Kobelt, 1902: 124.

Cyclophorus aquila. – Nevill, 1878: 267.

Cyclophorus (*Salpingophorus*) *aquila*. – Kobelt, 1908: 578, Taf. 74, Fig. 3–5.

Cyclophorus perdix aquila. – van Benthem Jutting, 1949: 52.

Cyclophorus (*Salpingophorus*) *perdix aquila*. – Zilch, 1956: 45.

Cyclophorus aquilus. – Pfeiffer, 1846: 14, pl. 8, fig. 1–2; Pfeiffer, 1852a: 57; Reeve, 1861: sp. 45, fig. 45a–b; Martens, 1867: 134; Kobelt, 1886: 31, Taf. 2, Fig. 11–13; Fischer, 1891: 102; Morlet, 1891b: 246; Ho, 1995: 93; Nantararat *et al.*, 2014b: 5, fig. 3E–F.

Type locality: Singapore.

Type material. Lectotype NHMUK 20110225/1, paralectotype NHMUK 20110225/2–3 [Nantararat *et al.*, 2014b: fig. 3E–F].

Material examined. **Sla2012/001b** Vietnam, Son La Province, Muong La District, Muong Bu Commune, entrance



FIG. 1. Localities of examined samples of Vietnamese *Cyclophorus*: 1. *Cyclophorus affinis*, 2. *Cyclophorus amoenus*, 3. *Cyclophorus aquilus*, 4. *Cyclophorus aurantiacus pernobilis*, 5. *Cyclophorus bensoni*. The numbered *Cyclophorus* species are detailed in Table 1.

Рис. 1. Нахождения вьетнамских *Cyclophorus*: 1. *Cyclophorus affinis*, 2. *Cyclophorus amoenus*, 3. *Cyclophorus aquilus*, 4. *Cyclophorus aurantiacus pernobilis*, 5. *Cyclophorus bensoni*. Детали в Табл. 1.

of the Tham Bo Cave, Limestone slope with woody regrowth, 21°24.05'N, 104°06.13'E, 715 m, leg. D.S. Do and N.C. Bui, 27 October 2012; **Sla2013/004a** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Nam Tien Village, Limestone slope with woody regrowth, 21°23.44'N, 103°46.23'E, 661 m, leg. D.S. Do and T.D. Luong, 16 August 2013; **Sla2017/001b** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, left side of the road to Tang Me Cave, Steep limestone slope with disturbed forest, 20°58.55'N, 104°48.37'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017.

Diagnosis. Shell large, conical, with tall spire. Shell pale yellowish to brownish, with an irregular zig-zag pattern, with one wide darker brown band below the periphery; umbilical region pale yellowish. Umbilicus wide, to 1/4 covered by the peristome.

Dimensions: D 36.1–43.0, H 31.2–35.2 mm (n = 6).

Distribution. In Vietnam, known from Son La Province. Elsewhere, in Singapore, Thailand, Ma-

laysia, China [Sowerby, 1843a; Pfeiffer, 1852a; Nevill, 1878; Ho, 1995; Nantararat *et al.*, 2014b].

Remark. This species was previously recorded from Song-ma locality (the locality can be Ma River or Song Ma District of Son La Province) by Morlet [1891b: 246].

Cyclophorus aurantiacus pernobilis

Gould, 1844

Figs 1.4, 14D

Cyclophorus pernobilis Gould, 1844: 458, pl. 24, fig. 11; Pfeiffer, 1846: 30, Taf. 3, Fig. 15; Pfeiffer, 1852a: 57; Hanley, Theobald, 1870: 1, pl. 1, fig. 7; Nevill, 1878: 266; Martens, 1886: 159, Taf. 14, Fig. 3–4; Tapparone-Cane-fri, 1889: 307.

Cyclophorus (Salpingophorus) aurantiacus var. *pernobilis*. – Kobelt, Möllendorff, 1897: 109; Kobelt, 1902: 125; Gude, 1921: 71.

Cyclophorus aurantiacus pernobilis. – Kobelt, 1908: 612, Taf. 82, Fig. 5–6, Taf. 84, Fig. 6; Nantararat *et al.*, 2014a: 99–111, fig. 1Civ.

Type locality: King Island, Myanmar.

Type material. Not seen.

Material examined. **Hbi2014/003** Vietnam, Hoa Binh Province, Kim Bôi District, Thuong Tien Commune, Khu Village, Sparsely vegetated limestone rocks, 20°38.51'N, 105°26.17'E, 303 m, leg. V.N. Do, 26 December 2014; **Sla2013/004a** Vietnam, Son La Province, Thuan Chau District, Co Ma Commune, Copia Nature Reserve, Steep limestone slope with dense disturbed vegetation, 21°21.26'N, 103°31.18'E, 1246 m, leg. D.S. Do and T.H. Nguyen, 08 June 2013; **Sla2015/008** Vietnam, Son La Province, Son La City, Chieng Xom Commune, La Muong Village, left side of the road to Muong La District, Exposed limestone with little soil and vegetation of herbs, 21°22.39'N, 103°55.43'E, 809 m, leg. D.S. Do, 28 August 2015; **Dbi2010/002** Vietnam, Dien Bien Province, Dien Bien District, Na U Commune, near the Tay Trang border region, Exposed limestone with little soil and vegetation of herbs, 21°12.11'N, 102°55.49'E, 615 m, col. P.D. Dinh, 10 July 2010.

Diagnosis. Shell very large. Spire medium tall. Periphery with a distinct edge. Peristome simple. Umbilicus open and very wide.

Dimensions: D 51.0–60.0, H 38.6–49.5 mm (shells from different localities, n = 17).

Distribution. In Vietnam, known from Hoa Binh, Son La, Dien Bien Provinces. Elsewhere, in Myanmar, Thailand, Malaysia [Gude, 1921; Nantararat *et al.*, 2014a].

Remark. This subspecies differs from *Cyclophorus aurantiacus andersoni* in its larger shell, distinct edge at the periphery, very wide umbilicus and more thickened, expanded peristome.

Cyclophorus bensoni (Pfeiffer, 1854)

Figs 1.5, 14C

Cyclostoma bensoni Pfeiffer, 1854e: 158; Pfeiffer, 1853: 244, pl. 32, fig. 11–13.

Cyclophorus (Glossostylus) bensoni. – Kobelt, 1902: 108.

Cyclophorus bensoni var. *cryptomphaloides* Gude, 1921: 57, 58.

Cyclophorus bensoni. – Pfeiffer, 1852b: 63; Benson, 1854:

414; Pfeiffer, 1865: 64; Hanley, Theobald, 1870: 16, pl. 34, fig. 5; Nevill, 1878: 270; Rochebrune, 1882: 64; Nantararat *et al.*, 2014a: 99–111, fig. 1D; Nantararat *et al.*, 2014b: 6, fig. 4D.

Type locality: Unknown.

Type material. Lectotype NHMUK 20130115 [Nantararat *et al.*, 2014b: fig. 4D].

Material examined. **Kgi2008/001** Vietnam, Kien Giang Province, Kien Luong District, Binh An Commune, Mo So mountain area, Sparsely vegetated limestone rocks, 10°11.30'N, 104°39.02'E, 22 m, leg. V.N. Do, 08 July 2008.

Diagnosis. Shell large, conical with tall spire. Shell yellowish brown, usually with numerous darker brown bands below the periphery.

Dimensions: D 37.8, H 33.0 mm (n = 1).

Distribution. In Vietnam, known from Kien Giang Province. Elsewhere, in Thailand, India, Cambodia [Rochebrune, 1882; Gude, 1921; Nantararat *et al.*, 2014a].

Remark. In Vietnam, the species is known from a small area, and only one specimen was collected.

Cyclophorus cambodgensis Morlet, 1884

Figs 2.6, 14A–B

Cyclophorus cambodgensis Morlet, 1884: 388, pl. XI, fig. 3, 3a–c; Fischer, 1891: 102; Do *et al.*, 2015: 120, fig. 2E.

Cyclophorus (Litostylus) cambodgensis. – Kobelt, Möllendorff, 1897: 105; Kobelt, 1902: 98; Kobelt, 1908: 616, Taf. 83, Fig. 1–2.

Cyclophorus (Kobeltostylus) cambodgensis. – Vermeulen, Maassen, 2003: 20; Egorov, Greke, 2007: 58–64, fig. 1M.

Type locality: Cambodia.

Type material. Not seen.

Material examined. **Bka2015/006** Vietnam, Bac Kan Province, Ba Be District, Ba Be National Park, Limestone slope with disturbed forest, 22°27.26'N, 105°34.21'E, 183 m, leg. V.N. Do and N.K. Hoang, 03 September 2015; **Lso2009/006** Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; **Lso2017/002** Vietnam, Lang Son Province, Huu Lung District, Huu Lien Commune, Huu Lien Nature Reserve, Primary forest on limestone, 21°40.46'N, 106°22.35'E, 549 m, leg. V.N. Do, 24 April 2017; **Hph2016/012** Vietnam, Hai Phong City, Cat Ba National Park, near Trung Trang Cave, Steep limestone cliff with woody regrowth, 20°47.47'N, 106°59.41'E, 38 m, leg. D.S. Do, 14 October 2016; **Hph2017/006** Vietnam, Hai Phong City, Cat Ba National Park, right side of the road to Kim Giao Hill, Primary forest on limestone, 20°47.48'N, 106°59.40'E, 56 m, leg. D.S. Do, 18 July 2017; **Hno2012/029** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, small hill just behind of Trinh Temple, 20°34.21'N, 105°46.37'E, 313 m, leg. V.N. Do, 15 July 2012; **Hno2018/001** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, entrance of the Huong Tich Cave, Exposed limestone with little soil and vegetation, 20°34.22'N, 105°44.37'E, 366 m, leg. D.S. Do, 22 February 2018; **Nbi2010/002** Vietnam, Ninh Binh Province, Gia Vien District, Gia Van Commune, Van Long Nature Reserve, Small isolated limestone hill, 20°21.39'N, 105°52.29'E, 325 m, leg. V.N. Do, 01 December 2010; **Nbi2010/016** Vietnam, Ninh Binh Province, Gia Vien

District, Gia Hung Commune, Small isolated limestone hill, 20°26.13'N, 105°51.18'E, 299 m, leg. V.N. Do, 02 December 2010; **Nbi2010/006** Vietnam, Ninh Binh Province, Gia Vien District, Gia Hoa Commune, Limestone outcrops in thick clayey soil, 20°25.41'N, 105°53.20'E, 286 m, leg. V.N. Do, 02 December 2010; **Nbi2013/030** Vietnam, Ninh Binh Province, Hoa Lu District, Truong Yen Commune, Trang An Landscape, Steep limestone cliff with woody regrowth, 20°18.53'N, 105°53.56'E, 374 m, leg. V.N. Do, 10 July 2013; **Nbi2013/003** Vietnam, Ninh Binh Province, Nho Quan District, Cuc Phuong National Park, Steep limestone slope with disturbed forest, 20°21.10'N, 105°35.02'E, 612 m, leg. V.N. Do, 10 July 2013; **Nbi2016/020** Vietnam, Ninh Binh Province, Cuc Phuong National Park, Limestone outcrops in shale bedrock of primary forest, 20°21.13'N, 105°54.22'E, 297 m, leg. D.S. Do and T.L. Nguyen, 19 August 2016; **Vph2011/004** Vietnam, Vinh Phuc Province, Tam Dao District, Tam Dao National Park, Rung Rin mountain, Limestone outcrops in shale bedrock of primary forest, 21°26.42'N, 105°38.22'E, 437 m, leg. V.N. Do, 18 June 2011; **Vph2014/006** Vietnam, Vinh Phuc Province, Tam Dao District, Tam Dao National Park, right side of the road to Rung Rin mountain, Limestone outcrops in clayey soil, 21°26.40'N, 105°38.21'E, 399 m, leg. V.N. Do, 23 August 2014; **Pth2008/001** Vietnam, Phu Tho Province, Tan Son District, Xuan Son Commune, Du Village, Xuan Son National Park, in leaf litter bellow high limestone walls, 21°07.51'N, 104°54.33'E, 318 m, leg. V.N. Do, 07 July 2008; **Hbi2013/026** Vietnam, Hoa Binh Province, Yen Thuy District, Yen Lac Commune, Yen Hoa Village, Sparsely vegetated limestone rocks, 20°23.10'N, 105°36.46'E, 409 m, leg. T.Q. Bui, 20 September 2013; **Hbi2014/030** Vietnam, Hoa Binh Province, Lac Son District, An Nghia Commune, Limestone outcrops in primary forest, 20°24.24'N, 105°30.21'E, leg. T.Q. Bui, 16 April 2014; **Hbi2015/009** Vietnam, Hoa Binh Province, Lac Thuy District, Phu Thanh Commune, Limestone outcrops in shale bedrock, 20°36.37'N, 105°41.34'E, 202 m, leg. V.N. Do, 03 September 2015; **Hbi2015/011** Vietnam, Hoa Binh Province, Mai Chau District, Mai Chau Town, Limestone escarpments along road No. 15, 20°39.18'N, 105°06.05'E, 621 m, leg. V.N. Do, 11 September 2015; **Hbi2016/066** Vietnam, Hoa Binh Province, Lac Thuy District, Lac Long Commune, Woodland on dry soil and limestone rock, 20°30.34'N, 105°47.08'E, 367 m, leg. T.N. Pham and V.N. Do, 01 May 2016; **Hbi2016/018** Vietnam, Hoa Binh Province, Kim Boi District, Hop Kim Commune, Primary forest on limestone, 20°39.48'N, 105°34.28'E, 290 m, leg. V.N. Do and T.N. Pham, 26 March 2016; **Hbi2016/010** Vietnam, Hoa Binh Province, Kim Boi District, Trung Bi Commune, near the military area, Limestone hill with degraded regrowth, 20°41.22'N, 105°32.11'E, 283 m, leg. V.N. Do and T.N. Pham, 26 March 2016; **Hbi2018/009** Vietnam, Hoa Binh Province, Mai Chau District, Tan Son Commune, Bo Liem Village, Under rocks in old secondary forest, 20°43.32'N, 104°58.17'E, 553 m, leg. D.S. Do and V.L. Chu Lau, 07 January 2018; **Hbi2018/003** Vietnam, Hoa Binh Province, Luong Son District, Cao Thang Commune, Cho Ben Village, Small isolated limestone hill with depleted primary forest, 20°40.37'N, 105°39.54'E, 277 m, leg. D.S. Do, 30 April 2018; **Sla2015/001** Vietnam, Son La Province, Chieng An Commune, Son La Pass, Limestone outcrops in thick clayey soil, 21°19.40'N, 103°53.12'E, 765 m, leg. D.S. Do, 22 April 2015; **Sla2017/011** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, Pua Lai Village, Primary forest on limestone, 20°58.53'N, 104°48.30'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Tho2014/031** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam

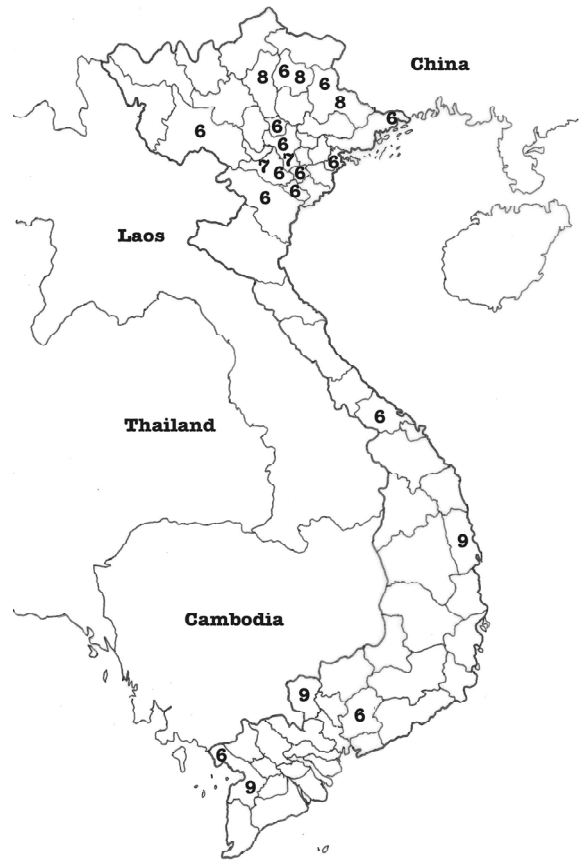


FIG. 2. Localities of examined samples of Vietnamese *Cyclophorus*: 6. *Cyclophorus cambodgensis*, 7. *Cyclophorus cantori*, 8. *Cyclophorus clouthianus*, 9. *Cyclophorus consociatus*.

РИС. 2. Нахождения вьетнамских *Cyclophorus*: 6. *Cyclophorus cambodgensis*, 7. *Cyclophorus cantori*, 8. *Cyclophorus clouthianus*, 9. *Cyclophorus consociatus*.

Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.09'E, 538 m, leg. V.N. Do, 15 August 2014; **Tho2015/036** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Limestone slope with woody regrowth, 20°20.29'N, 105°29.43'E, 266 m, leg. T.Q. Bui, 13 July 2015; **Tho2015/099** Vietnam, Thanh Hoa Province, Thanh Hoa City, Dong Cuong Ward, Ham Rong mountain area, Small isolated limestone hill, 19°50.03'N, 105°45.58'E, 79 m, leg. V.N. Do and T.N.A. Nguyen, 24 June 2009; **TThu2017/002** Vietnam, Thua Thien Hue Province, Nam Dong District, Thuong Long Commune, Primary forest on limestone, 16°07.34'N, 107°40.09'E, 180 m, leg. T.H.P. Nguyen, 26 June 2017; **Dna2010/002** Vietnam, Dong Nai Province, Vinh Cuu District, 93 Zone, Small isolated limestone hill with primary forest, 21°40.46'N, 106°22.35'E, 133 m, leg. V.N. Do, 24 May 2010; **Kgi2013/006** Vietnam, Kien Giang Province, Kien Luong District, Binh An Commune, Mo So Mountain, Sparsely vegetated limestone rocks, 10°11.28'N, 104°39.12'E, 24 m, leg. V.B. Nguyen, 16 June 2013; **Kgi2013/006** Vietnam, Kien Giang Province, Kien Hai District, Lai Son Commune, Limestone slope with dense vegetation, 09°47.58'N, 104°36.37'E, 38 m, leg. V.B. Nguyen, 21 November 2013.

Diagnosis. Shell large sized. Spire medium. Last

whorl well-rounded without edge. Peristome simple, thick and reflected. Umbilicus wide.

Dimensions: D 35.2–46.0, H 27.3–36.1 mm (shells from different localities).

Distribution. In Vietnam, known from Bac Kan, Lang Son, Quang Ninh, Hai Phong, Hanoi, Ha Nam, Ninh Binh, Vinh Phuc, Phu Tho, Hoa Binh, Son La, Thanh Hoa, Thua Thien Hue, Dong Nai, Kien Giang Provinces [Vermeulen, Maassen, 2003]. Elsewhere, in Cambodia [Morlet, 1884].

Remark. *Cyclophorus cambodgensis* is a very variable species in terms of shell characters. The population assigned to *C. cambodgensis* inhabiting Ham Rong mountain area, Thanh Hoa Province, differs from those from all other areas of Vietnam in smaller shell. This species is widespread in limestone hills from Northern to Southern Vietnam.

Cyclophorus cantori (Benson, 1851)

Figs 2.7, 15E

Cyclostoma cantori Benson, 1851: 186; Pfeiffer, 1852b: 65; Pfeiffer, 1854a: 383, Taf. 50, Fig. 4–8.

Cyclophorus (Eucyclophorus) cantori. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus cantori Reeve, 1861: sp. 54, pl. 13, fig. 54a–b; Pfeiffer, 1865: 65; Fischer, 1891: 103; Kongim *et al.*, 2006: 1–6, fig. 2B; Nantararat *et al.*, 2014a: 99–111, fig. 1E.

Cyclophorus (Cyclophorus) cantori. – Kobelt, 1902: 135.

Type locality: Insulam Penang, Malaysia.

Type material: Not seen.

Material examined. **Hbi2014/002** Vietnam, Hoa Binh Province, Kim Boi District, Thuong Tien Commune, Khu Village, Sparsely vegetated limestone rocks, 20°38.51'N, 105°26.17'E, 303 m, leg. V.N. Do, 26 December 2014; **Hbi2014/005** Vietnam, Hoa Binh Province, Lac Son District, An Nghia Commune, Limestone outcrops in primary forest, 20°24.24'N, 105°30.21'E, col. T.Q. Bui, 16 April 2014; **Pth2008/017** Vietnam, Phu Tho Province, Tan Son District, Xuan Son Commune, Du Village, Xuan Son National Park, Limestone hill with degraded regrowth, 21°07.56'N, 104°54.32'E, 307 m, leg. V.N. Do, 18 December 2008.

Diagnosis. Shell large, conical with tall spire. Shell dark brown, with an irregular zig-zag pattern; umbilical region pale brownish, with numerous dark brown bands.

Dimensions: D 40.7–45.5, H 36.3–41.8 mm (n = 24).

Distribution. In Vietnam, known from Hoa Binh, Phu Tho Provinces. Elsewhere, in Malaysia, Thailand, Cambodia [Benson, 1851; Nantararat *et al.*, 2014a].

Remark. This species can be distinguished from congeners by its very tall spire, periphery with a distinct keel that continues up to the peristome.

Cyclophorus clouthianus Möllendorff, 1882

Figs 2.8, 15B

Cyclophorus (Eucyclophorus) clouthianus Möllendorff, 1882: 274, Taf. 10, Fig. 1; Kobelt, Möllendorff, 1897: 110.

Cyclophorus (Cyclophorus) clouthianus. – Kobelt, 1902: 136;

Kobelt, 1908: 629, Taf. 88, Fig. 3–4.

Cyclophorus clouthianus. – Yen, 1939: 21, Taf. 1, Fig. 43; 1941: 186.

Type locality: Guang-dung, China.

Type material: Not seen.

Material examined. **Lso2015/017** Vietnam, Lang Son Province, Van Lang District, Tan My Commune, Steep limestone slope with dense disturbed vegetation, 21°59.09'N, 106°40.04'E, 633 m, leg. V.N. Do, 15 April 2015; **Tqu2018/039** Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune, Primary forest on limestone slope, 21°40.50'N, 105°28.11'E, 472 m, leg. D.S. Do, 26 April 2018; **Bka2016/009** Vietnam, Bac Kan Province, Bac Kan City, Xuat Hoa Ward, Tan Cu Village, Limestone hill with mainly regrowth thickets, 22°8.44'N, 105°48.53'E, 278 m, leg. Do V.N., 23 April 2016.

Diagnosis. Shell medium sized to large, conical with tall spire. Shell colour dark brownish, often with a row of white spots at the periphery; umbilical region pale brown, usually with numerous narrow bands of dark brownish.

Dimensions: D 37.4–45.0, H 32.5–38.0 mm (shells from different localities).

Distribution. In Vietnam, known from Lang Son, Tuyen Quang, Bac Kan Provinces. Elsewhere, in China [Möllendorff, 1882; Yen, 1939].

Cyclophorus consociatus Smith, 1893

Figs 2.9, 15C

Cyclophorus consociatus Smith, 1893: 13; Nantararat *et al.*, 2014a: 99–111, fig. 1F; Nantararat *et al.*, 2014b: 7, fig. 5B–C.

Cyclophorus (Eucyclophorus) consociatus. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (Glossostylus) consociatus. – Möllendorff, 1898: 81; Kobelt, 1902: 109.

Type locality: Annam Vietnam.

Type material: Lectotype NHMUK 1893.2.26.8, paralectotypes NHMUK 1893.2.26.9–10 [Nantararat *et al.*, 2014b: fig. 5B–C].

Material examined. **Tni2010/002** Vietnam, Tay Ninh Province, Tay Ninh City, Thanh Tan Commune, Ba Den Mountain, Limestone mountain with disturbed forest, 11°23.18'N, 106°09.44'E, 388 m, leg. V.N. Do, 23 July 2010; **Kgi2013/004** Vietnam, Kien Giang Province, Kien Hai District, Hon Tre Commune, Hon Tre mountain area, foot of limestone hill with degraded regrowth, near farmland, 09°58.29'N, 104°51.26'E, 23 m, col. V.B. Nguyen, 13 November 2013; **Kgi2013/005** Vietnam, Kien Giang Province, Kien Hai District, Lai Son Commune, Lai Son mountain area, Limestone slope with disturbed vegetation, 09°47.58'N, 104°36.37'E, 27 m, col. V.B. Nguyen, 15 November 2013; **Kgi2014/003** Vietnam, Kien Giang Province, Kien Hai District, An Son Commune, An Son Mountain area, Limestone slope with disturbed vegetation, 09°41.58'N, 104°21.36'E, 26 m, col. V.B. Nguyen, 14 October 2014.

Diagnosis. Shell large. Spire tall. Last whorl well-rounded without edge. Peristome simple. Umbilicus narrow, always covered by peristome.

Dimensions: D 31.7–40.7, H 28.0–34.6 mm (n = 7).

Distribution. In Vietnam, known from Binh

Dinh, Tay Ninh, Kien Giang Provinces [Smith, 1893]. Elsewhere, in Thailand [Nantarat *et al.*, 2014a].

Remark. The original description did not include an illustration and specific locality. Möllendorff subsequently [1898: 81] recorded and included “Songcan” locality of the species. The “Songcan” locality can be Con River (Song Con) of Binh Dinh Province, central Vietnam.

Cyclophorus courbeti courbeti Ancey, 1888
Figs 3.10, 15D

Cyclophorus courbeti Ancey, 1888a: 93, fig. 8; Fischer, 1891: 104; Fischer, Dautzenberg, 1904: 39; van Benthem Jutting, 1959: 68; Kongim *et al.*, 2006: 1–8, fig. 2C; Nantarat *et al.*, 2014a: 99–111, fig. 1G.

Cyclophorus (Eucyclophorus) courbeti. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (Cyclophorus) courbeti. – Kobelt, 1902: 136; *Cyclophorus courbeti*, form *minor* Dautzenberg, Fischer, 1908: 205.

Cyclophorus (Salpingophorus) courbeti. – Kobelt, 1908: 617, Taf. 85, Fig. 1–5.

Type locality: Lang-Son and Bac-Ninh, Vietnam.

Type material: Not seen.

Material examined. **Hgi2018/001** Vietnam, Ha Giang Province, Dong Van District, Lung Tao Commune, Limestone with little soil and vegetation of herbs, 23°17.26'N, 105°16.30'E, 947 m, leg. D.S. Do and V.B. Vu, 14 March 2018; **Lso2009/008** Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; **Lso2017/012** Vietnam, Lang Son Province, Huu Lung District, Huu Lien Commune, Huu Lien Nature Reserve, Primary forest on limestone, 21°40.46'N, 106°22.35'E, 549 m, leg. V.N. Do, 24 April 2017; **Bka2017/003** Vietnam, Bac Kan Province, Cho Don District, Ban Thi Commune, Keo Nang Village, Primary forest on limestone, 22°15.06'N, 105°30.15'E, 372 m, leg. Do V.N., 04 June 2017; **Tng2017/005** Vietnam, Thai Nguyen Province, Vo Nai District, Than Sa-Phuong Hoang Nature Reserve, Densely vegetated limestone hill, 21°50.51'N, 105°53.19'E, 260 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; **Tqu2010/002** Vietnam, Tuyen Quang Province, Tuyen Quang City, An Khang Commune, Thuc Thuy Village, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 359 m, col. T.N. Nguyen, 30 June 2010; **Tqu2018/011** Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 466 m, leg. D.S. Do, 26 April 2018; **Vph2011/003** Vietnam, Vinh Phuc Province, Tam Dao District, Tam Dao National Park, Rung Rinh mountain area, Limestone outcrops in shale bedrock of primary forest, 21°26.42'N, 105°38.22'E, 437 m, leg. V.N. Do, 18 June 2011; **Nbi2013/002** Vietnam, Ninh Binh Province, Nho Quan District, Cuc Phuong Commune, Limestone slope with disturbed forest, 20°17.31'N, 105°40.29'E, 439 m, col. D.S. Do and T.Q. Bui, 22 July 2013; **Hbi2015/003** Vietnam, Hoa Binh Province, Mai Chau District, Mai Chau Town, Limestone escarpments along road No. 15, 20°39.18'N, 105°06.05'E, 621 m, leg. V.N. Do, 11 September 2015; **Hbi2017/004** Vietnam, Hoa Binh Province, Mai Chau District, Pa Co Commune, Hang Kia-Pa Co Nature Reserve, near the road No. 6, between Hoa



FIG. 3. Localities of examined samples of Vietnamese *Cyclophorus*: 10. *Cyclophorus courbeti courbeti*, 11. *Cyclophorus courbeti leucostoma*, 12. *Cyclophorus cryptomphalus*, 13. *Cyclophorus dilatatus*.

ПИС. 3. Нахождения вьетнамских *Cyclophorus*: 10. *Cyclophorus courbeti courbeti*, 11. *Cyclophorus courbeti leucostoma*, 12. *Cyclophorus cryptomphalus*, 13. *Cyclophorus dilatatus*.

Binh and Son La Provinces, under rocks in primary forest, 20°45.47'N, 104°52.26'E, 829 m, leg. D.S. Do and X.H. Nguyen, 03 September 2017; **Hbi2018/029** Vietnam, Hoa Binh Province, Luong Son District, Long Son Commune, Yen Lich Village, Exposed limestone with little soil and vegetation of herbs, 20°40.19'N, 105°38.03'E, 455 m, leg. D.S. Do, 21 February 2018; **Sla2013/007** Vietnam, Son La Province, Mai Son District, Co Noi Commune, Lech Village, 21°07.31'N, 104°09.18'E, 685 m, Limestone karst, leg. D.S. Do and T.N. Phung, 18 November 2013; **Sla2014/022** Vietnam, Son La Province, Muong La District, Muong Bu Commune, Tham Bo Cave, Limestone cliff with woody regrowth, 21°24.05'N, 104°06.13'E, 718 m, leg. D.S. Do and T.L. Nguyen, 15 August 2014; **Sla2017/013** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, Pua Lai Village, Primary forest on limestone, 20°58.53'N, 104°48.30'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Sla2017/002** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, left side of the road to Tang Me Cave, Steep limestone slope with disturbed forest, 20°58.53'N, 104°48.32'E, 825 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Sla2016/003** Vietnam, Son La Province, Van Ho District, Xuan Nha Commune, Tun

Village, Xuan Nha Nature Reserve, Steep limestone slope with disturbed forest, 20°41.38'N, 104°45.03'E, 619 m, leg. D.S. Do, 13 October 2016; **Dbi2017/003** Vietnam, Dien Bien Province, Tuan Giao District, Chieng Dong Commune, Po Village, Pu Hong Cay mountain area, near Tham Pua Cave, Sparsely vegetated limestone rock, 21°29.44'N, 103°22.27'E, 511 m, leg. D.S. Do and X.H. Nguyen, 09 April 2017; **Lch2015/028** Vietnam, Lai Chau Province, Phong Tho District, Khong Lao Commune, Limestone outcrops, 22°35.20'N, 103°23.52'E, 889 m, leg. D.S. Do and V.T. Sin, 14 July 2015; **Tho2015/001** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Limestone slope with woody regrowth, 20°20.29'N, 105°29.43'E, 266 m, leg. T.Q. Bui, 13 July 2015.

Diagnosis. Shell medium sized to large, with very tall spire. Shell pale yellowish to brownish, with an irregular zig-zag pattern. Peristome yellowish brown to reddish brown, thickened and reflected.

Dimensions: D 39.0–43.5, H 29.1–37.0 mm (shells from different localities)

Distribution. In Vietnam, known from Ha Giang, Lang Son, Cao Bang, Bac Kan, Thai Nguyen, Tuyen Quang, Vinh Phuc, Ninh Binh, Hoa Binh, Son La, Lai Chau, Dien Bien, Thanh Hoa Provinces [Ancey, 1888a; Dautzenberg, Fischer, 1905b, 1908]. Elsewhere, in Thailand, Indonesia [van Benthem Jutting, 1959; Kongim *et al.*, 2006; Nantararat *et al.*, 2014a].

Remark. This species is distinguished from congeners by its periphery with a distinct keel that continues up to the peristome. *Cyclophorus courbeti* is a very variable species in terms of shell characters.

Cyclophorus courbeti leucostoma

Dautzenberg et Fischer, 1905

Figs 3.11, 15A

Cyclophorus courbeti var. *leucostoma* Dautzenberg, Fischer, 1905b: 432.

Cyclophorus (Salpingophorus) courbeti var. *leucostoma* Kobelt, 1908: 618, Taf. 85, Fig. 3–5.

Type locality: Ha Giang, Vietnam.

Type material: Syntypes MNHN–IM–2000–33834.

Material examined. **Bka2009/003** Vietnam, Bac Kan Province, Cho Moi District, Hoa Muc Commune, Exposed limestone with little soil and vegetation of herbs, 22°03.54'N, 105°50.46'E, 341 m, leg. D.S. Do, 14 May 2009; **Bka2016/007** Vietnam, Bac Kan Province, Bac Kan City, Xuat Hoa Ward, Tan Cu Village, Limestone hill with mainly regrowth thickets, 22°8.41'N, 105°48.57'E, 255 m, leg. Do V.N., 22 April 2016; **Hbi2017/003** Vietnam, Hoa Binh Province, Mai Chau District, Xa Linh Village, Hang Kia-Pa Co Nature Reserve, under rocks in primary forest, 20°46.33'N, 104°46.13'E, 910 m, leg. D.S. Do and X.H. Nguyen, 04 September 2017.

Diagnosis. Shell from medium sized to large. Spire very tall. Periphery with a distinct keel. Peristome simple.

Dimensions: D 32.3–41.2, H 27.5–33.5 mm (n = 13).

Distribution. In Vietnam, known from Ha Giang, Bac Kan, Hoa Binh Provinces [Dautzenberg, Fischer, 1905b].

Remark. This species distinguished from congeners by its very tall conical spire, distinct sculpture and periphery with a distinct keel.

Cyclophorus cryptomphalus Benson, 1857

Figs 3.12, 16C

Cyclophorus cryptomphalus Benson, 1857: 206; Theobald, 1858: 247; Pfeiffer, 1858: 58; Reeve, 1861: sp. 37, pl. 9, fig. 37a–b; Pfeiffer, 1865: 68; Hanley, Theobald, 1876: 2, pl. 3, fig. 7; Nevill, 1878: 270; Gude, 1921: 59; Nantararat *et al.*, 2014a: 99–111, fig. 1H.

Cyclophorus (Glossotylus) cryptomphalus. – Kobelt, Möllendorff, 1897: 107; Kobelt, 1902: 110; Kobelt, 1908: 643, Taf. 91, Fig. 5.

Type locality: Ava regni Burmanorum, India.

Type material: Not seen.

Material examined. **Sla2017/001** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, Pua Lai Village, Limestone hill with depleted primary forest, 20°58.54'N, 104°48.31'E, 7615 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Sla2013/002c** Vietnam, Son La Province, Son La City, Chieng Ngan Commune, Hip Village, Exposed limestone with little soil and vegetation of herbs, 21°19.33'N, 103°58.49'E, 617 m, col. T.T. Nguyen, 19 October 2013; **Tho2014/001** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.11'E, 541 m, leg. V.N. Do, 15 August 2014.

Diagnosis. Shell brownish to dark brown, below the periphery often with one darker brown band; umbilical region white or pale brown. Peristome whitish, thickened and reflected.

Dimensions: D 31.1–34.2, H 23.6–25.8 mm (n = 4).

Distribution. In Vietnam, known from Son La, Thanh Hoa Provinces. Elsewhere, in Thailand, India [Benson, 1857; Nantararat *et al.*, 2014a].

Cyclophorus dilatatus Heude, 1886

Figs 3.13, 16D

Cyclophorus dilatatus Heude, 1886: 208; Heude, 1890: 125, pl. 36, fig. 5.

Cyclophorus (Eucyclophorus) dilatatus. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (Cyclophorus) dilatatus. – Kobelt, 1902: 137.

Cyclophorus (Litostylus) dilatatus. – Kobelt, 1908: 622, Taf. 86, Fig. 10–12.

Type locality: Ta-li-fou, Yun-nan, China.

Type material: Not seen.

Material examined. **Lso2015/007** Vietnam, Lang Son Province, Van Lang District, Tan My Commune, Steep limestone slope with dense disturbed vegetation, 21°59.09'N, 106°40.04'E, 633 m, leg. V.N. Do, 15 April 2015; **Bka2016/003** Vietnam, Bac Kan Province, Bac Kan City, Xuat Hoa Ward, Tan Cu Village, Limestone hill with mainly regrowth thickets, 22°8.41'N, 105°48.57'E, 255 m, leg. V.N. Do, 22 April 2016; **Hbi2018/027** Vietnam, Hoa Binh Province, Luong Son District, Long Son Commune, Yen Lich Village, Ex-

posed limestone with little soil and vegetation of herbs, 20°40.19'N, 105°38.03'E, 455 m, leg. D.S. Do, 21 February 2018; **Sla2013/017** Vietnam, Son La Province, Van Ho District, Xuan Nha Commune, Na An Village, Steep limestone slope with disturbed forest, 20°43.25'N, 104°47.44'E, 346 m, leg. D.S. Do, 26 October 2013.

Diagnosis. Shell small to medium sized, conical, with very tall spire. Shell brown, often with one or two white bands at umbilical region. Aperture rounded and expanded. Peristome white or cream-coloured, slightly thickened and distinctly reflected, double or simple.

Dimensions: D 21.6–26.3, H 20.3–23.6 mm (shells from different localities, n = 54)

Distribution. In Vietnam, known from Lang Son, Bac Kan, Hoa Binh, Son La Provinces. Elsewhere, in China, Laos [Heude, 1886].

Remark. This species is distinguished from congeners by its small shell, tall spire, pronounced spiral ridges and distinct keeled periphery.

Cyclophorus dodrans dodrans Mabile, 1887

Figs 4.14, 16A

Cyclophorus dodrans Mabile, 1887a: 14; Mabile, 1887b: 145, pl. III, fig. 13; Fischer P., 1891: 104; Ancey, 1888a: 84, fig. 3; Fischer H., 1898: 332; Fischer, Dautzenberg, 1904: 428; Dautzenberg, Fischer, 1905a: 166, 1905b: 433; Dautzenberg, Fischer, 1908: 205.

Cyclophorus (Litostylus) dodrans. – Kobelt, Möllendorff, 1897: 105; Kobelt, 1908: 608, Taf. 82, Fig. 3–4.

Cyclophorus (Salpingophorus) dodrans. – Kobelt, 1902: 128.

Type locality: Than Moi, Lang Son, Vietnam.

Type material: Syntype MNHN-IM-2000-33790.

Material examined. **Lso2009/004** Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 13 April 2009; **Tqu2017/016** Vietnam, Tuyen Quang Province, Na Hang District, Thanh Tuong Commune, Na Don Village, Limestone mountain with disturbed forest, 22°17.58'N, 105°22.30'E, 466 m, leg. V.N. Do, 11 July 2017; **Tng2017/006** Vietnam, Thai Nguyen Province, Vo Nhai District, Than Sa–Phuong Hoang Nature Reserve, Limestone mountain with disturbed forest, 21°50.51'N, 105°53.19'E, 260 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; **Hph2008/001** Vietnam, Hai Phong City, An Lao District, Truong Thanh Commune, Voi mountain area, Small isolated limestone hill, 20°50.47'N, 106°34.08'E, leg. V.N. Do and T.M. Ngo, 22 August 2008; **Hbi2017/003** Vietnam, Hoa Binh Province, Lac Thuy District, Dong Tam Commune, Limestone cliffs on the left side of the road to Nho Quan District (Ninh Binh Province), 20°29.31'N, 105°49.05'E, leg. V.N. Do and T.N. Pham, 01 May 2017.

Diagnosis. Shell very large. Spire low. Shell covered with thin, fibrous periostracum. Shell brown, with one wide band of darker brown below the periphery; umbilical region white, usually with fewer brown markings than elsewhere. Last whorl rounded. Peristome very thick, simple.

Dimensions: D 53.6–64.3, H 37.0–46.8 mm (shells from different localities).



FIG. 4. Localities of examined samples of Vietnamese *Cyclophorus*: 14. *Cyclophorus dodrans dodrans*, 15. *Cyclophorus dodrans fasciatus*, 17. *Cyclophorus eudeli*, 18. *Cyclophorus expansus*.

РИС. 4. Нахождения вьетнамских *Cyclophorus*: 14. *Cyclophorus dodrans dodrans*, 15. *Cyclophorus dodrans fasciatus*, 17. *Cyclophorus eudeli*, 18. *Cyclophorus expansus*.

Distribution. In Vietnam, known from Lang Son, Ha Giang, Thai Nguyen, Tuyen Quang, Hai Phong, Cao Bang, Hoa Binh Provinces [Dautzenberg, Fischer, 1905b, 1908]. Elsewhere, in China (?).

Remark. This species is distinguished from congeners by its large and more thick shell, low conical spire, distinct sculpture, rounded periphery.

Cyclophorus dodrans fasciatus Kobelt, 1908

Figs 4.15, 16B

Cyclophorus dodrans fasciatus Kobelt, 1908: 623, Taf. 87, Fig. 1–3.

Type locality: Annam Vietnam.

Type material: Not seen.

Material examined. **Hbi2013/002** Vietnam, Hoa Binh Province, Yen Thuy District, Yen Lac Commune, Yen Hoa Village, Sparsely vegetated limestone rocks, 20°23.10'N, 105°36.46'E, 409 m, leg. T.Q. Bui, 20 September 2013; **Sla2013/001** Vietnam, Son La Province, Mai Son District, Co Noi Commune, Lech Village, Limestone cliff with woody regrowth, 21°07.33'N, 104°09.22'E, 669 m, leg. D.S. Do

and T.N. Phung, 18 November 2013; **Sla2012/004** Vietnam, Son La Province, Son La City, Chieng Co Commune, Hom Village, Exposed limestone with little soil and vegetation of herbs, 21°20.13'N, 103°52.10'E, 645 m, leg. D.S. Do and N.C. Bui, 21 October 2012; **Sla2017/001a** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, left side of the road to Tang Me Cave, Steep limestone slope with disturbed forest, 20°58.55'N, 104°48.37'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Tho2013/012** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach My Commune, Primary forest on limestone, 20°17.33'N, 105°33.59'E, 376 m, col. T.Q. Bui, 20 September 2013.

Diagnosis. Shell large to very large, conical with very tall spire. Shell brownish to dark brown, often with numerous bands of darker brown below the periphery. Umbilicus wide, sometimes partly covered by the peristome.

Dimensions: D 42.0–48.1, H 35.3–40.2 mm (shells from different localities, n = 20).

Distribution. In Vietnam, known from Hoa Binh, Son La, Thanh Hoa Provinces.

Remark. The original description did not include exact locality [Kobelt, 1908: 623].

Cyclophorus donghoiensis

Thach et Huber, 2017

Cyclophorus donghoiensis Thach et Huber in Thach, 2017: 13, pl. 5, fig. 50–53.

Type locality: Bo Trach, Dong Hoi, Quang Binh, Central Vietnam.

Type material: Holotype NHMUK–20170273.

Material examined. No material was available.

Diagnosis. Shell very large. Spire tall. Last whorl rounded. Peristome simple.

Dimensions: D 55.0–58.7, H 40.0–43.4 mm [Thach, 2017].

Distribution. In Vietnam, known only from Bo Trach, Dong Hoi District, Quang Binh Province [Thach, 2017].

Cyclophorus eudeli Smith, 1893

Figs 4.17, 17A–B

Cyclophorus eudeli Smith, 1893: 13; Nantararat *et al.*, 2014b: 8, fig. 6B–C.

Cyclophorus (Eucyclophorus) eudeli. – Kobelt, Möllendorff, 1897: 110; Möllendorff, 1898: 81.

Cyclophorus (Cyclophorus) eudeli. – Kobelt, 1902: 137.

Type locality: Annam Vietnam.

Type material: Lectotype NHMUK 1893.2.26.5, paralectotypes NHMUK 1893.2.26.6–7 [Nantararat *et al.*, 2014b: fig. 6B–C].

Material examined. **Kgi2013a/003** Vietnam, Kien Giang Province, Ha Tien Town, My Duc Commune, Thach Dong Village, Thach Dong Hill, Limestone rocks with sparsely vegetated, 10°24.48'N, 104°28.23'E, 56 m, col. V.B. Nguyen, 20 June 2013.

Diagnosis. Shell medium in size. Shell brown or with brown zigzag pattern, often with one narrower darker brown band below the periphery. Last whorl rounded and stout. Aperture rounded and expanded.

Peristome white or cream-coloured, very thickened and distinctly reflected, always double.

Dimensions: D 30.2–33.6, H 29.7–33.1 mm (n = 5).

Distribution. In Vietnam, known from Binh Dinh, Kien Giang Provinces [Smith, 1893; Möllendorff, 1898].

Remark. The species has previously been recorded from Song-can locality (Con River, Binh Dinh Province) [Möllendorff, 1898: 81].

Cyclophorus expansus (Pfeiffer, 1853)

Figs 4.18, 17C–D

Cyclostoma expansum Pfeiffer, 1851b [1853]: 242.

Cyclostoma expansus. – Pfeiffer, 1852b: 65; Pfeiffer, 1854a: 293, pl. 39, fig. 20–21; Theobald, 1858: 246; Reeve 1861: sp. 18, pl. 5, fig. 18a–b; Pfeiffer, 1865: 65; Hanley, Theobald, 1876: 1, pl. 2, fig. 3–4; Godwin–Austen, 1876: 173; Nevill, 1878: 269; von Martens E., 1886: 160, Taf. 15, Fig. 7–8; Tapparone–Canefri, 1889: 308; Gude, 1921: 77; Nantararat *et al.*, 2014a: 99–111, fig. 1J; Nantararat *et al.*, 2014b: 10, fig. 7E–F.

Cyclophorus (Salpingohorus) expansus. – Kobelt, Möllendorff, 1897: 109; Kobelt 1902: 129; Kobelt 1908: 656, Taf. 94, Fig. 10–11.

Type locality: Unknown.

Type material: Lectotype NHMUK 20130086/1, paralectotype NHMUK 20130086/2–3 [Nantararat *et al.*, 2014b: fig. 7E–F].

Material examined. **Hbi2016/003** Vietnam, Hoa Binh Province, Mai Chau District, Mai Chau Town, left side of the road No.15, Limestone hills with sparsely vegetated, 20°39.56'N, 105°07.33'E, 574 m, leg. V.N. Do, 05 September 2016; **Sla2013/012** Vietnam, Son La Province, Son La City, Chieng Ngan Commune, Khoang Village, 21°19.28'N, 103°58.55'E, 566 m, Limestone hill with regrowth, leg. D.S. Do and T.T. Nguyen, 26 October 2013; **Sla2013/005** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Dom Huon Village, Limestone hills with sparsely vegetated, 21°22.234'N, 103°46.190'E, 605 m, leg. D.S. Do and T.D. Luong, 02 November 2013; **Sla2014/002** Vietnam, Son La Province, Son La City, Quyet Tam Ward, Residential Sub-division No 5, Steep limestone cliff with woody regrowth, 21°19.29'N, 103°56.07'E, 749 m, leg. D.S. Do, 11 December 2014; **Sla2014/003** Vietnam, Son La Province, Son La City, Chieng Sinh Ward, Sang Village, Foot of limestone cliff with degraded regrowth, near gardens with *Coffea* sp., 21°19.06'N, 103°56.41'E, 697 m, leg. D.S. Do, 11 December 2014; **Sla2013/005** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Dom Huon Village, Limestone hills with sparsely vegetated, 21°22.234'N, 103°46.190'E, 605 m, leg. D.S. Do and T.D. Luong, 02 November 2013; **Tho2014/008** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.09'E, 538 m, leg. V.N. Do, 15 August 2014.

Diagnosis. Shell medium in size, conical, with tall spire. Shell brown, usually with an irregular zigzag pattern of dark brown; umbilical region whitish, with numerous bands of dark brown. Umbilicus wide, half covered by peristome. Peristome cream-coloured or white, thickened and expanded.

Dimensions: D 26.2–33.0, H 21.3–28.0 mm (shells from different localities, n = 38).

Distribution. In Vietnam, known from Hoa Binh, Son La, Thanh Hoa Provinces. Elsewhere, in Thailand, Malaysia, Myanmar [Kobelt, 1902; Gude, 1921; Nantararat *et al.*, 2014a].

Cyclophorus fargesianus Heude, 1885

Figs 5.19, 18A

Cyclophorus fargesianus Heude, 1885: 89, Taf. 23, Fig. 2; Yen, 1939: 20, Taf. 1, Fig. 39.

Cyclophorus (*Eucyclophorus*) *fargesianus*. – Möllendorff, 1886a: 162; Kobelt, Möllendorff, 1897: 110.

Cyclophorus (*Cyclophorus*) *fargesianus*. – Kobelt 1902: 138.

Cyclophorus (s. str.) *fargesianus*. – Kobelt 1908: 618, Taf. 85, Fig. 6–7.

Type locality: Tschen-k'ou, Szechwan, China.

Type material: Not seen.

Material examined. **Tqu2010/003** Vietnam, Tuyen Quang Province, Tuyen Quang City, An Khang Commune, Thuc Thuy Village, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 359 m, col. T.N. Nguyen, 30 June 2010; **Hbi2012/031** Vietnam, Hoa Binh Province, Da Bac District, Tu Ly Commune, U Bo Village, Exposed limestone with little soil and vegetation of herbs, 20°51.13'N, 105°11.55'E, 610 m, col. T.L. Bui, 28 August 2012; **Hbi2013/009** Vietnam, Hoa Binh Province, Da Bac District, Tu Ly Commune, Tay Mang Village, Steep limestone slope with disturbed forest, 20°52.32'N, 105°10.58'E, 622 m, col. T.L. Bui, 30 June 2013; **Hbi2018/013** Vietnam, Hoa Binh Province, Luong Son District, Long Son Commune, Yen Lich Village, Exposed limestone with little soil and vegetation of herbs, 20°40.19'N, 105°38.03'E, 455 m, leg. D.S. Do, 21 February 2018; **Pth2008/011** Vietnam, Phu Tho Province, Tan Son District, Xuan Son Commune, Du Village, Xuan Son National Park, Limestone hill with degraded regrowth, 21°07.56'N, 104°54.32'E, 307 m, leg. V.N. Do, 18 December 2008; **Pth2017/020** Vietnam, Phu Tho Province, Yen Lap District, Dong Thinh Commune, Dong Bai Village, Small isolated limestone hill with depleted primary forest, 21°19.28'N, 105°04.53'E, 488 m, leg. D.S. Do and M.L. Ha, 08 June 2017; **Sla2012/007** Vietnam, Son La Province, Yen Chau District, Yen Son Commune, Chi Day Cave area, Primary forest on limestone, 21°08.30'N, 104°10.29'E, 815 m, leg. D.S. Do and X.H. Nguyen, 02 September 2012; **Sla2013/023** Vietnam, Son La Province, Van Ho District, Xuan Nha Commune, Na An Village, Steep limestone slope with disturbed forest, 20°43.25'N, 104°47.44'E, 346 m, leg. D.S. Do, 26 October 2013; **Sla2013/013** Vietnam, Son La Province, Van Ho District, Van Ho Commune, Pa Cop Village, Densely vegetated limestone hill, 21°45.56'N, 104°44.30'E, 1013 m, leg. D.S. Do and T.Q. Bui, 26 October 2013; **Sla2013/005a** Vietnam, Son La Province, Mai Son District, Muong Bang Commune, Na Hoi Village, Limestone hill with degraded regrowth, 21°18.11'N, 104°02.16'E, 779 m, leg. D.S. Do and T.L. Nguyen, 22 November 2013; **Sla2013/026** Vietnam, Son La Province, Son La City, Chieng Ngan Commune, Khoang Village, 21°19.31'N, 103°58.47'E, 623 m, Limestone hill with regrowth, leg. D.S. Do, 20 October 2013.

Diagnosis. Shell medium in size, conical, with tall spire. Shell colour brownish, often with a row of white spots at the periphery; umbilical region white to pale brown, usually with numerous narrow brownish bands. Peristome white or cream-co-

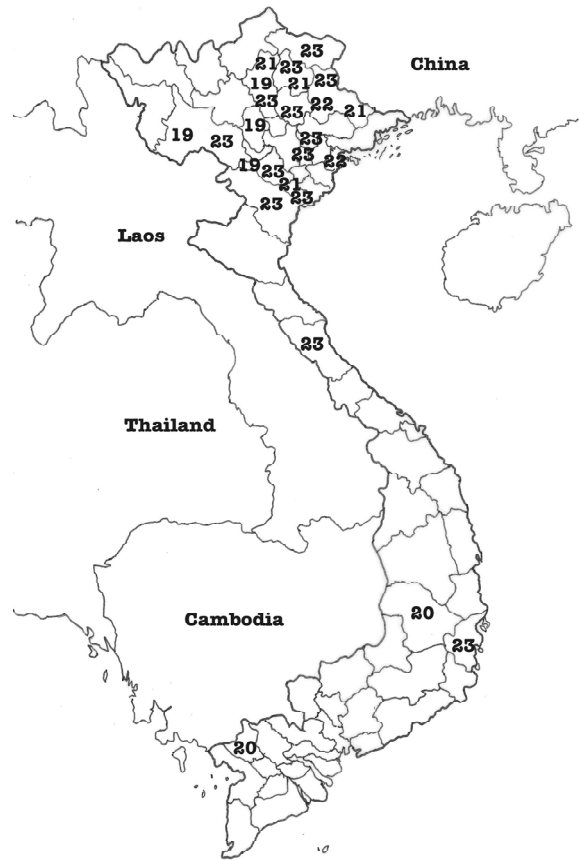


FIG. 5. Localities of examined samples of Vietnamese *Cyclophorus*: 19. *Cyclophorus fargesianus*, 20. *Cyclophorus floridus*, 21. *Cyclophorus fruhstorferi fruhstorferi*, 22. *Cyclophorus fruhstorferi langsonensis*, 23. *Cyclophorus fulguratus*.

РИС. 5. Нахождения вьетнамских *Cyclophorus*: 19. *Cyclophorus fargesianus*, 20. *Cyclophorus floridus*, 21. *Cyclophorus fruhstorferi fruhstorferi*, 22. *Cyclophorus fruhstorferi langsonensis*, 23. *Cyclophorus fulguratus*.

loured, distinctly thickened and reflected, simple or double.

Dimensions: D 29.2–33.1, H 24.4–29.3 mm (shells from different localities).

Distribution. In Vietnam, known from Tuyen Quang, Phu Tho, Hoa Binh, Son La Provinces. Elsewhere, in China [Heude, 1885; Yen, 1939].

Cyclophorus floridus (Pfeiffer, 1854)

Figs 5.20, 18B–C

Cyclostoma floridus Pfeiffer, 1854b: 300.

Cyclophorus floridus. – Pfeiffer, 1858: 43; Reeve 1861: sp. 12, pl. IV, fig. 12a–b; Pfeiffer, 1865: 63; Rochebrune, 1882: 64; Morlet, 1891b: 237.

Cyclophorus (*Eucyclophorus*) *floridus*. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (*Cyclophorus*) *floridus*. – Kobelt, 1902: 138.

Type locality: Unknown.

Type material: Not seen.

Material examined. **Agi2015/001** Vietnam, An Giang

Province, Thoai Son District, Oc Eo Town, Ba The mountain area, 10°14.49'N, 105°08.26'E, 77 m, leg. V.B. Nguyen, 27 June 2015; **Gla2016/002** Vietnam, Gia Lai Province, Mang Yang District, Kon Ka Kinh National Park, Limestone outcrops in thick clayey soil, near H'ngoi Waterfall, leg. D.T. Dinh, 21 September 2016.

Diagnosis. Shell medium sized. Spire very tall. Last whorl well-rounded. Peristome slightly thick, simple.

Dimensions: D 28.7–29.6, H 27.1–28.4 mm (n = 3).

Distribution. In Vietnam, known from An Giang and Gia Lai Provinces. Elsewhere, in Thailand, Laos (Ménam–Pinh) [Pfeiffer, 1858; Reeve, 1861; Rochebrune, 1882; Morlet, 1891b].

Remark. This species is distinguished from *Cyclophorus subfloridus* by its small shell, pronounced spiral ridges and somewhat keeled periphery.

Cyclophorus fruhstorferi fruhstorferi

Möllendorff, 1901

Figs 5.21, 19A

Cyclophorus (Litostylus) fruhstorferi Möllendorff, 1901b: 80; Kobelt, 1902: 99; Kobelt, 1908: 605, Taf. 81, Fig. 1–4.

Type locality: Mansongebirge, Lang Son, Vietnam.

Type material: Not seen.

Material examined. **Lso2005/003** Vietnam, Lang Son Province, Chi Lang District, Sao Mai Commune, Gio cave area, Steep limestone cliff with primary forest, 21°42.31'N, 106°36.58'E, 374 m, leg. V.N. Do, 20 July 2005; **Tqu2017/017** Vietnam, Tuyen Quang Province, Na Hang District, Thanh Tuong Commune, Na Don Village, Limestone mountain with disturbed forest, 22°17.58'N, 105°22.30'E, 466 m, leg. V.N. Do, 11 July 2017; **Tqu2018/035** Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 466 m, leg. D.S. Do, 26 April 2018; **Bka2016/003** Vietnam, Bac Kan Province, Bac Kan City, Xuat Hoa Ward, Tan Cu Village, Limestone hill with mainly regrowth thickets, 22°8.41'N, 105°48.57'E, 255 m, leg. Do V.N., 22 April 2016; **Bka2017/001** Vietnam, Bac Kan Province, Cho Don District, Quang Bach Commune, Khuoi Dam Village, Primary forest on limestone, 22°16.14'N, 105°35.37'E, 359 m, leg. V.N. Do, 03 June 2017; **Bka2017/002** Vietnam, Bac Kan Province, Cho Don District, Ban Thi Commune, Keo Nang Village, Primary forest on limestone, 22°15.06'N, 105°30.15'E, 372 m, leg. V.N. Do, 03 June 2017; **Nbi2013/002** Vietnam, Ninh Binh Province, Nho Quan District, Cuc Phuong Commune, Limestone mountain area, 20°17.31'N, 105°40.29'E, 439 m, leg. D.S. Do, 22 July 2013.

Diagnosis. Shell very large. Spire low. Shell covered with thin, fibrous periostracum. Periphery with a distinct keel. Peristome thick, simple, sometimes discontinuous.

Dimensions: D 51.3–62.0, H 34.1–42.0 mm (shells from different localities, n = 59).

Distribution. In Vietnam, known from Lang Son, Tuyen Quang, Bac Kan, Ninh Binh Provinces.

Remark. Distinguished from *Cyclophorus do-drans* by its periphery with a distinct keel that

continues up to the peristome. Shell covered with thin, fibrous periostracum.

Cyclophorus fruhstorferi langsonensis

Kobelt, 1908

Figs 5.22, 19B

Cyclophorus (Litostylus) fruhstorferi langsonensis Kobelt, 1908: 606, Taf. 82, Fig. 1–2.

Type locality: Lang Son, Vietnam.

Type material: Not seen.

Material examined. **Hph2008/001** Vietnam, Hai Phong City, An Lao District, Truong Thanh Commune, Voi mountain area, Small isolated limestone hill, 20°50.47'N, 106°34.08'E, leg. V.N. Do, 22 August 2008; **Hph2009/002** Vietnam, Hai Phong City, An Lao District, An Tien Commune, Voi mountain area, Sparsely vegetated limestone rocks, 20°50.11'N, 106°33.48'E, leg. V.N. Do and T.M. Ngo, 13 August 2009.

Diagnosis. Shell very large. Spire low. Shell covered with thin, fibrous periostracum. Periphery with a slight keel. Peristome thick, simple.

Dimensions: D 47.0–47.7, H 35.7–36.5 mm (n = 3).

Distribution. In Vietnam, known from Lang Son and Hai Phong Provinces [Kobelt, 1908].

Remark. *Cyclophorus fruhstorferi langsonensis* differs from *Cyclophorus fruhstorferi fruhstorferi* in its smaller shell, but taller spire and a slightly more pronounced peripheral keel.

Cyclophorus fulguratus Pfeiffer, 1852

Figs 5.23, 18D

Cyclophorus fulguratum Pfeiffer, 1852a: 63.

Cyclophorus fulguratus. – Pfeiffer, 1852b: 80; Benson, 1856: 232; Pfeiffer, 1858: 58; Theobald, 1858: 247; Reeve, 1861: sp. 35, pl. IX, fig. 35a–d; Pfeiffer, 1865: 62; Hanley, Theobald, 1876: 2, pl. 3, fig. 3; Rochebrune, 1882: 64; Tapparone-Canefri, 1889: 308; Fischer P., 1891: 103; Fischer H., 1898: 331; Möllendorff, 1900: 135; Kongim *et al.*, 2006: 1–8, fig. 2E; Nantararat *et al.*, 2014a: 99–111, fig. 1K; Nantararat *et al.*, 2014b: 11, fig. 8A–B; Nantararat *et al.*, 2014c: 12, fig. 4A–B, 5A–C.

Cyclostoma (Cyclophorus) fulguratum. – Pfeiffer, 1854d: 345, Taf. XLV, Fig. 9–10.

Cyclostoma fulguratum var. *major* Pfeiffer, 1869: 440, Taf. XCVIII, Fig. 1–2.

Cyclophorus fulguratus var. *patens* Nevill, 1878: 271.

Cyclophorus fulguratus var. *barniana* Ancy, 1888a: 93, fig. 5.

Cyclophorus fulguratus var. *subflorida* Ancy, 1888a: 93, fig. 7.

Cyclophorus (Glossostylus) fulguratus. – Kobelt, Möllendorff, 1897: 107; Kobelt, 1902: 112; Gude, 1921: 61; Solem, 1966: 10; Budha *et al.*, 2015: 3.

Cyclophorus (Glossostylus) fulguratus var. *barniana* Kobelt, 1902: 112.

Cyclophorus (Glossostylus) fulguratus var. *subflorida* Kobelt, 1902: 112.

Type locality: Unknown.

Type material: Lectotype NHMUK 20130117/1, paralectotypes NHMUK 20130117/2–3 [Nantararat *et al.*, 2014b: fig. 8A–B].

Material examined. **Tqu2018/013** Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune,

Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 466 m, leg. D.S. Do, 26 April 2018; **Nbi2013/005** Vietnam, Ninh Binh Province, Hoa Lu District, Truong Yen Commune, Trang An ancient landscape, Steep limestone cliff with woody regrowth, 20°18.53'N, 105°53.56'E, 374 m, leg. V.N. Do, 10 July 2013; **Nbi2016/003** Vietnam, Ninh Binh Province, Cuc Phuong National Park, Limestone outcrops in shale bedrock of primary forest, 20°21.13'N, 105°54.22'E, 297 m, leg. D.S. Do and T.L. Nguyen, 19 August 2016; **Hno2013/003** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, near Trinh Temple, Exposed limestone with little soil and vegetation, 20°34.26'N, 105°46.33'E, 322 m, leg. V.N. Do, 02 April 2013; **Vph2014/015** Vietnam, Vinh Phuc Province, Tam Dao District, Tam Dao National Park, right side of the road to Rung Rin mountain, Limestone outcrops in clayey soil, 21°26.40'N, 105°38.21'E, 399 m, leg. V.N. Do, 23 August 2014; **Hbi2015/011** Vietnam, Hoa Binh Province, Cao Phong District, Tan Phong Commune, Limestone hill with degraded regrowth, 20°40.19'N, 105°20.37'E, 636 m, leg. D.S. Do, 18 July 2015; **Sla2015/002** Vietnam, Son La Province, Van Ho District, Lien Hoa Commune, Non Village, Primary forest on limestone, 20°58.54'N, 104°52.49'E, 427 m, leg. D.S. Do, 27 June 2015; **Sla2014/002** Vietnam, Son La Province, Son La City, Quyet Tam Ward, Subregion No.5, Steep limestone cliff with woody regrowth, 21°19.29'N, 103°56.07'E, 749 m, leg. D.S. Do, 11 December 2014; **Tho2009/021** Vietnam, Thanh Hoa Province, Thanh Hoa City, Dong Cuong Commune, Ham Rong mountain area, Small isolated limestone hill, 19°50.03'N, 105°45.58'E, 79 m, leg. V.N. Do and T.N.A. Nguyen, 24 June 2009; **Tho2015/031** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Limestone slope with woody regrowth, 20°20.29'N, 105°29.43'E, 266 m, leg. T.Q. Bui, 13 July 2015.

Diagnosis. Shell medium sized to large. Spire tall. Last whorl well-rounded without edge. Peristome thick, simple.

Dimensions: D 29.7–37.5, H 20.6–29.5 mm (shells from different localities).

Distribution. In Vietnam, known from Tuyen Quang, Lang Son, Thai Nguyen, Bac Kan, Cao Bang, Hanoi, Ninh Binh, Vinh Phuc, Hoa Binh, Son La, Thanh Hoa, Quang Binh, Khanh Hoa Provinces [Ancey, 1888a; Möllendorff, 1900; Solem, 1966]. Elsewhere, in Thailand, Myanmar, Nepal, Cambodia [Pfeiffer, 1852a; Tapparone-Canefri, 1889; Gude, 1921; Nantararat *et al.*, 2014a; Budha *et al.*, 2015].

Remark. *Cyclophorus fulguratus* is a very variable species in terms of shell characters. This species is widespread in limestone hills from Northern to Central Vietnam.

Cyclophorus haughtoni Theobald, 1858

Figs 6.24, 19D

Cyclophorus haughtoni Theobald, 1858: 246; Hanley, Theobald 1876: 1, pl. 1, fig. 6, pl. 48, fig. 6; Pfeiffer, 1876: 405; Nevill, 1878: 270; Tapparone-Canefri, 1889: 308; Nantararat *et al.*, 2014a: 99–111, fig. 1L; Nantararat *et al.*, 2014b: 12, fig. 10A–B.

Cyclophorus haughtoni var. *phayrei* Nevill, 1878: 405.

Cyclophorus haughtoni var. *picta* Nevill, 1878: 405.

Cyclophorus pernobilis. – Tapparone-Canefri, 1889: 308 (not of Gould, 1844).



FIG. 6. Localities of examined samples of Vietnamese *Cyclophorus*: 24. *Cyclophorus haughtoni*, 25. *Cyclophorus herklotsi*, 27. *Cyclophorus ignilabris*, 28. *Cyclophorus implicatus implicatus*, 29. *Cyclophorus implicatus kanhoensis* sp. nov.

РИС. 6. Нахождения вьетнамских *Cyclophorus*: 24. *Cyclophorus haughtoni*, 25. *Cyclophorus herklotsi*, 27. *Cyclophorus ignilabris*, 28. *Cyclophorus implicatus implicatus*, 29. *Cyclophorus implicatus kanhoensis* sp. nov.

Cyclophorus (*Salpingophorus*) *haughtoni*. – Kobelt, 1897: 109; Kobelt, 1902: 129; Kobelt, 1908: 661, Taf. 94, Fig. 4.

Type locality: Maulmein, Myanmar.

Type material: Lectotype NHMUK 1888.12.4.1953, paralectotype NHMUK 1888.12.4.1954 [Nantararat *et al.*, 2014b: fig. 10A–B].

Material examined. **Gla2016/001** Vietnam, Gia Lai Province, Mang Yang District, Kon Ka Kinh National Park, Limestone outcrops in thick clayey soil, near H ngoi Waterfall, leg. D.T. Dinh, 21 September 2016.

Diagnosis. Shell large, conical, with very tall spire. Shell colour brownish, umbilical region white to yellowish. Last whorl rounded, stout, with numerous wide brownish bands below the periphery and umbilical region. Umbilicus open, deep, sometimes partly covered by the peristome.

Dimensions: D 38.1, H 33.7 mm (n = 1).

Distribution. In Vietnam, known only from Gia

Lai Province. Elsewhere, in Myanmar, Thailand [Theobald, 1858; Nantararat *et al.*, 2014a, 2014b].

Cyclophorus herklotsi Martens, 1861

Figs 6.25, 19C

Cyclophorus herklotsi Martens, 1861: 42; Pfeiffer, 1865: 63; Martens, 1867: 13, pl. 3, fig. 1; Noseworthy *et al.* 2007: 71; Nantararat *et al.*, 2014a: 99–111, fig. 1M.

Cyclophorus (*Eucyclophorus*) *herklotsi*. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (*Cyclophorus*) *herklotsi*. – Kobelt, 1902: 139.

Cyclophorus (s. str.) *herklotsi*. – Kobelt, 1908: 632, Taf. 88, Fig. 12–16.

Type locality: Japan.

Type material: Not seen.

Material examined. **Agi2015/005** Vietnam, An Giang Province, Tri Ton District, Co To Commune, Co To mountain area, Isolated limestone hill with depleted primary forest, 10°24.11'N, 105°00.260'E, 437 m, leg. V.B. Nguyen, 23 June 2015; **Agi2015/013** Vietnam, An Giang Province, Thoai Son District, Oc Eo Town, Ba The mountain area, Isolated limestone hill, 10°14.49'N, 105°08.26'E, 77 m, leg. V.B. Nguyen, 27 June 2015; **Dna2010/009** Vietnam, Dong Nai Province, Vinh Cuu District, Phu Ly Commune, Small isolated limestone hill with primary forest, 11°22.31'N, 107°08.36'E, leg. V.N. Do, 26 May 2010.

Diagnosis. Shell small, conical with very tall spire. Rounded dorsal whorls with numerous spiral ridges.

Dimensions: D 18.9–22.1, H 19.1–25.0 mm (n = 27)

Distribution. In Vietnam, known from Dong Nai, An Giang Provinces. Elsewhere, in Japan, South Korea, Thailand [Noseworthy *et al.* 2007; Nantararat *et al.*, 2014a].

Remark. This species is distinguished from *Cyclophorus zebrinus* by its circular and flat peristome.

Cyclophorus huberi Thach, 2016

Thach, 2016: 35, fig. 50*, 99*–104*.

Type locality: Kham Duc, Quang Nam, Vietnam.

Type material: Holotype MNHN IM-2000-31889.

Material examined. No material was available.

Diagnosis. Shell very large. Spire tall. Last whorl rounded. Peristome simple.

Dimensions: D 49.5–55.9, H 33.5–38.6 mm [Thach, 2016].

Distribution. In Vietnam, known only from Quang Nam Province [Thach, 2016].

Remark. This species is distinguished from congeners by large size, reticulate sculpture at exterior surface and presence of a broad concave area below suture of body whorl [Thach, 2016].

Cyclophorus ignilabris Möllendorff, 1901

Figs 6.27, 20D

Cyclophorus (*Litostylus*) *ignilabris* Möllendorff, 1901b: 117; Kobelt, 1902: 537; Kobelt, 1908: 600, Taf. 80, Fig. 1–2.

Type locality: Bah-mun Island, Tonkin Vietnam.

Type material: Not seen.

Material examined. **Lso2005/001** Vietnam, Lang Son Province, Chi Lang District, Sao Mai Commune, Gio Cave, 21°42.31'N, 106°36.58'E, 374 m, leg. V.N. Do, 20 July 2005; **Qni2011/003** Vietnam, Quang Ninh Province, Cam Pha City, Quang Hanh Ward, Limestone hill with regrowth, 20°59.15'N, 107°11.38'E, 166 m, leg. V.N. Do, 25 April 2011; **Qni2015/002** Vietnam, Quang Ninh Province, Van Don District, Dai Xuyen Commune, Dai Van Village, 21°12.38'N, 107°29.13'E, 98 m, leg. V.N. Do, 12 April 2011; **Qni2015/002** Vietnam, Quang Ninh Province, Uong Bi City, Vang Danh Ward, Limestone rocks near coal-mine, 21°06.57'N, 106°48.22'E, 203 m, leg. V.N. Do, 14 April 2015; **Qni2015/009** Vietnam, Quang Ninh Province, Hoanh Bo District, Ha My Pass, Limestone cliffs on the right of the road to Bac Giang Province, 21°11.820'N, 106°51.242'E, 287 m, leg. V.N. Do, 15 April 2015.

Diagnosis. Shell very large, conical with tall spire. The first whorl moderately convex, the others almost flat to slightly convex; periphery with a distinct keel that continues up to the peristome. Shell covered with thin, fibrous periostracum. Shell white to yellowish brown, often with one wide band of darker brown below the periphery. Peristome expanded and thickened.

Dimensions: D 47.2–52.7, H 33.2–39.8 mm (n = 17).

Distribution. In Vietnam, known from Quang Ninh and Lang Son Provinces.

Remark. This species was collected from North-eastern Vietnam (Quang Ninh, Lang Son Provinces) with distribution range, including the islands and mainland.

Cyclophorus implicatus implicatus

Bavay et Dautzenberg, 1908

Figs 6.28, 20A

Cyclophorus implicatus Bavay, Dautzenberg, 1908: 249; Bavay, Dautzenberg, 1909: 285, Taf. XI, Fig. 5–7; Nantararat *et al.*, 2014b: 13, fig. 11C; Do *et al.*, 2015: 120, fig. 2F.

Type locality: Muong Bo and Binh-Lu, Lai Chau, Vietnam.

Type material: Lectotype MNHN-IM-2000-33829.

Material examined. **Lch2015/100** Vietnam, Lai Chau Province, Phong Tho District, Khong Lao Commune, 22°35.020'N, 103°23.520'E, 1289 m, Limestone outcrops, leg. D.S. Do and V.T. Sin, 14 July 2015; **Lch2015/007** Vietnam, Lai Chau Province, Lai Chau City, Pu Sam Cap cave area, 22°23.414'N, 103°21.560'E, 837 m, exit of the stone path, leg. D.S. Do and V.T. Sin, 15 July 2015; **HNUE-OC-086** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Dom Huon Village, Limestone karst, 21°22.234'N, 103°46.190'E, 605 m, leg. D.S. Do and T.D. Luong, 20.8.2013; **Sla2013/002** Vietnam, Son La Province, Mai Son District, Co Noi Commune, Lech Village, 21°07.31'N, 104°09.18'E, 685 m, Limestone karst, leg. D.S. Do and T.N. Phung, 18 November 2013; **Hgi2012/003** Vietnam, Ha Giang Province, Dong Van District, Ta Phin Commune, under rocks and logs in old forest, 23°14.15'N, 105°18.53'E, 961 m, leg. V.N. Do, 01 October 2012; **Lso2009/001** Vietnam, Lang Son

Province, Huu Lung District, Quyet Thang Commune, Ray Village, Limestone karst, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 13 April 2009.

Diagnosis. Shell medium in size, conical, with low to medium high spire. Shell pale yellowish to brown, usually with an irregular zig-zag pattern of dark brown, often with a row of white spots at the periphery, with one, two or three narrower bands of darker brown below the periphery.

Dimensions: D 28.1–37.4, H 21.3–25.5 mm (shells from different localities)

Distribution. In Vietnam, known from Ha Giang, Lang Son, Lai Chau, Son La Provinces.

Remark. The species is easily recognisable and can be separated from congeners without difficulty by shell morphology and sculpture. Colour pattern highly variable.

Cyclophorus implicatus kanhoensis

Do et Do subsp. nov.

Figs 6.29, 20B–C

urn:lsid:zoobank.org:act:15B8177D-7AF2-4EA4-9495-B509CCC84733

Type material. Holotype VNMN_IZ 000.000.155, Vietnam, Lai Chau Province, Muong Te District, Kan Ho Commune, Si Thau Chai Village, 22°17.55'N, 102°47.39'E, 812 m, leg. D.S. Do, 16 September 2015. Paratype: same locality and data (CBER–TBU 2015/1).

Diagnosis. A medium sized species with tall spire, flattened whorls and with a distinct keel at the periphery.

Description. Shell medium in size, conical, with tall spire. Shell white to pale brown, with an irregular zig-zag pattern of brown, below the periphery often with a band of darker brown; umbilical region whitish to pale yellowish, with fewer brown markings than elsewhere, often with numerous narrow bands of dark brown. Whorls 5–5¼, rounded, somewhat flattened, periphery with a distinct keel; protoconch (1½–2 whorls) glossy, finely ribbed; teleoconch slightly, rather irregularly finely ribbed, spiral lines visible mainly at the periphery side where sometimes they are as strong as the ribs. Suture relatively shallow, but channelled. Spiral sculpture present, fine, wavy and weaker on the ventral side. Umbilicus 3.8–4.1 mm wide, deep, sometimes partly covered by the peristome. Peristome white or cream-coloured, slightly to distinctly thickened and distinctly reflected, double or simple. Callus well-developed. The operculum is unknown.

Measurements (in mm). Holotype: D 25.2, H 20.1, Paratype: D 27.1, H 21.0 mm.

Distribution. This new subspecies is thus far known only from limestone slope with disturbed forest in Kan Ho Commune, Muong Te District, Lai Chau Province, Vietnam.

Etymology. The specific epithet is derived from the type locality of this new subspecies, Kan Ho Commune, Muong Te District, Lai Chau Province.

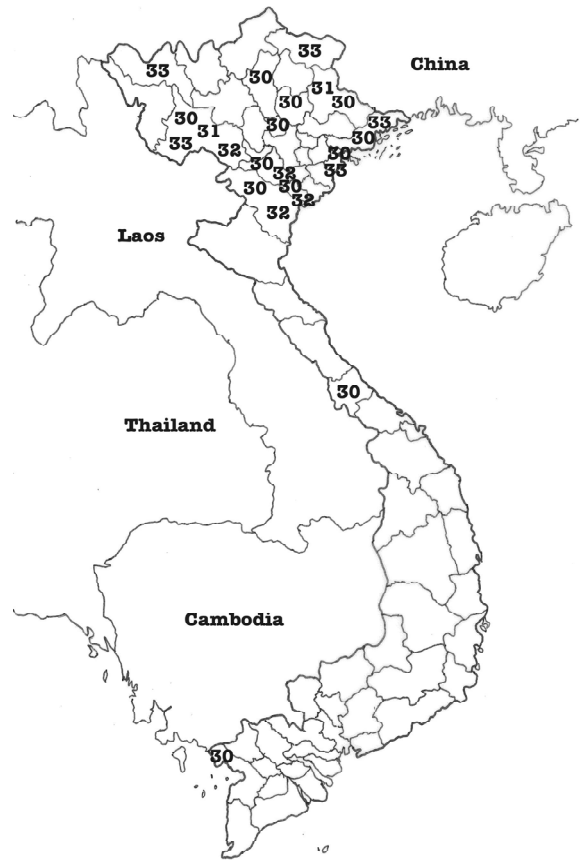


FIG. 7. Localities of examined samples of Vietnamese *Cyclophorus*: 30. *Cyclophorus jourdyi*, 31. *Cyclophorus labiosus*, 32. *Cyclophorus malayanus*, 33. *Cyclophorus mansuyi*.

РИС. 7. Нахождения вьетнамских *Cyclophorus*: 30. *Cyclophorus jourdyi*, 31. *Cyclophorus labiosus*, 32. *Cyclophorus malayanus*, 33. *Cyclophorus mansuyi*.

Remark. This new subspecies differs from *Cyclophorus implicatus implicatus* Bavay et Dautzenberg, 1908 in its larger shell and distinct keel. To date no living specimens have been found.

Cyclophorus jourdyi Morlet, 1886

Figs 7.30, 21A–B

Cyclophorus jourdyi Morlet, 1886a: 4; Morlet, 1886b: 260, 281, pl. XIV, fig. 1, 1a; Mabille, 1887b: 143; Fischer P., 1891: 103; Fischer, Dautzenberg, 1904: 428; Dautzenberg, Fischer, 1905a: 168; 1905b: 433; Nantararat *et al.*, 2014a: 99–111, fig. 1N.

Cyclophorus jourdyi var. *longsonensis* Morlet, 1891b: 246. *Cyclophorus* (*Glossostylus*) *jourdyi*. – Kobelt, Möllendorff, 1897: 107; Kobelt, 1902: 113; Kobelt, 1908: 678, Taf. 99, Fig. 7, 8.

Type locality: Halong, Tonkin Vietnam.

Type material: Syntypes MNHN–IM–2000–33830, MNHN–IM–2000–33831.

Material examined. Lso2009/005 Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth,

21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; **Tqu2018/009** Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 466 m, leg. D.S. Do, 26 April 2018; **Tng2017/019** Vietnam, Thai Nguyen Province, Vo Nhai District, Than Sa Commune, Ngoc Son Village, Than Sa–Phuong Hoang Nature Reserve, Steep limestone slope with disturbed forest, 21°50.56'N, 105°53.23'E, 319 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; **Tng2017/005** Vietnam, Thai Nguyen Province, Vo Nhai District, Than Sa Commune, Thuong Kim Village, Than Sa–Phuong Hoang Nature Reserve, Limestone cliff with woody regrowth, 21°50.48'N, 105°53.22'E, 300 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; **Hph2008/002** Vietnam, Hai Phong City, An Lao District, Truong Thanh Commune, Voi mountain area, Small isolated limestone hill with depleted primary forest, 20°50.47'N, 106°34.08'E, leg. V.N. Do, 22 August 2008; **Qni2011/021** Vietnam, Quang Ninh Province, Van Don District, Van Yen Commune, near Van Hoa Harbour, Small isolated limestone hill with depleted primary forest, 21°11.43'N, 107°28.05'E, 167 m, leg. V.N. Do, 08 April 2011; **Vph2011/015** Vietnam, Vinh Phuc Province, Tam Dao District, Tam Dao National Park, Rung Rin mountain area, Limestone outcrops in shale bedrock of primary forest, 21°26.42'N, 105°38.22'E, 437 m, leg. V.N. Do, 18 June 2011; **Hno2012/013** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, Small hill just behind of Trinh Temple, Exposed limestone with little soil and vegetation, 20°34.21'N, 105°46.37'E, 313 m, leg. V.N. Do, 15 June 2012; **Hno2012/009** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, right side of the Yen Stream, Exposed limestone with little soil and vegetation, 20°34.33'N, 105°46.15'E, 285 m, leg. V.N. Do, 29 December 2012; **Nbi2010/007** Vietnam, Ninh Binh Province, Gia Vien District, Gia Hung Commune, Steep limestone cliff with woody regrowth, 20°26.42'N, 105°51.35'E, 341 m, leg. V.N. Do, 26 November 2010; **Nbi2010/002** Vietnam, Ninh Binh Province, Gia Vien District, Van Long Nature Reserve, Bong cave area, Primary forest on limestone, 20°22.26'N, 105°53.17'E, 355 m, leg. V.N. Do, 27 November 2010; **Nbi2010/002** Vietnam, Ninh Binh Province, Gia Vien District, Van Long Nature Reserve, Mo Coi mountain area, Limestone hill with little soil and vegetation of herbs, 20°22.37'N, 105°54.22'E, 386 m, leg. V.N. Do, 27 November 2010; **Hbi2015/008** Vietnam, Hoa Binh Province, Cao Phong District, Tay Phong Commune, Limestone hill with degraded regrowth, 20°42.30'N, 105°18.16'E, 517 m, col. T.N. Phung, 10 July 2015; **Hbi2016/011** Vietnam, Hoa Binh Province, Lac Thuy District, Phu Thanh Commune, Limestone outcrops in shale bedrock, 20°36.42'N, 105°41.51'E, 314 m, col. T.N. Pham, 12 June 2016; **Sla2015/004** Vietnam, Son La Province, Van Ho District, Lien Hoa Commune, Non Village, Primary forest on limestone, 20°58.54'N, 104°52.49'E, 427 m, leg. D.S. Do, 27 June 2015; **Sla2017/029** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, entrance of the Tang Me Tomb Cave, Steep limestone slope with disturbed forest, 20°58.53'N, 104°48.32'E, 825 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Tho2009/015** Vietnam, Thanh Hoa Province, Thanh Hoa City, Dong Cuong Commune, Ham Rong mountain area, Small isolated limestone hill, 19°50.24'N, 105°45.45'E, 83 m, leg. V.N. Do and T.N.A. Nguyen, 20 November 2009; **Tho2013/006** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach My Commune, Primary forest on limestone, 20°17.33'N, 105°33.59'E, 376 m, col. T.Q. Bui, 20 September 2013; **Kgi2014/003** Vietnam, Kien Giang Province, Kien Luong District, Binh An Commune, Nho mountain area, Lime-

stone hill with low woodland, 10°16.54'N, 104°34.00'E, 21 m, col. V.B. Nguyen, 08 December 2014.

Diagnosis. Shell medium in size, with tall spire. Shell brownish to dark brown, with an irregular zig-zag pattern of pale yellowish, with one wide band of darker brown below the periphery; umbilical region white to pale yellowish, with numerous bands of darker brown. Umbilicus narrow, $\frac{1}{2}$ covered by the peristome.

Dimensions: D 28.2–33.4, H 24.2–28.6 mm (shells from different localities).

Distribution. In Vietnam, known from Lang Son, Thai Nguyen, Tuyen Quang, Quang Ninh, Hai Phong, Hanoi, Vinh Phuc, Ninh Binh, Hoa Binh, Son La, Thanh Hoa, Quang Tri, Kien Giang Provinces [Morlet, 1886a, 1891b; Fischer P., 1891: 103; Dautzenberg, Fischer, 1905a; Nantararat *et al.*, 2014a].

Remark. This species is widespread in limestone hills from Northern to Southern Vietnam.

Cyclophorus labiosus (Pfeiffer, 1854)

Figs 7.31, 21C

Cyclostoma labiosus Pfeiffer, 1854c: 51.

Cyclophorus labiosus. – Pfeiffer, 1858: 48; Reeve, 1861: sp. 32, pl. VIII, fig. 32a–b; Pfeiffer, 1865: 65; Nantararat *et al.*, 2014a: 99–111, fig. 10; Nantararat *et al.*, 2014b: 14, fig. 12C.

Cyclophorus (Litostylus) labiosus. – Kobelt, Möllendorff, 1897: 105; Kobelt, 1902: 100.

Type locality: Unknown.

Type material: Lectotype NHMUK 20130080 [Nantararat *et al.*, 2014b: fig. 12C].

Material examined. **Sla2013/001** Vietnam, Son La Province, Son La City, Chieng Ngan Commune, Khoang Village, Limestone hill with regrowth, 21°19.31'N, 103°58.47'E, 623 m, leg. D.S. Do, 20 October 2013; **Sla2017/001** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, entrance of the Tang Me Tomb Cave, Steep limestone slope with disturbed forest, 20°58.53'N, 104°48.32'E, 825 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017.

Diagnosis. Shell large, spire low. Last whorl well-rounded without edge. Peristome very thick, simple.

Dimensions: D 38.3–42.2, H 29.8–30.4 mm (n = 2).

Distribution. In Vietnam, known from Lang Son, Son La Provinces [Morlet, 1891b]. Elsewhere, in Thailand [Nantararat *et al.*, 2014a].

Remark. The species was previously recorded from Long-Son (Lang Son Province) [Morlet, 1891b: 246].

Cyclophorus malayanus (Benson, 1852)

Figs 7.32, 21D

Cyclostoma malayanum Benson, 1852: 269.

Cyclostoma volvulus. – Eyndoux, Souleyet, 1852: 533, pl. 30, fig. 18–21 (not of O. F. Müller, 1774).

Cyclophorus malayanus Pfeiffer, 1854d: 82; Pfeiffer, 1858: 42; Reeve, 1861: sp. 2, pl. I, fig. 2a–b; Pfeiffer, 1865: 62; Martens, 1867: 133; Stoliczka, 1872: 262, pl. 10, fig. 1–

5; Nevill, 1878: 267; Möllendorff, 1886b: 309; Möllendorff, 1894: 153; Fischer P., 1891: 103; Möllendorff, 1894: 153; Gude, 1921: 80; van Benthem Jutting, 1949: 53; Vermeulen, Maassen, 2003: 20; Kongim *et al.*, 2006: 1–8, fig. 2F; Nantararat *et al.*, 2014a: 99–111, fig. 1P; Nantararat *et al.*, 2014b: 17, fig. 8A–B; Foon *et al.*, 2017: 16, fig. 6D. *Cyclophorus malayanus* var. *saturna* Nevill, 1878: 267 (loc. Cambodia). *Cyclophorus malayanus* var. *minor* Nevill, 1878: 267 (loc. Cambodia). *Cyclophorus (Salpingophorus) malayanus*. – Kobelt, Möllendorff, 1897: 109; Kobelt, 1902: 130; Kobelt, 1908: 658, Taf. 92, Fig. 3–4, Taf. 96, Fig. 1.

Type locality: Malaysia Peninsula.

Type material: Syntype NHMUK 20130089 [Nantararat *et al.*, 2014b: fig. 13A].

Material examined. **Hno2011/001** Vietnam, Hanoi City, Quoc Oai District, Quoc Oai Town, Hoang Xa mountain area, Limestone hill with little soil and vegetation of herbs, 20°59.49'N, 105°38.38'E (map), 207 m, leg. V.N. Do, 26 June 2011; **Nbi2013/005** Vietnam, Ninh Binh Province, Nho Quan District, Cuc Phuong National Park, Steep limestone slope with disturbed forest, 20°21.10'N, 105°35.02'E, 612 m, leg. V.N. Do, 10 July 2013; **Hbi2015/002** Vietnam, Hoa Binh Province, Mai Chau District, Mai Chau Town, Limestone escarpments along road No. 15, 20°39.18'N, 105°06.05'E, 621 m, leg. V.N. Do, 11 September 2015; **Hbi2015/018** Vietnam, Hoa Binh Province, Cao Phong District, Tay Phong Commune, Limestone hill with degraded regrowth, 20°42.30'N, 105°18.16'E, 517 m, col. T.N. Phung, 10 July 2015; **Sla2013/027** Vietnam, Son La Province, Van Ho District, Van Ho Commune, Pa Cop Village, Densely vegetated limestone hill, 21°45.56'N, 104°44.30'E, 1013 m, leg. D.S. Do, 26 October 2013; **Sla2013/014** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Nam Tien Village, Limestone slope with woody regrowth, 21°23.25'N, 103°46.39'E, 620 m, leg. D.S. Do and T.D. Luong, 20 October 2013; **Sla2013/021** Vietnam, Son La Province, Mai Son District, Muong Bang Commune, Na Hoi Village, Limestone hill with degraded regrowth, 21°18.11'N, 104°02.16'E, 779 m, leg. D.S. Do and T.L. Nguyen, 22 November 2013; **Sla2016/003** Vietnam, Son La Province, Muong La District, Muong Bu Commune, Tham Bo cave area, Limestone hill with degraded regrowth, 21°25.48'N, 104°01.06'E, 683 m, leg. D.S. Do, 18 August 2016; **Sla2017/028** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, Pua Lai Village, Primary forest on limestone, 20°58.30'N, 104°48.18'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Tho2013/009** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach My Commune, Primary forest on limestone, 20°17.33'N, 105°33.59'E, 376 m, col. T.Q. Bui, 20 September 2013.

Diagnosis. Shell large to very large, with tall spire. Shell yellowish brown, often with numerous bands of darker brown below the periphery.

Dimensions: D 37.3–50.2, H 29.3–41.2 mm (shells from different localities).

Distribution. In Vietnam, known from Hanoi, Ninh Binh, Hoa Binh, Son La, Thanh Hoa Provinces [Vermeulen, Maassen, 2003]. Elsewhere, in Malaysia, Thailand, Indonesia, India [Benson, 1852; Fischer P., 1891; Gude, 1921; Nantararat *et al.*, 2014c].

Remark. *Cyclophorus malayanus* is a very variable species in terms of shell characters.

Cyclophorus mansuyi Dautzenberg et Fischer, 1908 Figs 7.33, 22A–B

Cyclophorus mansuyi Dautzenberg, Fischer, 1908: 204, pl. VIII, fig. 1–4.

Type locality: Quang-Huyen, Cao Bang, Vietnam.

Type material: Syntypes MNHN IM-2000-33835, MNHN IM-2000-33836.

Material examined. **Qni2011/001** Vietnam, Quang Ninh Province, Cam Pha City, Quang Hanh Ward, Steep limestone slope with disturbed forest, 20°59.14'N, 107°12.42'E, 174 m, leg. V.N. Do, 25 April 2011; **Qni2008/0022** Vietnam, Quang Ninh Province, Quang Yen Town, Hoang Tan Commune, limestone cliff with woody regrowth and grassland, 20°54.08'N, 106°55.13'E, 310 m, leg. V.N. Do, 06 August 2008; **Qni2011/004** Vietnam, Quang Ninh Province, Ha Long Bay area, Ba Cua Island, Woodland on dry sandy soil and limestone rock bordering beach, leg. V.N. Do, 26 April 2011; **Hph2009/002** Vietnam, Hai Phong City, An Lao District, An Tien Commune, Voi Mountain, sparsely vegetated limestone rocks, 20°50.11'N, 106°33.48'E, leg. V.N. Do and T.M. Ngo, 13 August 2009; **Sla2012/001** Vietnam, Son La Province, Thuan Chau District, Tong Lan Commune, Ban Tham Cave, 21°26.198'N, 103°46.06'E, 572 m, leg. D.S. Do, 02 November 2012; **Sla2013/002** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Dom Huon Village, 21°22.234'N, 103°46.190'E, 605 m, leg. D.S. Do and T.D. Luong, 02 November 2013; **Lch2015/004** Vietnam, Lai Chau Province, Muong Te District, Kan Ho Commune, Si Thau Chai Village, 22°17.546'N, 102°47.387'E, 812 m, leg. D.S. Do, 16 September 2015; **Sla2013/003** Vietnam, Son La Province, Son La City, Chieng Xom Commune, Cao Pha Pass, 21°21.416'N, 103°58.28'E, 832 m, leg. D.S. Do and N.C. Bui, 10 August 2013.

Diagnosis. Shell large, spire low. Last whorl well-rounded and expanded. Peristome slightly thickened, simple. Umbilicus very wide, not covered by the peristome.

Dimensions: D 35.0–40.7, H 23.9–28.3 mm (n = 18)

Distribution. In Vietnam, known from Cao Bang, Quang Ninh, Hai Phong, Son La, Lai Chau Provinces [Dautzenberg, Fischer, 1908].

Remarks. The species is distinguished from its congeners by its large shell, distinct sculpture, rounded periphery and more thickened, expanded umbilicus. Colour pattern highly variable, cream-coloured to pale red. The species is easily recognisable and can be separated from congeners without difficulty by shell morphology and sculpture. This species can be endemic to Vietnam.

Cyclophorus martensianus Möllendorff, 1874 Figs 8.34, 22D

Cyclophorus martensianus Möllendorff, 1874: 78; Möllendorff, 1875: 120, pl. 3, fig. 3; Martens, 1875: 127; Pfeiffer, 1876: 110; Nevill, 1878: 267; Gredler, 1881: 32; Heude, 1882: 1, pl. 12, fig. 1, 5; Möllendorff, 1882: 275; Ancey, 1888b: 354; Yen, 1941: 185.

Cyclophorus martensianus var. *davidis* Ancey, 1888b: 355



FIG. 8. Localities of examined samples of Vietnamese *Cyclophorus*: 34. *Cyclophorus martensianus*, 35. *Cyclophorus massiei*, 36. *Cyclophorus monachus*, 37. *Cyclophorus muspratti*.

РИС. 8. Нахождения вьетнамских *Cyclophorus*: 34. *Cyclophorus martensianus*, 35. *Cyclophorus massiei*, 36. *Cyclophorus monachus*, 37. *Cyclophorus muspratti*.

(loc. Westliches Setschuan, China).

Cyclophorus martensianus var. *gredleriana* Ancey, 1888b: 355 (loc. Westliches Setschuan, China).

Cyclophorus (*Eucyclophorus*) *martensianus*. – Kobelt, Möllendorff, 1897: 110.

Cyclophorus (*Cyclophorus*) *martensianus*. – Kobelt, 1902: 140.

Cyclophorus (*Cyclophorus*) *martensianus* var. *davidis* Kobelt, 1902: 140 (loc. Westliches Setschuan, China).

Cyclophorus (*Cyclophorus*) *martensianus* var. *gredleriana* Kobelt, 1902: 140 (loc. Westliches Setschuan, China).

Cyclophorus (*Cyclophorus*) *martensianus* var. *nankingensis* Kobelt, 1902: 140 (loc. Nanking, China).

Cyclophorus (*Cyclophorus*) *martensianus* var. *pallens* Kobelt, 1902: 141 (loc. Hupei, China).

Cyclophorus (s. str.) *martensianus*. – Kobelt, 1908: 633, Taf. 89, Fig. 1–6.

Cyclophorus martensianus martensianus. – Yen, 1939: 20, Taf. 1, Fig. 34–36.

Type locality: China.

Type material: Not seen.

Material examined. Bka2016/002 Vietnam, Bac Kan Province, Bac Kan City, Xuat Hoa Ward, Tan Cu Village,

Limestone hill with mainly regrowth thickets, 22°8.41'N, 105°48.57'E, 255 m, leg. Do V.N., 22 April 2016; **Lso2009/002** Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; **Lso2017/003** Vietnam, Lang Son Province, Huu Lung District, Huu Lien Commune, Huu Lien Nature Reserve, Primary forest on limestone, 21°40.46'N, 106°22.35'E, 549 m, leg. V.N. Do, 24 April 2017; **Tqu2018/008** Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 466 m, leg. D.S. Do, 26 April 2018; **Qni2011/002** Vietnam, Quang Ninh Province, Cam Pha City, Quang Hanh Ward, Limestone rocks, 20°59.15'N, 107°12.38'E, 166 m, leg. V.N. Do, 25 April 2011; **Hno2011/002** Vietnam, Hanoi City, Ba Vi District, Van Hoa Commune, Small isolated limestone hill with depleted primary forest, 21°06.36'N, 105°25.49'E, 439 m, leg. V.N. Do, 28 June 2011; **Tho2013/010** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.09'E, 538 m, leg. V.H. Luong, 21 July 2013.

Diagnosis. Shell from medium to large, conical with tall spire. Shell dark brownish, umbilical region pale brownish with numerous narrow band.

Dimensions: D 31.2–39.0, H 28.5–34.6 mm (shells from different localities).

Distribution. In Vietnam, known from Bac Kan, Lang Son, Tuyen Quang, Quang Ninh, Hanoi, Thanh Hoa Provinces. Elsewhere, in China [Möllendorff, 1874; Yen, 1939, 1941].

Remarks. This species is distinguished from its congeners by its tall spire and periphery with a weak keel that continues up to the peristome. The two subspecies of *Cyclophorus martensianus* (*C. martensianus nankingensis* Heude, 1882, pl. 89, fig. 7–9; *C. martensianus pallens* Heude, 1882, pl. 89, fig. 15–17) were recorded from China by Kobelt [1908: 634–635]. Yen [1939: 20] redescribed and recorded three subspecies (*C. martensianus martensianus* Möllendorff, 1874, Taf. 1, Fig. 34–36, loc. Kiukiang, Kiangsi; *C. martensianus ngankingensis* Heude, 1882, Taf. 1, Fig. 37, loc. An-king, Anhwei; *C. martensianus macroformis* Yen, 1939, Taf. 1, Fig. 38, loc. Hupei).

Cyclophorus massiei Morlet, 1891

Figs 8.35, 22C

Cyclophorus massiei Morlet, 1891b: 246, 251, pl. VII, fig. 2; Do et al., 2015: 120: fig. 3A.

Cyclophorus (*Glossostylus*) *massiei*. – Kobelt, Möllendorff, 1897: 107; Kobelt, 1902: 114; Kobelt, 1908: 668, Taf. 97, Fig. 14.

Type locality: Noire and Song-ma, Tonkin Vietnam.

Type material: Not seen.

Material examined. HNUE–OC 087 Vietnam, Son La Province, Muong La District, Chieng Cong Commune, Mao Village, Limestone slope with woody regrowth, 21°26.44'N, 104°13.48'E, 1766 m, leg. D.S. Do, 06 December 2013; **Sla2013/006** Vietnam, Son La Province, Muong La District, Chieng Cong Commune, Mao Village, Limestone hill with

depleted primary forest, 21°26.46'N, 104°13.51'E, 1572 m, leg. D.S. Do, 06 December 2013; **Lch2015/022** Vietnam, Lai Chau Province, Phong Tho District, Khong Lao Commune, Limestone outcrops, 22°35.020'N, 103°23.520'E, 889 m, leg. D.S. Do and V.T. Sin, 14 July 2015.

Diagnosis. Shell small, conical and brownish, with an irregular zig-zag pattern of white. Spire tall. Periphery with a distinct keel. Peristome thin and slightly expanded. Umbilicus narrow.

Dimensions: D 17.1–21.3, H 15.2–18.4 mm (n = 29).

Distribution. In Vietnam, known from Lai Chau and Son La Provinces.

Remarks. This species is distinguished from its congeners by small shell, distinct sculpture and periphery with a distinct keel. Shell characters are stable. The populations assigned to this species inhabit several regions of North-western Vietnam. This species is known only from Viet Nam where it occurs in Lai Chau and Son La Provinces. The species was not present in samples collected from surveys conducted in the surrounding provinces.

Cyclophorus monachus (Morelet, 1866)

Figs 8.36, 23D

Cyclostoma monachus Morelet, 1866: 166.

Cyclophorus annamiticus Crosse, 1867: 204, pl. VI, fig. 6; Möllendorff, 1898: 80; Kobelt, 1908: 619, Taf. 86, Fig. 1–4.

Cyclophorus monachus. –Pfeiffer, 1876: 403; Nantararat *et al.*, 2014b: 17, fig. 13B–C.

Cyclophorus coopertus Heude, 1888: 243; Heude, 1890: 126, pl. 36, fig. 4; Fischer P., 1891: 102, 104.

Cyclophorus (Litostylus) annamiticus. – Kobelt, Möllendorff, 1897: 105.

Cyclophorus (Litostylus) monachus. – Kobelt, 1902: 100.

Type locality: Cochinchina, Vietnam.

Type material: Lectotype NHMUK 1893.2.4.499, paralectotype NHMUK 1893.2.4.500. [Nantararat *et al.*, 2014b: fig. 13B–C].

Material examined. **Tni2011/001** Vietnam, Tay Ninh Province, Tay Ninh City, Thanh Tan Commune, Ba Den mountain area, Limestone mountain with disturbed forest, 11°22.48'N, 106°10.52'E, 466 m, leg. V.N. Do, 15 June 2011.

Diagnosis. Shell large, with very low spire. Last whorl rounded, stout, with one wide band of yellowish above the periphery. Shell colour brownish or pale brownish, umbilical region yellowish to pale brown. Umbilicus very wide and not covered by the peristome. Peristome white, thickened and reflected.

Dimensions: D 39.3–40.4, H 20.5–21.1 mm (n = 3).

Distribution. In Vietnam known only from Tay Ninh Province.

Remark. This species is known only from Vietnam where it occurs in Ba Den mountain, Tay Ninh Province (which has tourism activities). The species was not present in samples collected from

surveys conducted in the surrounding areas. The species has been exploited and eaten by local communities, so it would also become one of the most threatened *Cyclophorus*. Management policies need to be developed in order to raise awareness of the environmental degradation caused by tourism and human activities.

Cyclophorus muspratti Godwin-Austen et
Beddome, 1894

Figs 8.37, 23A–B

Cyclophorus muspratti Godwin-Austen, Beddome, 1894: 506; Nantararat *et al.*, 2014b: 18, fig. 14A–B.

Cyclophorus (Litostylus) muspratti. – Kobelt, Möllendorff, 1897: 105; Kobelt, 1902: 101; Kobelt, 1908: 662, Taf. 96, Fig. 5–6; Gude, 1921: 49.

Type locality: Naga Hills, and Maokohehung, Naga Hills, India.

Type material: Holotype NHMUK 1903.7.1.1427, paratypes NHMUK 1903.7.1.1427 [Nantararat *et al.*, 2014b: fig. 14A–B].

Material examined. **Hno2002/002** Vietnam, Hanoi City, Ba Vi District, left side of road from Hanoi to Ba Vi National Park, in leaf litter below high limestone walls above road, 21°04.33'N, 105°21.40'E (map), leg. V.N. Do, 19 September 2002.

Diagnosis. Shell large to very large, conical, with very tall spire. Shell brownish, below the periphery often with numerous bands of darker brown.

Dimensions: D 43.8–51.3, H 36.8–41.7 mm (n = 2).

Distribution. In Vietnam known only from Hanoi Province (Ba Vi National Park). Elsewhere, in India [Godwin-Austen, Beddome, 1894; Nantararat *et al.*, 2014b].

Remark. This species is distinguished from its congeners by its larger shell, flattened whorls and with a distinct keel at the periphery. Two specimens were collected from Ba Vi National Park. This appears to be the first record of the species from Vietnam.

Cyclophorus orthostylus Möllendorff, 1898

Cyclophorus (Lithostylus) orthostylus Möllendorff, 1898: 80; Kobelt, 1902: 101; Kobelt, 1908: 663, Taf. 96, Fig. 7–8.

Type locality: Boloven, Annam Vietnam.

Type material: Not seen.

Material examined. no material was available.

Diagnosis. Shell large, spire tall. Umbilicus very wide.

Dimensions: D 37.5, H 26.5 mm (according to the original description).

Distribution. Known from Central Vietnam [Möllendorff, 1898].

Remark. The original description by Möllendorff [1898] did not give an illustration of the species. Kobelt [1908] redescribed and figured the species. This species is distinguished from its con-

genera by its open umbilicus not covered by the peristome.

Cyclophorus paviei Morlet, 1884

Figs 9.39, 23C

Cyclophorus paviei Morlet, 1884: 389, pl. XI, fig. 4, 4a; Fischer P., 1891: 103; Aguilar-Amat, 1932: 8.

Cyclophorus (Eucyclophorus) paviei. – Kobelt, Möllendorff, 1897: 110; Kobelt, 1908: 615, Taf. 83, Fig. 7–8.

Cyclophorus (Cyclophorus) paviei. – Kobelt, 1902: 141.

Type locality: Dey-Crahorn, Cambodia.

Type material: Not seen.

Material examined. Dna2010/015 Vietnam, Dong Nai Province, Vinh Cuu District, Subregion No. 93, Small isolated limestone hill with primary forest, 21°40.46'N, 106°22.35'E, 133 m, leg. V.N. Do, 24 May 2010.

Diagnosis. Shell medium in size, conical, with slightly elevated spire, somewhat keeled periphery and fine, complex brown mottled pattern. Shell yellowish brown to pale brown, often with three or four narrower bands of darker brown below the periphery.

Dimensions: D 32.4–35.5, H 26.1–32.0 mm (n = 15).

Distribution. In Vietnam known from Dong Nai Province. Elsewhere, in Cambodia [Morlet, 1884].

Remark. The species was previously recorded from Central Vietnam [Aguilar-Amat, 1932].

Cyclophorus pfeifferi Reeve, 1861

Figs 9.40, 24A

Cyclophorus pfeifferi Reeve, 1861: sp. 11, pl. III, fig. 11a–b; Pfeiffer, 1865: 64; Rochebrune, 1882: 64; Fischer P., 1891: 104; Nantararat *et al.*, 2014a: 99–111, fig. 1S.

Cyclophorus (Salpingophorus) pfeifferi. – Kobelt, Möllendorff, 1897: 109; Kobelt, 1902: 131.

Type locality: Pulo–Penang, Malaysia.

Type material: Not seen.

Material examined. Sla2012/001c Vietnam, Son La Province, Muong La District, Muong Bu Commune, entrance of the Tham Bo Cave, Limestone slope with woody regrowth, 21°24.05'N, 104°06.13'E, 715 m, leg. D.S. Do and N.C. Bui, 27 October 2012; Dbi2017/001 Vietnam, Dien Bien Province, Tuan Giao District, Chieng Dong Commune, Po Village, Pu Hong Cay mountain area, near Tham Pua Cave, Sparsely vegetated limestone rock, 21°29.44'N, 103°22.27'E, 511 m, leg. D.S. Do and X.H. Nguyen, 09 April 2017.

Diagnosis. Shell large, conical with tall spire. Shell brown or with brown zigzag pattern, often with one narrower bands of darker brown below the periphery; periphery with a distinct keel that continues up to the peristome. Last whorl rounded and stout. Aperture rounded and expanded. Peristome white or cream-coloured, thickened and distinctly reflected.

Dimensions: D 41.1–46.3, H 32.0–36.7 mm (n = 2).

Distribution. In Vietnam known from Son La,

Dien Bien, Ba Ria–Vung Tau Provinces [Rochebrune, 1882; Fischer P., 1891]. Elsewhere, in Malaysia, Cambodia, Thailand [Reeve, 1861; Rochebrune, 1882; Nantararat *et al.*, 2014a].

Remark. The species was previously recorded from Poulo-Condor (Con Dao Archipelago, Ba Ria–Vung Tau Province) [Rochebrune, 1882; Fischer P., 1891].

Cyclophorus polystictus Möllendorff, 1901

Figs 9.41, 24B

Cyclophorus (Eucyclophorus) polystictus Möllendorff, 1901b: 80; Kobelt, 1902: 141.

Type locality: Than-moi, Lang Son, Vietnam.

Type material: Not seen.

Material examined. Sla2012/001a Vietnam, Son La Province, Muong La District, Muong Bu Commune, entrance of the Tham Bo Cave, Limestone slope with woody regrowth, 21°24.05'N, 104°06.13'E, 715 m, leg. D.S. Do and N.C. Bui, 27 October 2012; Sla2013/001a Vietnam, Son La Province, Mai Son District, Muong Bang Commune, Bang Village, Limestone hill with degraded regrowth, 21°22.39'N, 104°03.50'E, 744 m, leg. D.S. Do and T.L. Nguyen, 08 November 2013; Sla2013/003a Vietnam, Son La Province, Muong La District, Muong Bu Commune, Gian Village, Limestone hill near the road to Bo Cop Village, 21°25.08'N, 104°01.50'E, 683 m, leg. D.S. Do and T.L. Nguyen, 20 November 2013.

Diagnosis. Shell medium in size, conical, with tall spire. Shell yellowish brown, with an irregular zig-zag pattern.

Dimensions: D 34.7–37.2, H 31.2–33.5 mm (n = 5).

Distribution. In Vietnam known from Lang Son, Son La Provinces [Möllendorff, 1901b].

Remark. This species is distinguished from its congeners by its slightly thickened periphery with a distinct edge that continues up to the peristome.

Cyclophorus pyrostoma Möllendorff, 1882

Figs 9.42, 24C

Cyclophorus pyrostoma Möllendorff, 1882: 271, Taf. 9, Fig. 6; Yen, 1939: 22, Taf. 1, Fig. 46; Yen, 1941: 186; Thach, 2016: 36, fig. 105*.

Cyclophorus (Eucyclophorus) pyrostoma. – Kobelt, Möllendorff, 1897: 111.

Cyclophorus (Cyclophorus) pyrostoma. – Kobelt, 1902: 142. *Cyclophorus (s. str.) pyrostoma*. – Kobelt, 1908: 628, Taf. 87, Fig. 11, 12.

Type locality: Hainan, China.

Type material: Not seen.

Material examined. Tqu2010/016 Vietnam, Tuyen Quang Province, Tuyen Quang City, An Khang Commune, Thuc Thuy Village, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 359 m, col. T.N. Nguyen, 30 June 2010; Tqu2017/050 Vietnam, Tuyen Quang Province, Yen Son District, Phu Lam Commune, right side off road Yen Son to Yen Bai Province, Limestone hill with degraded regrowth, 21°45.46'N, 105°07.38'E, 402 m, leg. V.N. Do, 09 June 2017; Lso2009/007a Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.24'N, 106°13.15'E, 611 m, leg. V.N. Do, 30 April 2009; Bka2009/005 Vietnam, Bac

Kan Province, Cho Moi District, Hoa Muc Commune, Exposed limestone with little soil and vegetation of herbs, 22°03.54'N, 105°50.46'E, 341 m, leg. V.N. Do, 14 May 2009; **Bka2017/011** Vietnam, Bac Kan Province, Ba Be District, Nam Mau Commune, Ba Be National Park, Limestone slope with disturbed forest, 22°24.48'N, 105°36.19'E, 201 m, leg. V.N. Do, 10 November 2017.

Diagnosis. Shell medium in size, conical, with tall spire. Shell brownish to dark brown; umbilical region pale brownish, with numerous bands of dark brown. Peristome pale yellowish to brownish red, thickened and expanded.

Dimensions: D 30.3–36.8, H 26.3–31.2 mm (shells from different localities).

Distribution. In Vietnam known from Tuyen Quang, Lang Son, Bac Kan Provinces. Elsewhere, in China [Möllerndorff, 1882].

Remark. This species is very species in terms of shell characters.

Cyclophorus saturnus Pfeiffer, 1862

Cyclophorus saturnus Pfeiffer, 1862a: 116, pl. XII, fig. 6; Pfeiffer, 1865: 61; Martens, 1867: 65; Rochebrune, 1882: 64; Fischer P., 1891: 102; Kongim *et al.*, 2006: 1–8, fig. 2G; Nantarat *et al.*, 2014a: 99–111, fig. 1T; Nantarat *et al.*, 2014b: 21, fig. 18A–B.

Cyclophorus (Salpingophorus) saturnus. – Kobelt, Möllerndorff, 1897: 109; Kobelt, 1902: 132.

Type locality: Cambodia.

Type material: Lectotype NHMUK 20130119/1, paralectotype NHMUK 20130119/2–3 [Nantarat *et al.*, 2014b: fig. 18A–B].

Materials examined. No material was available.

Diagnosis. Shell very large, spire tall. Last whorl rounded without edge. Aperture very wide. Peristome very thick, simple and expanded.

Dimensions: D 49.8–51.2, H 39.5–40.0 mm [Nantarat *et al.*, 2014b].

Distribution. In Vietnam, known from Lang Son Province [Fischer P., 1891] and along the border region with the Cambodia [Nantarat *et al.*, 2014b]. Elsewhere, in Cambodia, Thailand [Pfeiffer, 1862a; Nantarat *et al.*, 2014b].

Remark. This species is distinguished from its congeners by its larger shell, indistinct sculpture with complex brown mottled pattern, white or cream-coloured, distinctly thickened and reflected peristome. The species was previously recorded from Than-Moi area (Lang Son Province) [Fischer, 1891].

Cyclophorus siamensis (Sowerby, 1850)

Figs 9.44, 24D

Cyclostoma siamense Sowerby, 1850: 158, pl. XXXI.a, fig. 292–293; Pfeiffer, 1852b: 56; Pfeiffer, 1854a: 323, pl. 42, fig. 5, 6.

Cyclophorus siamensis. – Pfeiffer, 1858: 41; Reeve, 1861: sp. 19, pl. V, fig. 19a–b; Pfeiffer, 1865: 61; Fischer P., 1891: 102; Morlet, 1891b: 246; Nantarat *et al.*, 2014b: 23, fig. 20A–B.



FIG. 9. Localities of examined samples of Vietnamese *Cyclophorus*: 39. *Cyclophorus paviei*, 40. *Cyclophorus pfeifferi*, 41. *Cyclophorus polystictus*, 42. *Cyclophorus pyrostoma*, 44. *Cyclophorus siamensis*.

РИС. 9. Нахождения вьетнамских *Cyclophorus*: 39. *Cyclophorus paviei*, 40. *Cyclophorus pfeifferi*, 41. *Cyclophorus polystictus*, 42. *Cyclophorus pyrostoma*, 44. *Cyclophorus siamensis*.

Cyclophorus khasiensis Nevill, 1878: 273.

Cyclophorus (Salpingophorus) siamense. – Kobelt, Möllerndorff, 1897: 109; Kobelt, 1902: 132.

Type locality: Siam (Thailand).

Type material: Lectotype NHMUK 20130088/1, paralectotype NHMUK 20130088/2 [Nantarat *et al.*, 2014b: fig. 20A–B].

Material examined. **Lso2009/009** Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; **Nbi2012/001** Vietnam, Ninh Binh Province, Hoa Lu District, Truong Yen Commune, Trang An Landscape, Steep limestone cliff with woody regrowth, 20°18.46'N, 105°53.37'E, 326 m, leg. V.N. Do, 12 July 2012; **Nbi2012/002** Vietnam, Ninh Binh Province, Tam Diep City, Yen Son Commune, Oc mountain area, Steep limestone slope with disturbed forest, 20°11.33'N, 105°53.26'E, 359 m, leg. V.N. Do, 6 July 2012; **Hbi2014/004** Vietnam, Hoa Binh Province, Lac Son District, An Nghia Commune, Lao Thanh Village, Limestone outcrops in primary forest, 20°24.24'N, 105°30.21'E, col. T.Q. Bui, 16 April 2014; **Sla2013/003** Vietnam, Son La Province,

Muong La District, Muong Bu Commune, Gian Village, Limestone hill near the road to Bo Cop Village, 21°25.08'N, 104°01.50'E, 683 m, leg. D.S. Do and T.L. Nguyen, 20 November 2013.

Diagnosis. Shell large with tall spire. Shell brownish, with an irregular zig-zag pattern of white or pale yellowish; umbilical region whitish. Umbilicus wide, to 1/4 covered by the peristome.

Dimensions: D 37.1–55.2, H 29.3–45.0 mm (n = 19).

Distribution. In Vietnam, known from Lang Son, Ninh Binh, Hoa Binh, Son La Provinces. Elsewhere, in Thailand, India [Sowerby, 1850; Kobelt, 1902; Nantararat *et al.*, 2014b].

Remark. The species was previously recorded from Song-ma [Morlet, 1891b]. The species is easily recognisable and can be separated from congeners without difficulty by shell morphology and sculpture.

Cyclophorus songmaensis Morlet, 1891
Figs 10.45, 25A

Cyclophorus songmaensis Morlet, 1891b: 246, 250, pl. V, fig. 5; Morlet, 1891a: 27; Fischer P., 1891: 104; Nantararat *et al.* 2014a: 99–111, fig. 1V.

Cyclophorus (Salpingophorus) songmaensis. – Kobelt, Möllendorff, 1897: 109; Kobelt, 1902: 133.

Cyclophorus dodrans songmaensis. – Kobelt, 1908: 623, Taf. 87, Fig. 4; Thach, 2016: fig. 106*.

Type locality: Song-ma (Tonkin), Vietnam.

Type material: Not seen.

Material examined. **Hbi2012/038** Vietnam, Hoa Binh Province, Da Bac District, Tu Ly Commune, U Bo Village, Limestone hill with mainly regrowth and bamboo thickets, 20°51.11'N, 105°11.57'E, 602 m, leg. T.L. Bui, 08 August 2012; **Hbi2012/029** Vietnam, Hoa Binh Province, Da Bac District, Tu Ly Commune, Huong Ly Village, Limestone hill with mainly regrowth and bamboo thickets, 20°51.06'N, 105°11.54'E, 591 m, leg. T.L. Bui, 27 June 2012; **Hbi2013/011** Vietnam, Hoa Binh Province, Da Bac District, Tu Ly Commune, Tay Mang Village, Limestone hill near main road, with degraded regrowth, 20°52.30'N, 105°10.59'E, 616 m, leg. T.L. Bui, 21 January 2013; **Hbi2016/002** Vietnam, Hoa Binh Province, Kim Boi District, Trung Bi Commune, near the military area, Limestone hill with degraded regrowth, 20°41.22'N, 105°32.11'E, 283 m, leg. V.N. Do and T.N. Pham, 26 March 2016; **Hbi2016/006** Vietnam, Hoa Binh Province, Kim Boi District, Hop Kim Commune, left side of the road, Primary forest on limestone, 20°39.48'N, 105°34.28'E, 290 m, leg. V.N. Do and T.N. Pham, 26 March 2016; **Hbi2017/008** Vietnam, Hoa Binh Province, Mai Chau District, Pa Co Commune, Hang Kia–Pa Co Nature Reserve, near the road No. 6, between Hoa Binh and Son La Provinces, under rocks in primary forest, 20°45.47'N, 104°52.26'E, 829 m, leg. D.S. Do and X.H. Nguyen, 03 September 2017; **Hbi2017/007** Vietnam, Hoa Binh Province, Kim Boi District, Thuong Tien Commune, Thuong Tien Nature Reserve, Primary forest on limestone, 20°38.55'N, 105°26.22'E, 443 m, leg. V.N. Do, 01 May 2017; **Hbi2018/015** Vietnam, Hoa Binh Province, Mai Chau District, Tan Son Commune, Bo Liem Village, under rocks in old secondary forest, 20°43.32'N, 104°58.17'E, 553 m, leg. D.S. Do and V.L. Chu Lau, 07 January 2018; **Nbi2013/004** Vietnam, Ninh Binh Province, Nho Quan District, Cuc

Phuong National Park, Steep limestone slope with disturbed forest, 20°21.10'N, 105°35.02'E, 612 m, leg. V.N. Do, 10 July 2013; **Nbi2016/005** Vietnam, Ninh Binh Province, Cuc Phuong National Park, Limestone outcrops in shale bedrock of primary forest, 20°21.13'N, 105°54.22'E, 297 m, leg. D.S. Do and T.L. Nguyen, 19 August 2016; **Sla2013/024** Vietnam, Son La Province, Son La City, Chieng Xom Commune, near Cao Pha Pass, Limestone outcrops in thick clayey soil, 21°21.42'N, 103°58.03'E, 832 m, leg. D.S. Do, 17 August 2013; **Sla2013/015** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Nam Tien Village, Limestone slope with woody regrowth, 21°23.05'N, 103°46.39'E, 620 m, leg. D.S. Do and T.D. Luong, 20 October 2013; **Sla2013/004** Vietnam, Son La Province, Thuan Chau District, Co Ma Commune, Copia Nature Reserve, Steep limestone slope with dense disturbed vegetation, 21°21.26'N, 103°31.18'E, 1246 m, leg. D.S. Do and T.H. Nguyen, 08 June 2013; **Sla2013/006a** Vietnam, Son La Province, Van Ho District, Xuan Nha Commune, Na An Village, Steep limestone slope with disturbed forest, 20°43.25'N, 104°47.44'E, 346 m, leg. D.S. Do, 26 October 2013; **Sla2017/003** Vietnam, Son La Province, Yen Chau District, Yen Son Commune, Chi Day cave area, Primary forest on limestone, 21°08.30'N, 104°10.29'E, 815 m, leg. D.S. Do and X.H. Nguyen, 02 September 2017; **Dbi2017/005** Vietnam, Dien Bien Province, Tuan Giao District, Chieng Dong Commune, Po Village, Pu Hong Cay mountain area, near Tham Pua Cave, Sparsely vegetated limestone rock, 21°29.44'N, 103°22.27'E, 511 m, leg. V.N. Do and X.H. Nguyen, 09 April 2017; **Tho2014/003** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.09'E, 538 m, leg. V.N. Do, 15 August 2014.

Diagnosis. Shell large, with tall spire. Shell brownish, with an irregular zig-zag pattern, with a wide band of darker brown below the periphery; umbilical region whitish with three or four narrow bands of dark brown.

Dimensions: D 48.5–56.2, H 35.7–47.0 mm (shells from different localities).

Distribution. In Vietnam, known from Ninh Binh, Hoa Binh, Son La, Dien Bien, Thanh Hoa Provinces. Elsewhere, in Thailand [Nantararat *et al.* 2014a].

Remark. This species is distinguished from its congeners by its periphery with a distinct keel that continues up to the peristome.

Cyclophorus speciosus (Philippi, 1847)
Figs 10.46, 25B

Cyclostoma speciosum Philippi, 1847: 123.

Cyclophorus speciosus. – Pfeiffer, 1852b: 56; Pfeiffer, 1858: 41; Reeve, 1861: sp. 4, pl. I, fig. 4a–b); Pfeiffer, 1865: 61; Nevill, 1878: 267; Fischer P., 1891: 102; Fischer, Dautzenberg, 1904: 427; Dautzenberg, Fischer, 1905b: 433; Gude, 1921: 84; Kongim *et al.*, 2006: 1–8, fig. 2H; Nantararat *et al.* 2014a: 99–111, fig. 1W.

Cyclophorus theobaldianus Benson, 1857: 206; Hanley, Theobald, 1876: 1, pl. I, fig. 2.

Cyclophorus speciosus var. *aureolabris* Nevill, 1878: 267 (loc. Burma).

Cyclophorus edulis Mabille, 1889: 14.

Cyclophorus (Salpingophorus) speciosus. – Kobelt, Möllendorff, 1897: 109; Kobelt, 1902: 133.

Cyclophorus (*Salpingophorus*) *speciosus* var. *aureolabris*. – Kobelt, Möllendorff, 1897: 109.

Cyclophorus (*Annularia*) *speciosus*. – Solem, 1966: 10.

Type locality: Thailand.

Type material: Not seen.

Material examined. **Tqu2017/041** Vietnam, Tuyen Quang Province, Na Hang District, Thanh Tuong Commune, Na Don Village, Limestone mountain with disturbed forest, 22°17.58'N, 105°22.30'E, 466 m, leg. V.N. Do, 11 July 2017; **Nbi2012/008** Vietnam, Ninh Binh Province, Tam Diep City, Yen Son Commune, Oc mountain area, Steep limestone slope with disturbed forest, 20°11.33'N, 105°53.26'E, 359 m, leg. V.N. Do, 6 July 2012; **Hbi2012/003** Vietnam, Hoa Binh Province, Da Bac District, Tu Ly Commune, U Bo Village, Limestone hill with mainly regrowth and bamboo thickets, 20°51.11'N, 105°11.57'E, 602 m, leg. T.L. Bui, 08 August 2012; **Hbi2014/004** Vietnam, Hoa Binh Province, Lac Son District, An Nghia Commune, Lao Thanh Village, Limestone outcrops in primary forest, 20°24.24'N, 105°30.21'E, col. T.Q. Bui, 16 April 2014; **Hbi2015/017** Vietnam, Hoa Binh Province, Cao Phong District, Tay Phong Commune, Limestone hill with degraded regrowth, 20°42.30'N, 105°18.16'E, 517 m, col. T.N. Phung, 10 July 2015; **Sla2012/013** Vietnam, Son La Province, Muong La District, Muong Bu Commune, entrance of the Tham Bo Cave, Limestone slope with woody regrowth, 21°24.05'N, 104°06.13'E, 715 m, leg. D.S. Do and N.C. Bui, 27 October 2012; **Sla2013/019** Vietnam, Son La Province, Thuan Chau District, Bon Phang Commune, Nam Tien Village, Limestone slope with woody regrowth, 21°23.05'N, 103°46.39'E, 620 m, leg. D.S. Do and T.D. Luong, 20 October 2013; **Sla2013/004a** Vietnam, Son La Province, Thuan Chau District, Co Ma Commune, Copia Nature Reserve, Steep limestone slope with dense disturbed vegetation, 21°21.26'N, 103°31.18'E, 1246 m, leg. D.S. Do and T.H. Nguyen, 08 June 2013; **Sla2014/025** Vietnam, Son La Province, Phu Yen District, Muong Do Commune, Lan Village, Primary forest on limestone slope with rock outcrops, 21°11.46'N, 104°47.06'E, 674 m, leg. D.S. Do, 13 July 2014; **Sla2014/026** Vietnam, Son La Province, Quynh Nhai District, Chieng Khoang Commune, Khoang Village, Limestone outcrops with little soil and vegetation, 21°34.27'N, 103°41.51'E, 398 m, leg. D.S. Do, 05 September 2014; **Sla2017/008** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, left side of the road to Tang Me Cave, Steep limestone slope with disturbed forest, 20°58.55'N, 104°48.37'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Tho2013/014** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach My Commune, Noi Thanh Village, Primary forest on limestone, 20°17.33'N, 105°33.59'E, 376 m, col. T.Q. Bui, 20 September 2013.

Diagnosis. Shell from large to very large, conical, with tall spire. Shell dark brownish, with an irregular zig-zag pattern.

Dimensions: D 42.0–49.5, H 34.5–41.2 mm (shells from different localities).

Distribution. In Vietnam, known from Ha Giang, Tuyen Quang, Ninh Binh, Hoa Binh, Son La, Thanh Hoa Provinces [Dautzenberg, Fischer, 1905b]. Elsewhere, in Thailand, Laos, Cambodia, Myanmar [Fischer P., 1891; Reeve, 1961; Solem, 1966].

Remark. *Cyclophorus speciosus* is a very variable species in terms of shell characters. This species is distinguished from its congeners by its larger



FIG. 10. Localities of examined samples of Vietnamese *Cyclophorus*: 45. *Cyclophorus songmaensis*, 46. *Cyclophorus speciosus*, 47. *Cyclophorus subfloridus*, 48. *Cyclophorus tamdaoensis* sp. nov.

РИС. 10. Нахождения вьетнамских *Cyclophorus*: 45. *Cyclophorus songmaensis*, 46. *Cyclophorus speciosus*, 47. *Cyclophorus subfloridus*, 48. *Cyclophorus tamdaoensis* sp. nov.

shell, indistinct sculpture, somewhat keeled periphery and fine, complex brown mottled pattern.

Cyclophorus subfloridus Ancey, 1888

Figs 10.47, 25C

Cyclophorus fulguratus var. *subfloridus* Ancey, 1888a: 93, fig. 7.

Cyclophorus (*Glossostylus*) *subfloridus*. – Kobelt, 1902: 112; Kobelt, 1908: 638, Taf. 90, Fig. 4–9.

Cyclophorus subfloridus. – Aguilar-Amat, 1932: 8; Kongim et al., 2006: 1–8, fig. 2I; Natarat et al. 2014a: 99–111, fig. 1X).

Type locality: Than moi, Tonkin Vietnam.

Type material: Not seen.

Material examined. **Lso2009/097** Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; **Lso2017/045** Vietnam, Lang Son Province, Huu Lung District, Huu Lien Commune, Huu Lien Nature Reserve, Primary forest on limestone, 21°40.46'N, 106°22.35'E, 549 m, leg. V.N. Do, 25 April 2017; **Tng2017/016** Vietnam, Thai Nguyen Province, Vo Nhai District, Than Sa–Phuong Hoang Nature

Reserve, densely vegetated limestone hill, 21°50.51'N, 105°53.19'E, 260 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; **Hbi2016/005** Vietnam, Hoa Binh Province, Lac Thuy District, Phu Thanh Commune, Limestone outcrops in shale bedrock, 20°36.42'N, 105°41.51'E, 314 m, leg. T.N. Pham, 22 June 2016; **Hbi2018/005** Vietnam, Hoa Binh Province, Mai Chau District, Tan Son Commune, Bo Liem Village, under rocks in old secondary forest, 20°43.32'N, 104°58.17'E, 553 m, leg. D.S. Do and V.L. Chu Lau, 07 January 2018; **Hbi2018/017** Vietnam, Hoa Binh Province, Luong Son District, Long Son Commune, Yen Lich Village, Exposed limestone with little soil and vegetation of herbs, 20°40.19'N, 105°38.03'E, 455 m, leg. D.S. Do, 21 February 2018; **Hbi2018/002** Vietnam, Hoa Binh Province, Luong Son District, Long Son Commune, Yen Lich Village, left side of the road, near Tu Den Temple, Steep limestone slope with disturbed forest, 20°40.22'N, 105°37.42'E, 428 m, leg. D.S. Do, 21 February 2018; **Sla2017/032** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, Pua Lai Village, Primary forest on limestone, 20°58.53'N, 104°48.30'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Sla2017/008** Vietnam, Son La Province, Van Ho District, Suoi Bang Commune, left side of the road to Tang Me Cave, Steep limestone slope with disturbed forest, 20°58.55'N, 104°48.37'E, 745 m, leg. D.S. Do and T.B. Nguyen, 12 May 2017; **Tho2015/031** Vietnam, Thanh Hoa Province, Thanh Hoa City, Dong Cuong Commune, Ham Rong mountain area, Small isolated limestone hill, 19°50.03'N, 105°45.58'E, 79 m, leg. V.N. Do and T.N.A. Nguyen, 24 June 2009; **Tho2013/002** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.09'E, 538 m, leg. V.H. Luong, 123 July 2013; **Tho2015/002** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Limestone slope with woody regrowth, 20°20.29'N, 105°29.43'E, 266 m, leg. T.Q. Bui, 13 July 2015.

Diagnosis. Shell medium to large, with tall spire. Shell white to brownish, with an irregular zig-zag brownish pattern, with one wide darker brown band below the periphery; umbilical region white, usually with fewer brown markings than elsewhere.

Dimensions: D 26.3–34.7, H 23.2–31.5 mm (shells from different localities).

Distribution. In Vietnam, known from Lang Son, Thai Nguyen, Hoa Binh, Son La, Thanh Hoa Provinces. Elsewhere, in Thailand [Kongim *et al.*, 2006; Natarat *et al.* 2014a].

Cyclophorus tamdaoensis Do et Do sp. nov.

Figs 10.48, 26A–B

urn:lsid:zoobank.org:act:725B7B43-F79E-4BFF-9E51-D0DEB198C9DF

Type material. Holotype VNMN_IZ 000.000.156, Vietnam, Vinh Phuc Province, Tam Dao District, Tam Dao National Park, Rung Rin mountain area, 21°26.42'N, 105°38.22'E, 503 m, leg. V.N. Do, 12 June 2003. Paratypes: same locality and data (HNUE–OC 216, SORC 2003/1, CBER–TBU 2003/1, DDS/2, DVN/2).

Diagnosis. A medium in size to large species with low conical spire, well-rounded whorls and without edge at the periphery.

Description. Shell medium to large in size, conical, with low spire. Shell whitish to pale yellow, but with an irregular zig-zag pattern of brown or dark brown speckles, often with a darker brown band below the periphery; umbilical region whitish, often with numerous rows of brownish spots. Whorls 5–5½, well-rounded, periphery without edge; protoconch (2–3 whorls) glossy; teleoconch very finely, rather irregularly ribbed, spiral lines visible mainly at the periphery. Suture distinctly channelled from the start of the teleoconch onwards. Spiral sculpture present, fine, wavy and weaker on the ventral side. Umbilicus 4.2–4.9 mm wide, deep, to 1/3 covered by the peristome. Peristome creamy, distinctly thickened and reflected, double or simple. Callus well-developed. The operculum is unknown.

Measurements (in mm). Holotype: D 28.8, H 23.0 mm. Paratypes (type locality, n = 7): D 28.0–30.9, H 22.4–26.6 mm.

Distribution. This new species is thus far known only from limestone outcrops in clayey soil in Rung Rin mountain area, Tam Dao National Park, Vinh Phuc Province, Vietnam.

Etymology. The specific epithet is derived from the type locality of this new species, the Tam Dao National Park, Vinh Phuc Province, Vietnam.

Remark. This new species is most similar to *Cyclophorus affinis* Theobald, 1858 in shell shape but differs in having a low conical spire, double peristome, often consisting of thick, overlapping layers towards the outer margin, or simple. To date no living specimens have been found.

Cyclophorus tetrachrous Mabilie, 1887

Cyclophorus tetrachrous Mabilie, 1887a: 13; 1887b: 146.

Cyclophorus (*Litostylus*) *tetrachrous*. – Kobelt, Möllendorff, 1897: 106; Kobelt, 1902: 104.

Type locality: Tonkin Vietnam.

Type material: Not seen.

Materials examined. No material was available.

Diagnosis. Shell medium in size. Spire low. Shell pale brown, usually with an irregular zig-zag pattern of dark brown at the periphery; umbilical region whitish to pale yellowish.

Dimensions: D 27.0–34.0, H 17.0 mm (according to the original description).

Distribution. In Vietnam, known from Northern region [Mabilie, 1887a, 1887b].

Remark. The original description by Mabilie [1887a] did not give an illustration of the species or a specific locality.

Cyclophorus theodori Ancey, 1888

Figs 11.50, 26C

Cyclophorus theodori Ancey, 1888a: 92, fig. 4; Fischer P., 1891: 104.

Cyclophorus (*Eucyclophorus*) *theodori*. – Kobelt, Möllendorff, 1897: 111.

Cyclophorus (*Cylophorus*) *theodori*. – Kobelt, 1902: 143.
Cyclophorus (*Salpingophorus*) *theodori*. – Kobelt, 1908: 681,
 Taf. 100, Fig. 3, Taf. 102, Fig. 9–10.

Type locality: Lang-son and Bac-Ninh, Vietnam.

Type material: Holotype RBINS/MT/525934.

Material examined. Tng2017/020 Vietnam, Thai Nguyen Province, Vo Nhai District, Than Sa–Phuong Hoang Nature Reserve, Densely vegetated limestone hill, 21°50.51'N, 105°53.19'E, 260 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; Lso2009/007 Vietnam, Lang Son Province, Huu Lung District, Quyet Thang Commune, Ray Village, Steep limestone cliff with woody regrowth, 21°38.23'N, 106°13.17'E, 608 m, leg. V.N. Do, 27 April 2009; Tqu2018/014 Vietnam, Tuyen Quang Province, Son Duong District, Hop Thanh Commune, Small limestone outcrops in clayey soil, 21°40.53'N, 105°28.9'E, 466 m, leg. D.S. Do, 26 April 2018; Hbi2015/003 Vietnam, Hoa Binh Province, Lac Thuy District, Phu Thanh Commune, Limestone outcrops in shale bedrock, 20°36.37'N, 105°41.34'E, 202 m, leg. V.N. Do, 03 September 2015.

Diagnosis. Shell large in size. Shell cream-coloured to brown, usually with an irregular zig-zag pattern of dark brown, often with one wide bands of darker brown below the periphery; umbilical region whitish to pale yellowish. Spire tall conical.

Dimensions: D 37.5–39.3, H 27.2–30.1 mm (shells from different localities, n = 44).

Distribution. In Vietnam, known from Thai Nguyen, Lang Son, Tuyen Quang, Hoa Binh Provinces.

Remark. Colour pattern highly variable. The species was previously recorded from Bac Ninh Province [Ancey, 1888a: 92].

Cyclophorus tornatus Morlet, 1892

Figs 11.51, 26D

Cyclophorus tornatus Morlet, 1892: 322, pl. VIII, fig. 3, 3a–b.
Cyclophorus (*Eucyclophorus*) *tornatus*. – Kobelt, Möllendorff, 1897: 111.

Cyclophorus (*Cylophorus*) *tornatus*. – Kobelt, 1902: 143.
Cyclophorus (s. str.) *tornatus*. – Kobelt, 1908: 679, Taf. 99, Fig. 9–10.

Type locality: Lai-Chan, Tonkin Vietnam.

Type material: Not seen.

Material examined. Hgi2018/001 Vietnam, Ha Giang Province, Ha Giang City, Ngoc Duong Commune, Primary forest on limestone hill, 22°50.33'N, 105°02.06'E, 763 m, leg. D.S. Do and V.B. Vu, 10 March 2018.

Diagnosis. Shell brownish, with an irregular zig-zag pattern of white. Spire tall. Peristome white, only slightly thickened and reflected.

Dimensions: D 21.7, H 18.6 mm (n = 1).

Distribution. In Vietnam, known from Ha Giang, Lai Chau Provinces [Morlet, 1892].

Remark. This species is known only from Vietnam where it occurs in Lai Chau and Ha Giang Provinces. The species is easily recognisable and can be separated from congeners by its smaller shell and distinct sculpture.

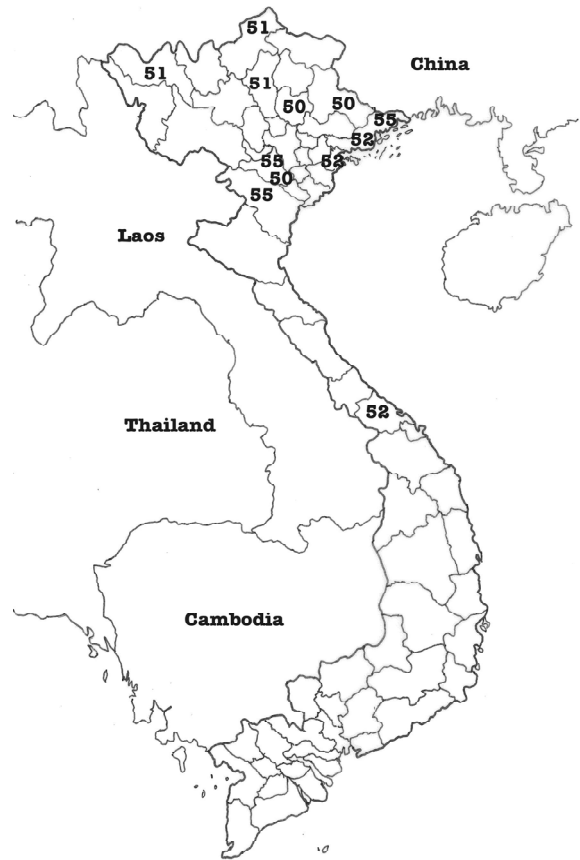


FIG. 11. Localities of examined samples of Vietnamese *Cyclophorus*: 50. *Cyclophorus theodori*, 51. *Cyclophorus tornatus*, 52. *Cyclophorus trouiensis trouiensis*, 55. *Cyclophorus unicus*.

РИС. 11. Нахождения вьетнамских *Cyclophorus*: 50. *Cyclophorus theodori*, 51. *Cyclophorus tornatus*, 52. *Cyclophorus trouiensis trouiensis*, 55. *Cyclophorus unicus*.

Cyclophorus trouiensis trouiensis

Wattebled, 1886

Figs 11.52, 27A

Cyclophorus trouiensis Wattebled, 1886: 55, pl. IV, fig. 1;
 Fischer P., 1891: 103; Vermeulen, Maassen, 2003: 20.

Cyclophorus (*Glossostylus*) *trouiensis*. – Möllendorff, 1898: 81; Kobelt, Möllendorff, 1899: 133; Kobelt, 1902: 119; Kobelt, 1908: 666, Taf. 97, Fig. 10–11.

Type locality: Annam Vietnam.

Type material: Not seen.

Material examined. Hph2016/015 Vietnam, Hai Phong City, Cat Ba National Park, Trung Trang Cave, Steep limestone cliff with woody regrowth, 20°47.47'N, 106°59.41'E, 38 m, leg. D.S. Do, 14 October 2016; Hph2017/002 Vietnam, Hai Phong City, Cat Ba National Park, right side of the road to Kim Giao Hill, Primary forest on limestone, 20°47.48'N, 106°59.40'E, 56 m, leg. D.S. Do, 18 July 2017.

Diagnosis. Shell large, conical, brownish, with an irregular zig-zag pattern of dark brown, with one wide darker brown band below the periphery, umbilical region white to pale yellowish.

Dimensions: D 38.2–48.3, H 26.5–34.8 mm (n = 17).

Distribution. In Vietnam, known from Quang Ninh, Hai Phong and Hue Provinces [Wattebled, 1886; Vermeulen, Maassen, 2003].

Remark. This species is distinguished from its congeners by its distinct sculpture and periphery with a distinct keel.

Cyclophorus trouiensis bendei Varga, 1972

Cyclophorus (Glossostylus) trouiensis bendei Varga, 1972: 133, Abb.1–5.

Type locality: Vietnam.

Type material: Not seen.

Material examined. no material was available.

Diagnosis. Shell very large, spire low. Periphery with a distinct keel. Peristome very thick, simple.

Dimensions: D 57.0–59.0, H 36.0–37.0 mm (according to the original description).

Distribution. It is known from Northern Vietnam [Varga, 1972].

Remark. The original description by Varga [1972] did not give a collection locality. This subspecies is distinguished from its congeners by its one wide darker brown band below the periphery and a distinct keel of last whorl.

Cyclophorus trouiensis omphalotropis Möllendorff, 1900

Cyclophorus trouiensis omphalotropis Möllendorff, 1900: 135.

Cyclophorus (Glossostylus) trouiensis var. *omphalotropis* Kobelt, 1902: 120.

Type locality: Phuc-son, Annam Vietnam.

Type material: Not seen.

Material examined. no material was available.

Diagnosis. Shell from large to very large, spire low. Periphery with a distinct keel.

Dimensions: D 41.0–47.0, H 32.0–35.0 mm (according to the original description).

Distribution. In Vietnam, known from Da Nang [Möllendorff, 1900].

Remark. The original description by Möllendorff [1900] did not give an illustration of the subspecies. This subspecies is distinguished from *Cyclophorus trouiensis bendei* by its smaller shell and a distinct keel [Möllendorff, 1900].

Cyclophorus unicus Mabilie, 1887 Figs 11.55, 27B

Cyclophorus unicus Mabilie, 1887a: 14; Mabilie, 1887b: 143; Fischer P., 1891: 104; Fischer, Dautzenberg, 1904: 429; Dautzenberg, Fischer, 1905a: 167, pl. IV, fig. 6–8.

Cyclophorus (Litostylus) unicus. – Kobelt, Möllendorff, 1897: 106; Kobelt, 1902: 104; Kobelt, 1908: 637, Taf. 90, Fig. 1–3.

Type locality: Tonkin Vietnam.

Type material: Syntype MNHN–IM–2000–33789.

Material examined. **Qni2011/002a** Vietnam, Quang Ninh Province, Cam Pha City, Quang Hanh Ward, Steep limestone slope with disturbed forest, 20°59.14'N, 107°12.42'E, 174 m, leg. V.N. Do, 25 April 2011; **Hbi2016/004** Vietnam, Hoa Binh Province, Lac Thuy District, Lac Long Commune, Woodland on dry soil and limestone rock, 20°30.34'N, 105°47.08'E, 367 m, leg. T.N. Pham and V.N. Do, 01 May 2016; **Tho2015/003** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Limestone slope with woody regrowth, 20°20.29'N, 105°29.43'E, 266 m, leg. T.Q. Bui, 13 July 2015.

Diagnosis. Shell medium to large, conical, with low spire. Shell dark brownish, usually with an irregular zig-zag pattern of pale yellowish.

Dimensions: D 32.3–38.0, H 23.4–26.5 mm (n = 9).

Distribution. In Vietnam, known from Quang Ninh, Hoa Binh, Thanh Hoa Provinces.

Remark. The original description by Mabilie, 1887 [1887a, b] did not give an illustration of the species and a collection locality. Dautzenberg and Fischer [1905a] redescribed and figured the species. The species was previously recorded from Fai Tsi Long Archipelago (Long Chau Archipelago, Hai Phong City) [Dautzenberg and Fischer, 1905a].

Cyclophorus volvulus (O.F. Müller, 1774) Figs 12.56, 27C

Helix volvulus O.F. Müller, 1774: 82.

Cyclostoma trochiforme Eyndoux, Souleyet, 1852: 533, pl. 30, fig. 18–21.

Cyclophorus volvulus. – Pfeiffer, 1852b: 58; Pfeiffer, 1858: 42; Reeve, 1861: sp. 24, pl. VI, fig. 24a–b; Crosse, Fischer, 1863: 366; Pfeiffer, 1865: 62; Martens, 1867: 64; Morelet, 1875: 280; Fischer P., 1891: 101; Vermeulen, Maassen, 2003: 20; Kongim *et al.*, 2006: 1–8, fig. 2J; Vermeulen *et al.* 2008: 150; Natarat *et al.* 2014a: 99–111, fig. 1Z.

Cyclophorus (Eucyclophorus) volvulus. – Kobelt, Möllendorff, 1897: 111.

Cyclophorus (Cyclophorus) volvulus. – Kobelt, 1902: 143; Egorov, Greke, 2007: 58–64, fig. 1A.

Type locality: Insel Pulo–Condor, Cochinchina Vietnam (?) [Kobelt, 1902].

Type material: Not seen.

Material examined. **Lso2005/031** Vietnam, Lang Son Province, Chi Lang District, Sao Mai Commune, Gio cave area, Steep limestone cliff with primary forest, 21°42.31'N, 106°36.58'E, 374 m, leg. V.N. Do, 20 July 2005; **Tng2017/030** Vietnam, Thai Nguyen Province, Vo Nhai District, Than Sa–Phuong Hoang Nature Reserve, Densely vegetated limestone hill, 21°50.51'N, 105°53.19'E, 260 m, leg. D.S. Do and T.B. Nguyen, 14 May 2017; **Qni2008/006** Vietnam, Quang Ninh Province, Quang Yen Town, Hoang Tan Commune, Limestone cliff with woody regrowth and grassland, 20°54.08'N, 106°55.13'E, 306 m, leg. V.N. Do, 05 August 2008; **Qni2011/003** Vietnam, Quang Ninh Province, Ha Long Bay area, Dau Go Island, Thien Cung Cave, drift material washed together over sinkhole in cave, 20°54.32'N, 107°01.16'E, 30 m, leg. V.N. Do, 26 April 2011; **Hph2007/001** Vietnam, Hai Phong City, An Lao District, An Tien Commune, Voi mountain area,

Sparsely vegetated limestone rocks, 20°50.20'N, 106°33.42'E, leg. V.N. Do, 16 August 2007; **Hph2008/004** Vietnam, Hai Phong City, An Lao District, Truong Thanh Commune, Voi mountain area, Small isolated limestone hill, 20°50.47'N, 106°34.08'E, leg. V.N. Do, 22 August 2008; **Hph2016/020** Vietnam, Hai Phong City, Cat Ba National Park, Trung Trang Cave, Steep limestone cliff with woody regrowth, 20°47.47'N, 106°59.41'E, 38 m, leg. D.S. Do, 14 October 2016; **Hph2017/002** Vietnam, Hai Phong City, Cat Ba National Parks, right side of the road to Kim Giao Hill, Primary forest on limestone, 20°47.48'N, 106°59.40'E, 56 m, leg. D.S. Do, 16 October 2017; **Hno2012/003** Vietnam, Hanoi City, My Duc District, Huong Son Commune, Yen Vi Village, Small hill just behind of Trinh Temple, exposed limestone with little soil and vegetation, 20°34.21'N, 105°46.37'E, 313 m, leg. V.N. Do, 15 July 2012; **Hbi2016/009** Vietnam, Hoa Binh Province, Lac Thuy District, Lac Long Commune, Woodland on dry soil and limestone rock, 20°30.34'N, 105°47.08'E, 367 m, leg. T.N. Pham and V.N. Do, 01 May 2016; **HNUE-OC088/002** Vietnam, Son La Province, Van Ho District, Lien Hoa Commune, Non Village, Primary forest on limestone, 20°58.54'N, 104°52.49'E, 427 m, leg. D.S. Do, 27 June 2015; **Sla2015/003** Vietnam, Son La Province, Chieng An Commune, Son La Pass, Limestone outcrops in thick clayey soil, 21°19.40'N, 103°53.12'E, 765 m, leg. D.S. Do, 22 April 2015; **Tho2014/007** Vietnam, Thanh Hoa Province, Thach Thanh District, Thach Lam Commune, Noi Thanh Village, Primary forest on limestone, 20°20.51'N, 105°29.09'E, 538 m, leg. V.N. Do, 15 August 2014; **Agi2014/002** Vietnam, An Giang Province, Tri Ton District, Ba Truc Town, Nuoc mountain area, Isolated limestone hill with depleted primary forest, 10°30.26'N, 104°08.03'E, 41 m, leg. V.N. Do, 12 February 2014; **Kgi2013/004** Vietnam, Kien Giang Province, Kien Luong District, Kien Luong Town, Binh An Commune, Ca Sau cave area, Limestone rocks, 10°11.21'N, 104°39.05'E, 19 m, leg. V.B. Nguyen, 17 June 2013; **Kgi2013/001** Vietnam, Kien Giang Province, Hon Dat District, Tho Son Commune, Hon Me mountain area, Limestone outcrops in thick clayey soil, 10°08.36'N, 104°52.47'E, 42 m, leg. V.B. Nguyen, 18 June 2013; **Kgi2013/003** Vietnam, Kien Giang Province, Hon Dat District, Tho Son Commune, Hon Soc mountain area, Limestone outcrops in thick clayey soil, 10°08.31'N, 104°52.39'E, 46 m, leg. V.B. Nguyen, 18 June 2013; **Kgi2014/002** Vietnam, Kien Giang Province, Hon Dat District, Tho Son Commune, Hon Soc mountain area, Limestone outcrops in thick clayey soil, 10°08.32'N, 104°52.43'E, 45 m, leg. V.N. Do, 05 July 2014.

Diagnosis. Shell medium in size, with tall spire. Shell brownish to dark brown, with an irregular zig-zag pattern of white or pale yellowish, with one wide darker brown band below the periphery. Umbilicus narrow, to 4/5 covered by the peristome.

Dimensions: D 28.2–35.0, H 20.9–32.3 mm (shells from different localities).

Distribution. In Vietnam, known from Lang Son, Thai Nguyen, Quang Ninh, Hai Phong, Hanoi, Hoa Binh, Son La, Thanh Hoa, An Giang, Ba Ria–Vung Tau (Con Dao Island), Kien Giang Provinces [Fischer P., 1891; Vermeulen, Maassen, 2003]. Elsewhere, in Malaysia, Thailand, Cambodia, China (Hong Kong), India [Eydoux, Souleyet, 1852; Reeve, 1861; Fischer P., 1891; Egorov, Greke, 2007; Natarat *et al.* 2014c].

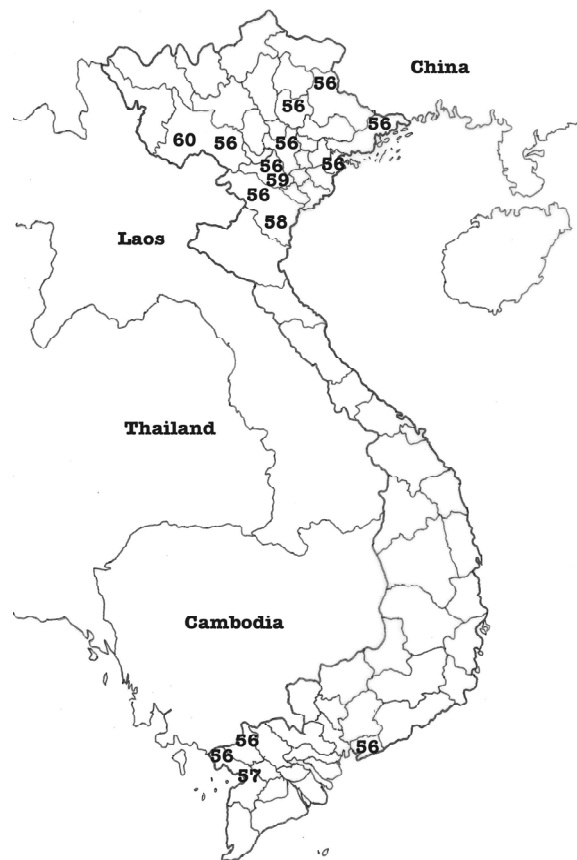


FIG. 12. Localities of examined samples of Vietnamese *Cyclophorus*: 56. *Cyclophorus volvulus*, 57. *Cyclophorus zebrinus*, 58. *Cyclophorus* sp.1, 59. *Cyclophorus* sp.2, 60. *Cyclophorus* sp.3.

РИС. 12. Нахождения вьетнамских *Cyclophorus*: 56. *Cyclophorus volvulus*, 57. *Cyclophorus zebrinus*, 58. *Cyclophorus* sp.1, 59. *Cyclophorus* sp.2, 60. *Cyclophorus* sp.3.

Remark. *Cyclophorus volvulus* is a very variable species in terms of shell characters.

Cyclophorus zebrinus (Benson, 1836)

Figs 12.57, 27D

Cyclostoma zebrinum Benson, 1836: 355.

Cyclophorus zebrinus. – Pfeiffer, 1852b: 71; Pfeiffer, 1854a: 256, Taf. 34, Fig. 21–23; Reeve, 1861: sp. 46, pl. XI, fig. 46a–b; Pfeiffer, 1865: 66; Godwin–Austen, 1876: 173; Hanley, Theobald, 1876: 1, pl. 2; Nevill, 1878: 268; Martens, 1886: 160; Morlet, 1891b: 246; Gude, 1921: 86; Dey, Mitra, 2000: 11; Vermeulen *et al.* 2008: 151; Natarat *et al.* 2014a: 99–111, fig. 1R.

Cyclophorus zebrinus aureolabris Nevill, 1878: 268 (loc. near Sibsagar).

Cyclophorus zebrinus var. *minor* Tapparone–Canefri, 1889: 309.

Cyclophorus (*Glossostylus*) *zebrinum*. – Kobelt, Möllendorff, 1897: 108; Kobelt, 1902: 123.

Type locality: Assam (Manipur, Khasi–und Dafla–Berger), India.

Type material: Not seen.

Material examined. Kgi2015/001 Vietnam, Kien Giang Province, Kien Luong District, Binh An Commune, Mo So mountain area, Sparsely vegetated limestone rocks, 10°11.28'N, 104°39.12'E, 24 m, leg. V.B. Nguyen, 16 June 2013.

Diagnosis. Shell small, conical with tall spire. Shell yellowish to brownish, with an irregular zigzag pattern of dark brown, with one wide darker brown band below the periphery; umbilical region yellowish. Umbilicus open, deep, to 3/4 covered by the peristome.

Dimensions: D 24.3, H 23.0 mm (n = 1).

Distribution. In Vietnam, known from Kien Giang Province. Elsewhere, in India, Thailand, China and Myanmar [Benson, 1836; Dey, Mitra, 2000; Natarat *et al.* 2014a].

Remark. This species is distinguished from its congeners by its smaller shell, thin callus, and somewhat keeled periphery. The species was recorded from Long-son and Song-ma regions by Morlet [1891b], but during the field trips, we found no specimens.

Cyclophorus sp.1

Figs 12.58, 28A

Material examined. Tho2013/001 Vietnam, Thanh Hoa Province, Thach Thanh District, Thach My Commune, Noi Thanh Village, Primary forest on limestone, 20°17.33'N, 105°33.59'E, 376 m, col. T.Q. Bui, 20 September 2013.

Diagnosis. Shell medium in size, conical, with tall spire. Shell dark brownish, with a pale yellowish band above the periphery; umbilical region pale yellowish, with numerous narrow brown bands. Umbilicus open, deep and to 3/4 covered by the peristome. Peristome discontinuous, white, slightly thickened and reflected.

Dimensions: D 29.9, H 26.0 mm (n = 1).

Remark. This species is similar to *Cyclophorus fulguratus*, but has a smaller shell, the last whorl distinctly, obtusely shouldered close to the suture, obtuse spiral ridge, periphery with a slight to distinct, obtuse edge.

Cyclophorus sp.2

Figs 12.59, 28B

Material examined. Hbi2018/001 Vietnam, Hoa Binh Province, Luong Son District, Long Son Commune, Yen Lich Village, Exposed limestone with little soil and vegetation of herbs, 20°40.19'N, 105°38.03'E, 455 m, leg. D.S. Do, 21 February 2018.

Diagnosis. Shell very large, conical with low spire. Shell brownish, with a dark brownish band below the periphery; umbilical region white, with numerous narrow brown bands. Umbilicus open and to 1/2 covered by the peristome. Periphery with a distinct keel that continues up to the peristome. Peristome very thick, simple and very expanded.

Dimensions: D 47.0, H 35.0 mm (n = 1)

Remark. This species is similar to *Cyclophorus malayanus* (Benson, 1852), but has a lower conical

spire, periphery with a distinct keel that continues up to the peristome, peristome thickened and expanded.

Cyclophorus sp.3

Figs 12.60, 28C

Materials examined. Sla2013/001c Vietnam, Son La Province, Son La City, Chieng Ngan Commune, Khoang Village, Limestone area near village, 21°19.28'N, 103°58.55'E, 566 m, leg. D.S. Do and T.T. Nguyen, 26 October 2013.

Diagnosis. Shell medium in size, conical, with low spire. Umbilicus open and to 1/3 covered by the peristome. Periphery with a distinct keel that continues up to the peristome.

Dimensions: D 29.2, H 22.6 mm (n = 1, corroded shell).

Remarks. This species is similar to *Cyclophorus affinis* Theobald, 1858, but has a lower conical spire, periphery with a distinct edge that continues up to the peristome, peristome thickened and expanded.

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We would like to thank Barna Páll-Gergely, Parm Viktor von Oheimb and Miklós Szekeres for providing useful references. We thank the Editor-in-Chief, Yuri I. Kantor and the reviewers, who have contributed significantly with their constructive comments to the improvement of the present paper. In addition, we thank many of our colleagues and students who collected the specimens and deposited at Center for Biodiversity and Environment Research, Tay Bac University (CBER-TBU) and Soil Organism Research Center of Hanoi National University of Education, Vietnam (SORC-HNUE).

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Table 2. Vietnamese localities mentioned in the paper.

Romanized form	Province or region	species
Annam (region)	Central Vietnam	<i>consociatus</i> , <i>dodrans fasciatus</i> , <i>orthostylus</i> , <i>eudeli</i>
Ba Be (national parks)	Bac Kan	<i>paviei</i>
Bah-mun, Bay-min (island)	Quang Ninh	<i>amoenus</i> , <i>ignilabris</i>
Bac-Ninh (province)	Bac Ninh	<i>courbeti</i> , <i>fulguratus</i> , <i>jourdyi</i> , <i>theodori</i>
Bien-Ba (mountain)	Tay Ninh	<i>monachus</i>
Binh-Lu (commune)	Lai Chau	<i>implicatus</i>
Boloven	Central Vietnam	<i>orthostylus</i>
Cochinchina (region)	Southern Vietnam	<i>floridus</i>
Cuc Phuong (national parks)	Ninh Binh	<i>cambodgensis</i> , <i>malayanus</i> , <i>songmaensis</i> , <i>volvulus</i>
Éléphant (mountain)	Hai Phong	<i>jourdyi</i>
Fai-Tsi-Long (archipelago)	Hai Phong	<i>unicus</i>
Ha-Giang (province)	Ha Giang	<i>courbeti</i> , <i>speciosus</i> , <i>courbet leucostoma</i>
Halong (bay)	Quang Ninh	<i>cambodgensis</i> , <i>jourdyi</i> , <i>trouiensis</i> , <i>volvulus</i>
Ha Tien (town)	Kien Giang	<i>volvulus</i>
Kham Duc (town)	Quang Nam	<i>hubei</i>
Khe Sanh (town)	Quang Tri	<i>jourdyi</i>
Lai-Chan (province)	Lai Chau	<i>tornatus</i>
Lang-son (province)	Lang Son	<i>courbeti</i> , <i>fulguratus</i> , <i>fulguratus langsonensis</i> , <i>jourdyi</i> , <i>polystictus</i> , <i>theodori</i>
Manson, Mau-son (mountain)	Lang Son	<i>fruhstorferi</i>
Montagne Éléphant (mountain)	Hai Phong	<i>jourdyi</i>
Muong Bo (village ?)	Lai Chau	<i>implicatus</i>
Nha-Trang (prefecture-level city)	Khanh Hoa	<i>cambodgensis</i> , <i>fulguratus</i>
Noire (river)	Northern Vietnam	<i>massiei</i>
Pha-rang (prefecture-level city)	Ninh Thuan	<i>amoenus</i>
Phu Ly (prefecture-level city)	Ha Nam	<i>cambodgensis</i>
Phuc-son (mountain)	Da Nang	<i>trouiensis omphalotropis</i>
Poulo-Condor (archipelago)	Ba Ria–Vung Tau	<i>pfeifferi</i> , <i>volvulus</i>
Pu Luong (nature reserve)	Thanh Hoa	<i>cambodgensis</i> , <i>malayanus</i> , <i>volvulus</i>
Quang-Huyen, Quang-uyen (town)	Cao Bang	<i>mansuyi</i>
Rivière Noire (river)	Northern Vietnam	<i>massiei</i>
Saigon (city, nation)	Ho Chi Minh	<i>monachus</i>
Songcan (river)	Binh Dinh	<i>consociatus</i> , <i>eudeli</i>
Song-ma, Song-Ma	Dien Bien, Son La, Thanh Hoa	<i>massiei</i> , <i>songmaensis</i> , <i>aquilus</i>
Tay-ninh, Taininh (province)	Tay Ninh	<i>monachus</i>
Than Moi, Than-moi (village ?)	Lang Son	<i>dodrans</i> , <i>fulguratus</i> , <i>polystictus</i> , <i>saturnus</i> , <i>subfloridus</i>
Tonkin, Tongking (region)	Northern Vietnam	<i>fruhstorferi</i> , <i>jourdyi</i> , <i>massiei</i> , <i>tetrachrous</i> , <i>unicus</i>
Trouié (mountain)	Thua Thien Hue	<i>trouiensis</i>
Tuyen Kwan (province)	Tuyen Quang	<i>fruhstorferi</i>
Yen Lac (town)	Bac Kan	<i>pyrosotma</i>

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Семейство Cyclophoridae во Вьетнаме (Gastropoda: Cyclophoroidea): род *Cyclophorus* Montfort, 1810

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РЕЗЮМЕ. Вьетнам характеризуется многочисленными известняковыми горными образованиями, концентрирующимися в северной, северо-центральной и южной частях, а также многочисленными разнообразными известняковыми островами, расположенными вдоль береговой линии. Соответственно, в регионе отмечены филогенетически разнообразная фауна наземных брюхоногих моллюсков, в которой доминируют эндемичные виды. Исследован род *Cyclophorus* (Cyclophoridae) во Вьетнаме. Всего в различных местообитаниях Вьетнама найдено 60 видов и подвидов. Описан новый вид *Cyclophorus tamdaoensis* sp. nov. из северного Вьетнама и новый подвид *Cyclophorus implicatus kanhoensis* ssp. nov., из северо-западного Вьетнама. Вариетет *Cyclophorus courbeti* var. *leucostoma* Dautzenberg et Fischer, 1905 поднят до ранга подвида.

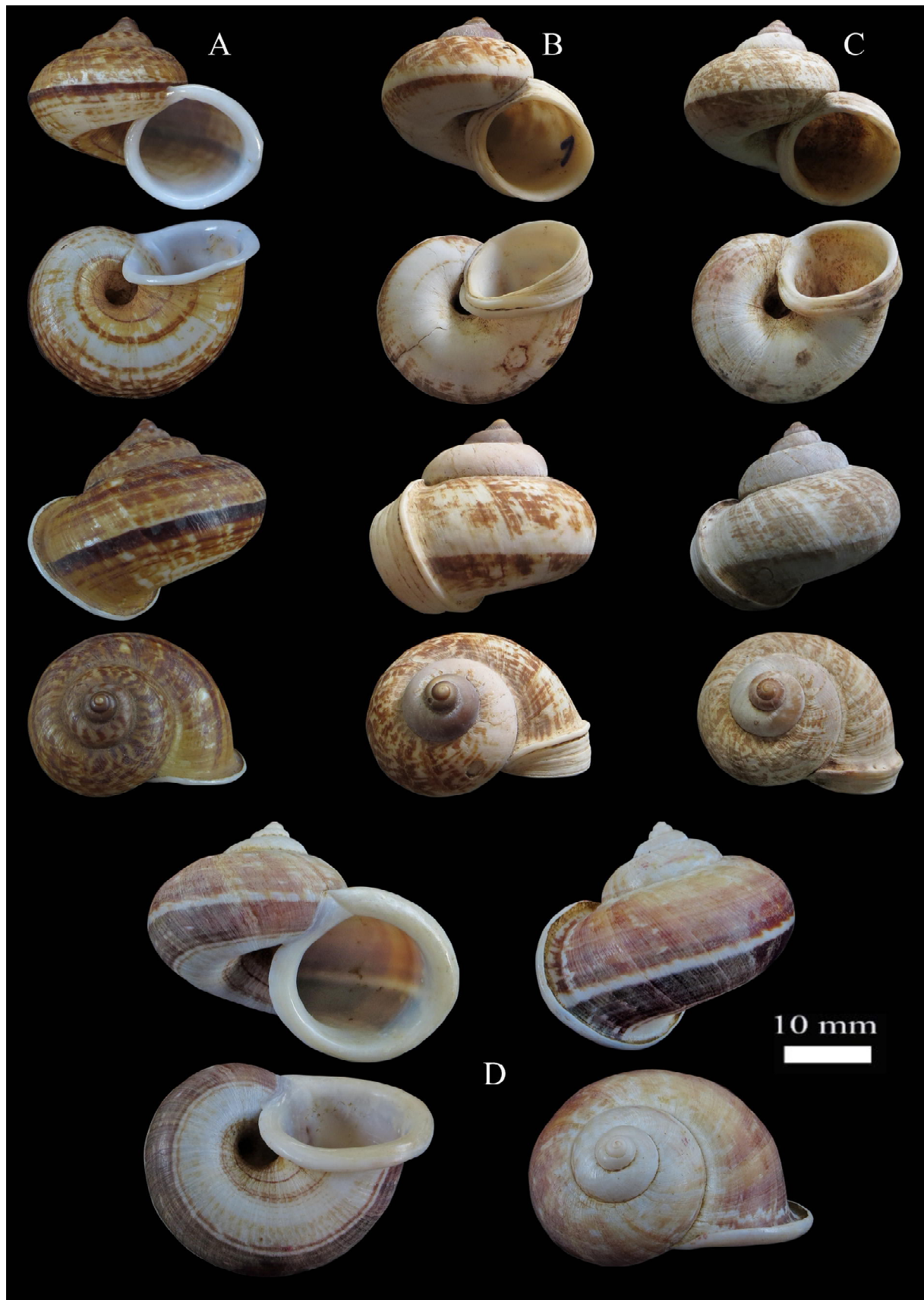


FIG. 13. **A.** *Cyclophorus affinis* Theobald, 1858, Sla2013/011 Chieng Ngan, Son La; **B, C.** *Cyclophorus amoenus* (Pfeiffer, 1854), Kgi2014/005 Kien Luong, Kien Giang; **D.** *Cyclophorus aquilus* (Sowerby, 1843), Sla2013/004a Thuan Chau, Son La.



FIG. 14. **A, B.** *Cyclophorus cambodgensis* Morlet, 1884, **A.** Tho2015/036 Thach Thanh, Thanh Hoa, **B.** Hph2017/006 Cat Ba, Hai Phong; **C.** *Cyclophorus bensoni* (Pfeiffer, 1854), Kgi2008/001 Kien Luong, Kien Giang; **D.** *Cyclophorus aurantiacus pernobilis* Gould, 1844, Sla2015/008 Chieng Xom, Son La.



FIG. 15. **A.** *Cyclophorus courbeti leucostoma* Dautzenberg et Fischer, 1905, Hbi2017/003 Mai Chau, Hoa Binh; **B.** *Cyclophorus clouthianus* Möllendorff, 1882, Bka2016/009 Xuat Hoa, Bac Kan; **C.** *Cyclophorus consociatus* Smith, 1893, Kgi2014/003 Kien Hai, Kien Giang; **D.** *Cyclophorus courbeti courbeti* Ancey, 1888, Tng2017/005 Vo Nhai, Thai Nguyen; **E.** *Cyclophorus cantori* Benson, 1851, Hbi2014/005 Lac Son, Hoa Binh.



FIG. 16. **A.** *Cyclophorus dodrans dodrans* Mabille, 1887, Lso2009/004 Huu Lung, Lang Son; **B.** *Cyclophorus dodrans fasciatus* Kobelt, 1908, Hbi2013/002 Yen Thuy, Hoa Binh; **C.** *Cyclophorus cryptomphalus* Benson, 1857, Sla2013/002c Chieng Ngan, Son La; **D.** *Cyclophorus dilatatus* Heude, 1886, Bka2016/003 Xuat Hoa, Bac Kan.

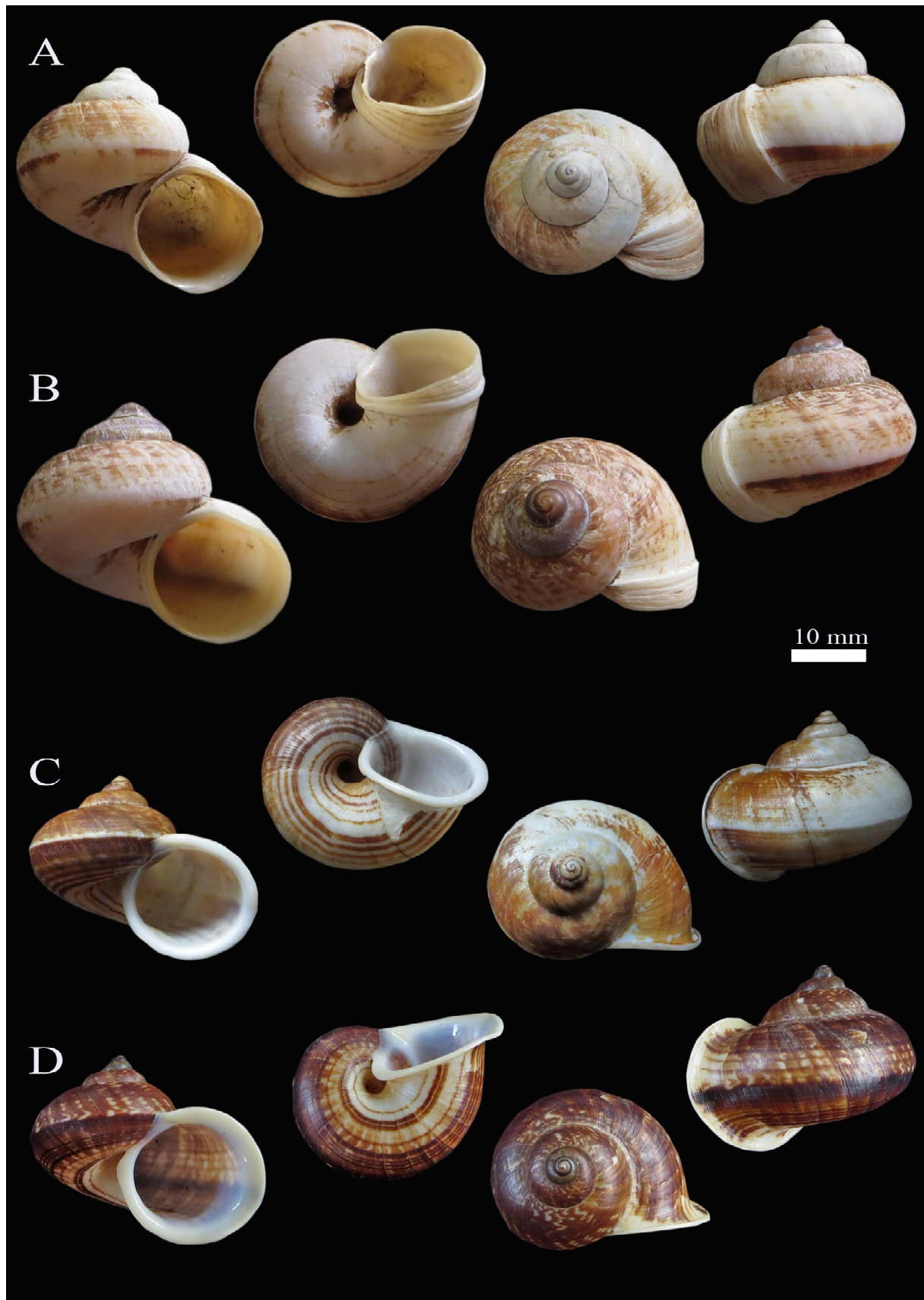


FIG. 17. **A, B.** *Cyclophorus eudeli* Smith, 1893, **A, B.** Kgi2013a/003 Ha Tien, Kien Giang; **C, D.** *Cyclophorus expansus* (Pfeiffer, 1853), **C.** Sla2014/003, Chieng Sinh, Son La, **D.** Tho2014/008 Thach Thanh, Thanh Hoa.

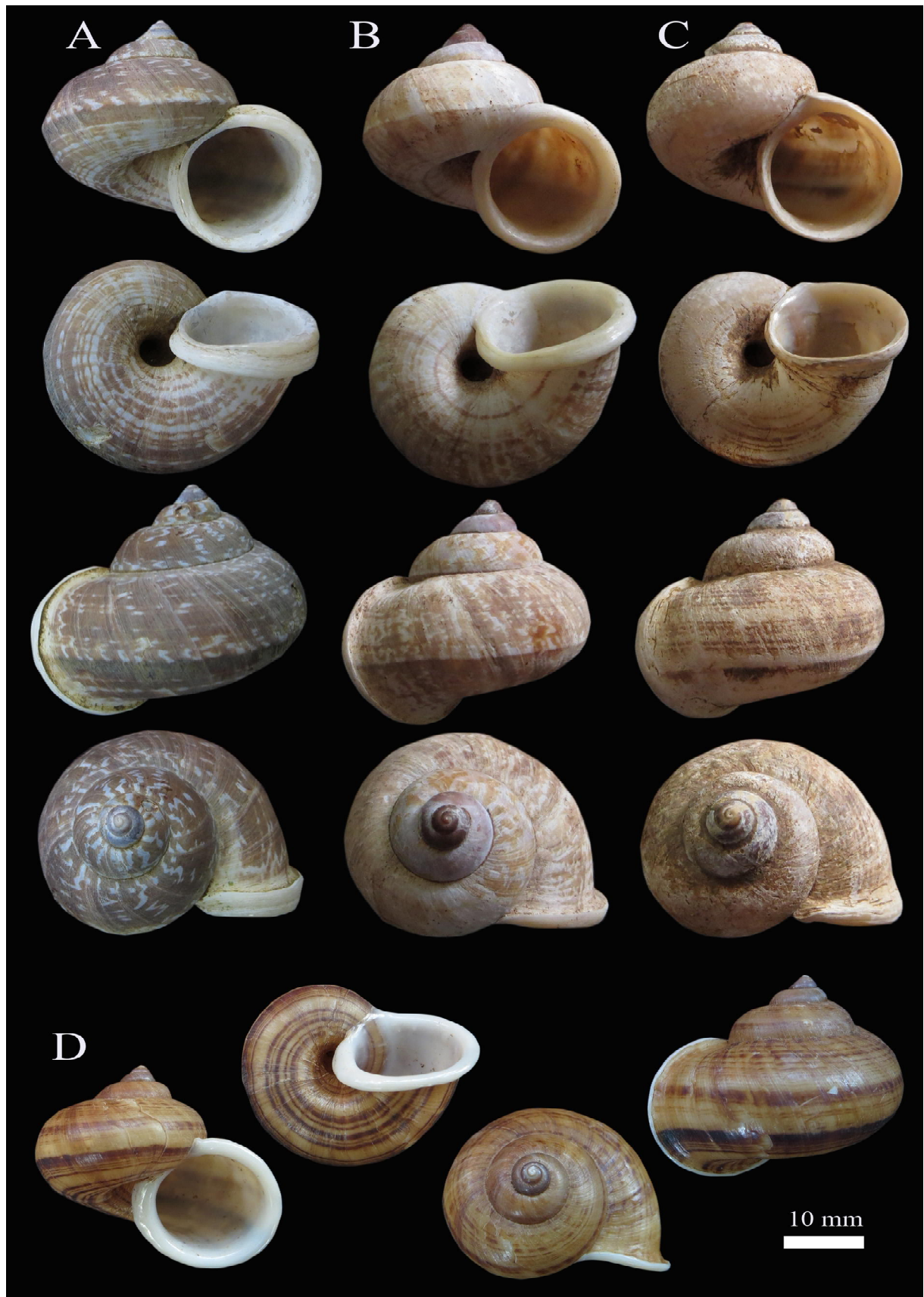


FIG. 18. **A.** *Cyclophorus fargesianus* Heude, 1885, Pth2017/020 Yen Lap, Phu Tho; **B, C.** *Cyclophorus floridus* (Pfeiffer, 1854), Gla2016/002 Mang Yang, Gia Lai; **D.** *Cyclophorus fulguratus* Pfeiffer, 1852, Nbi2016/003 Cuc Phuong, Ninh Binh.



FIG. 19. **A.** *Cyclophorus fruhstorferi fruhstorferi* Möllendorff, 1901, Bka2017/001 Cho Don, Bac Kan; **B.** *Cyclophorus fruhstorferi langsonensis* Kobelt, 1908, Hph2009/002 An Lao, Hai Phong; **C.** *Cyclophorus herklotsi* Martens, 1861, Agi2015/013 Thoai Son, An Giang; **D.** *Cyclophorus haughtoni* Theobald, 1858, Gla2016/001 Mang Yang, Gia Lai.

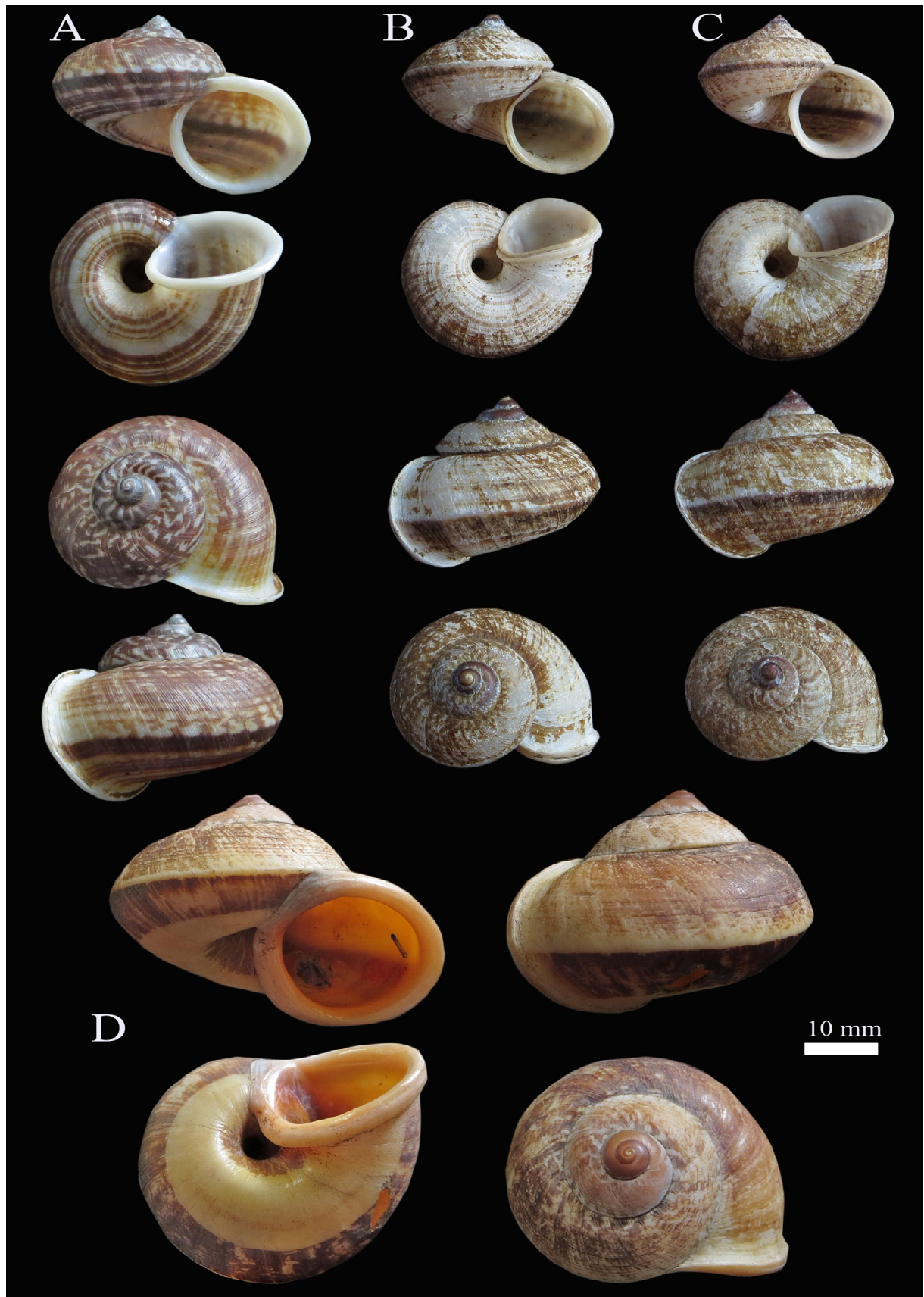


FIG. 20. **A.** *Cyclophorus implicatus implicatus* Bavay et Dautzenberg, 1908, Lch2015/100 Phong Tho, Lai Chau; **B.**, **C.** *Cyclophorus implicatus kanhoensis* subsp. nov., **B.** VNMN IZ 000.000.155, **C.** CBER–TBU 2015/1 Muong Te, Lai Chau; **D.** *Cyclophorus ignilabris* Möllendorff, 1901, Qni2015/009 Hoanh Bo, Quang Ninh.

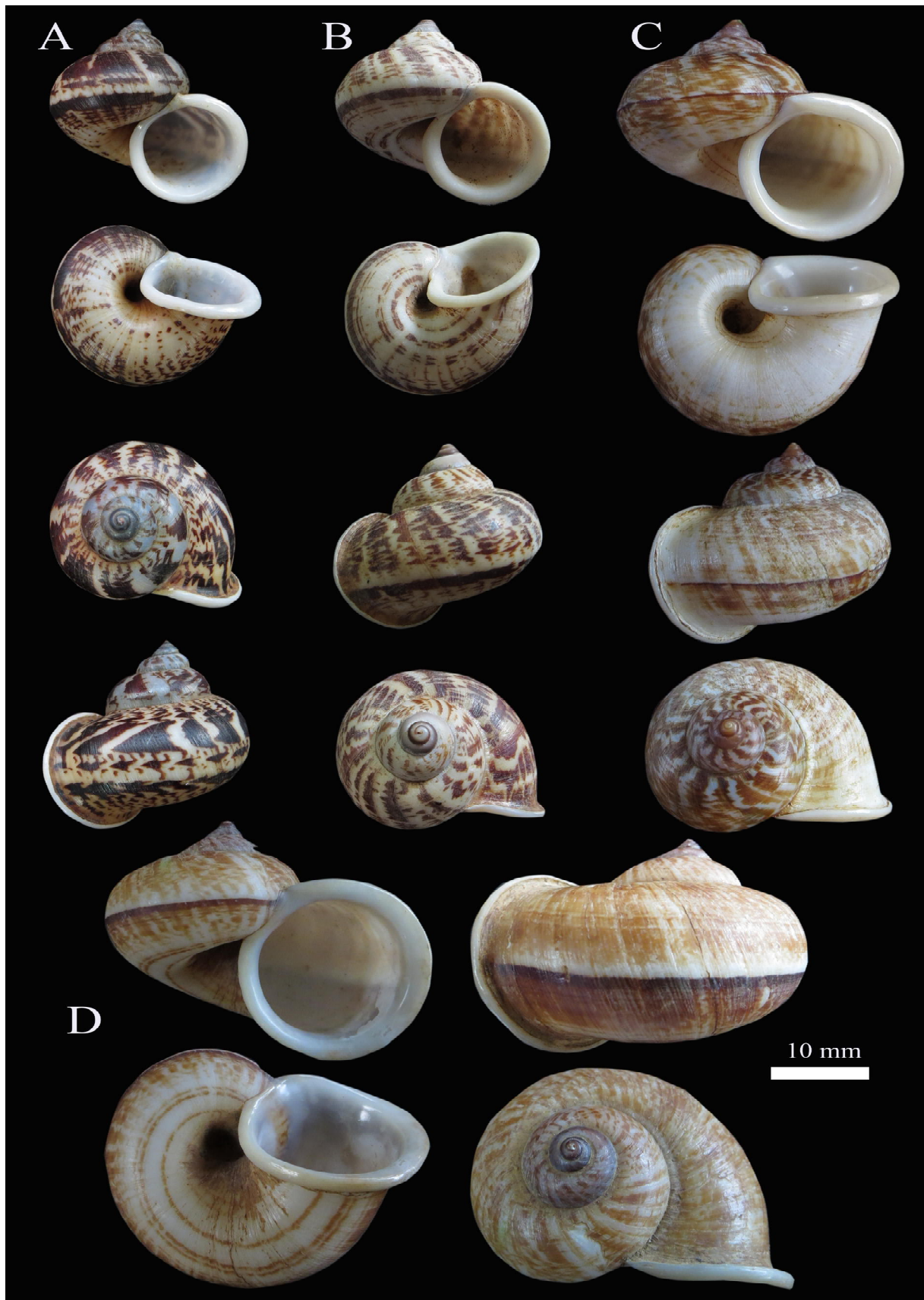


FIG. 21. **A, B.** *Cyclophorus jourdyi* Morlet, 1886, Tng2017/019 Vo Nhai, Thai Nguyen, **B.** Vph2011/015 Tam Dao, Vinh Phuc; **C.** *Cyclophorus labiosus* (Pfeiffer, 1854), Sla2013/001 Chiang Ngan, Son La; **D.** *Cyclophorus malayanus* (Benson, 1852), Sla2013/021 Mai Son, Son La.



FIG. 22. **A, B.** *Cyclophorus mansuyi* Dautzenberg et Fischer, 1908, **A.** Hph2009/002 An Lao, Hai Phong, **B.** Qni2008/0022 Quang Yen, Quang Ninh; **C.** *Cyclophorus massiei* Morlet, 1891, Lch2015/022 Phong Tho, Lai Chau; **D.** *Cyclophorus martensianus* Möllendorff, 1874, Bka2016/002 Xuat Hoa, Bac Kan.



FIG. 23. **A, B.** *Cyclophorus muspratti* Godwin-Austen et Beddome, 1894, Hno2002/002 Ba Vi, Hanoi; **C.** *Cyclophorus paviei* Morlet, 1884, Dna2010/015 Vinh Cuu, Dong Nai; **D.** *Cyclophorus monachus* (Morelet, 1866), Tni2011/001 Thach Tan, Tay Ninh.

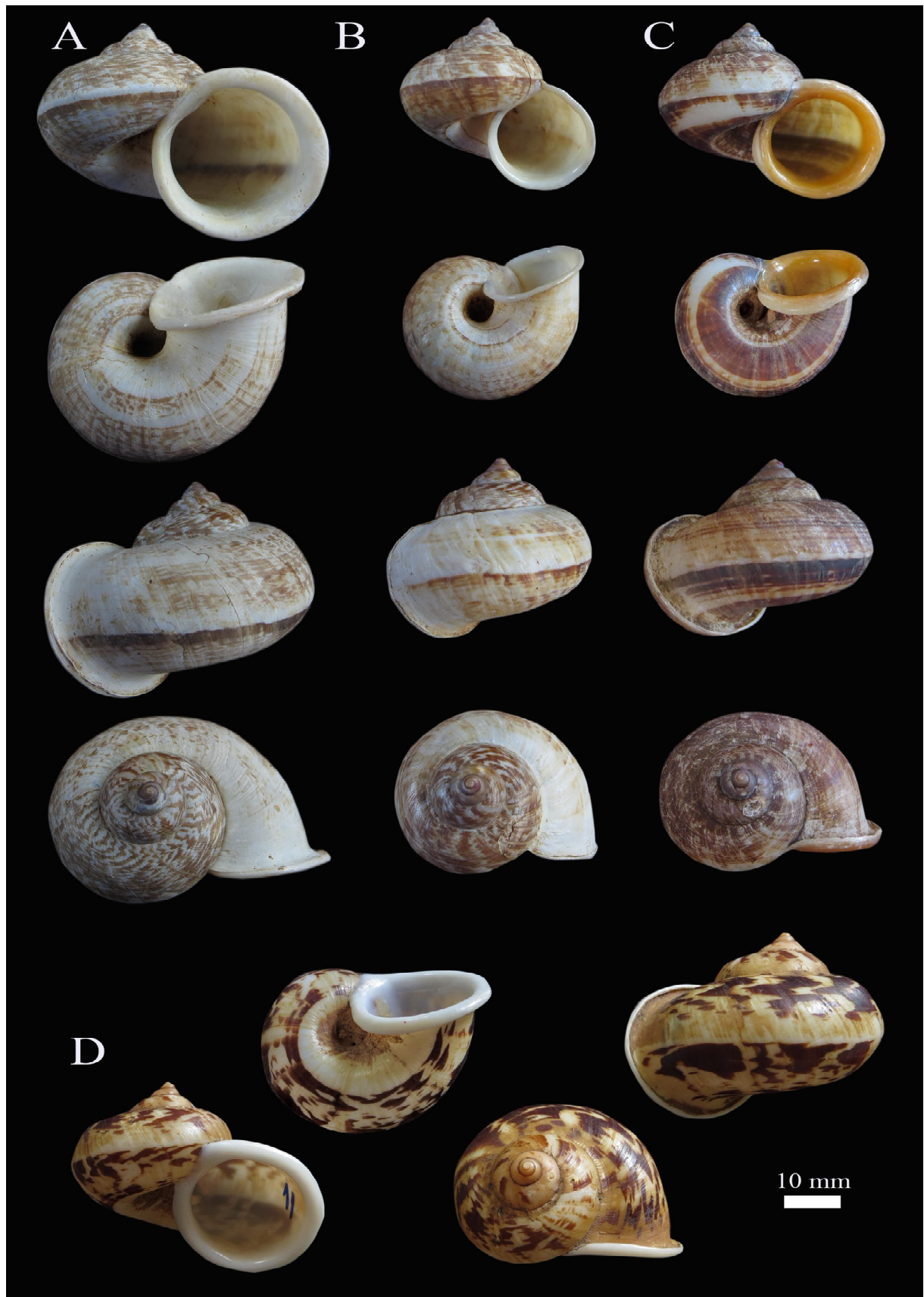


FIG. 24. **A.** *Cyclophorus pfeifferi* Reeve, 1861, Dbi2017/001 Tuan Giao, Dien Bien; **B.** *Cyclophorus polystictus* Möllendorff, 1901, Sla2013/003a Muong La, Son La; **C.** *Cyclophorus pyrostoma* Möllendorff, 1882, Bka2009/005 Cho Moi, Bac Kan; **D.** *Cyclophorus siamensis* Sowerby, 1850, Nbi2012/002 Tam Diep, Ninh Binh.

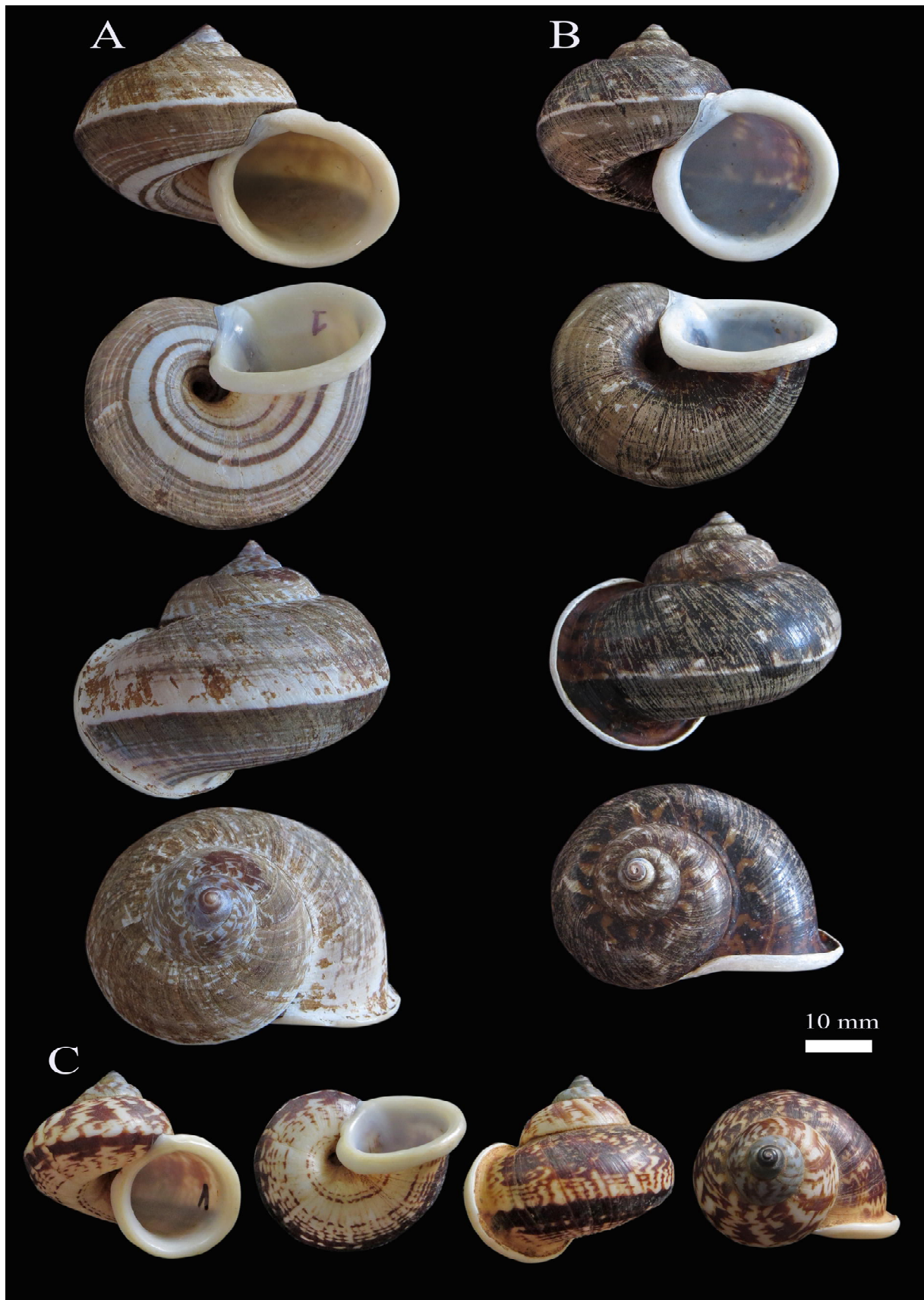


FIG. 25. **A.** *Cyclophorus songmaensis* Morlet, 1891, Hbi2018/015 Mai Chau, Hoa Binh; **B.** *Cyclophorus speciosus* (Philippi, 1847), Tqu2017/041 Na Hang, Tuyen Quang; **C.** *Cyclophorus subfloridus* Ancey, 1888, Lso2009/097 Huu Lung, Lang Son.

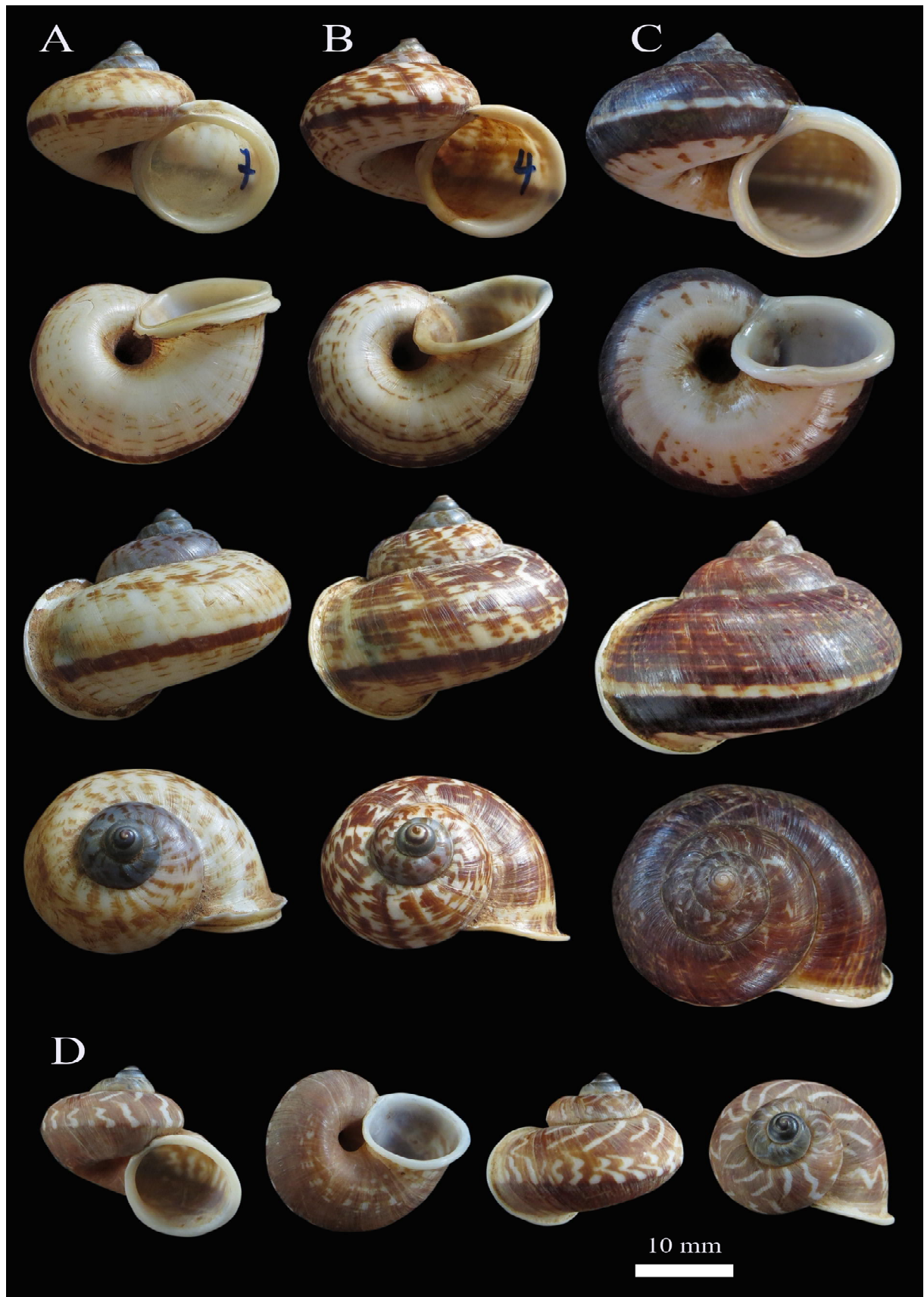


FIG. 26. **A, B.** *Cyclophorus tamdaoensis* sp. nov., **A.** VNMN_IZ 000.000.156, **B.** CBER-TBU 2003/1 Tam Dao, Vinh Phuc; **C.** *Cyclophorus theodori* Ancey, 1888, Tng2017/020 Vo Nhai, Thai Nguyen; **D.** *Cyclophorus tornatus* Morlet, 1892, Hgi2018/001 Ngoc Duong, Ha Giang.

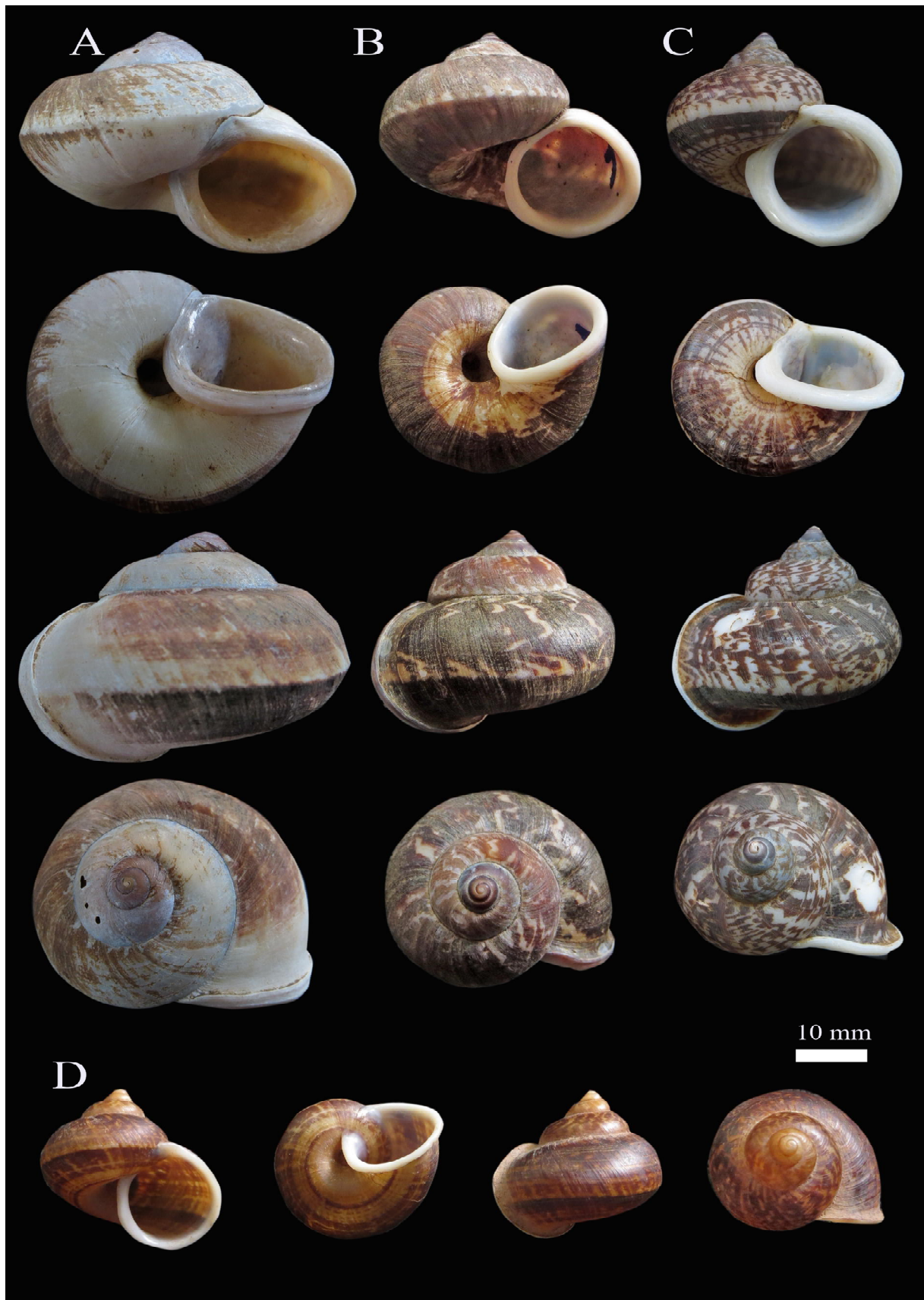


FIG. 27. **A.** *Cyclophorus trouiensis trouiensis* Wattebled, 1886, Hph2016/015 Cat Ba, Hai Phong; **B.** *Cyclophorus unicus* Mabilie, 1887, Qni2011/002a Cam Pha, Quang Ninh; **C.** *Cyclophorus volvulus* (Müller, 1774), Hph2016/020 Cat Ba, Hai Phong; **D.** *Cyclophorus zebrinus* (Benson, 1836), Kgi2015/001 Kien Luong, Kien Giang.



FIG. 28. **A.** *Cyclophorus* sp.1, Tho2013/001 Thach Thanh, Thanh Hoa; **B.** *Cyclophorus* sp.2, Hbi2018/001 Luong Son, Hoa Binh; **C.** *Cyclophorus* sp.3, Sla2013/001c Chieng Ngan, Son La.