Endothyrella Zilch, 1960 in Bhutan (Gastropoda: Pulmonata: Plectopylidae), with a description of three new species

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Abstract. Samples of the genus Endothyrella from Bhutan are dealt with, starting from the modern review of this genus by Páll-Gergely et al. (2015). Four species are recognized, 3 of which are new to science: E. bhutanensis, E. spirostriata, and E. pemagatshel. The record of Endothyrella bland a nearly 100 km southeast of its well documented range in Sikkim, India, puts some isolated unconfirmed records from India in a new light. Apart from shell size and shape, the number of spiral rows of hairs and the structure of the parietal and palatal callosities on the shell wall turned out to be important for identification. The species were found at altitudes of 335–2300 m a.s.l. in the Indo-Malayan part of Bhutan.

Key words. New species, Endothyrella bhutanensis, E. spirostriata, E. pemagatshel, Himalaya.

DOI. https://doi.org/10.1127/arch.moll/147/203-213

Introduction

Until recently, the molluscan fauna of the eastern Himalayan Kingdom of Bhutan had to be considered virtually unknown. Within the scope of the Bhutan Evertebrata Inventory Project of the National Biodiversity Centre (Serbithang, Thimphu, Bhutan), the Ugyen Wangchuck Institute for Conservation and Environment (Bumthang, Bhutan), Naturalis Biodiversity Center (Leiden, the Netherlands), and various associate institutes, molluscs were collected in 2012, 2013, 2014 and 2016. This material made it possible to start a series of articles on the molluscan fauna of Bhutan, trying to close the gaps in our knowledge that are apparent in distribution maps of various molluscan taxa (Páll-Gergely et al. 2014, 2015b). A good example is the family Plectopylidae, as is obvious from recent articles by Páll-Gergely & Hunyadi (2013) and Páll-Gergely et al. (2015a, 2017). We use these articles as a starting point for an analysis of the samples of Plectopylidae from Bhutan that are available for study.

Material and Methods

The specimens were collected by sieving soil samples of various quantities or by hand searching without any standardized time restriction. Therefore, the numbers of shells in the samples cannot be used as a measure of local abundance.

The whorls of the shells were counted in conformity with Kerney & Cameron (1979: 13) and Páll-Gergely & Hunyadi (2013: 5). To achieve an objective ratio for the relative size of the umbilicus (U), the distance between the suture just behind the peristome and the suture at the opposite side of the umbilicus was measured and related to the maximum breadth of the shell (B) by calculating the ratio U/B. The most abapical part of the whorl cross-section is referred to as the “umbilical bend” (Fig. 3). Measurements of the shell breadth and height (H) are given. The terminology used for the parietal lamella and the plicae (Fig. 7A) is based on Páll-Gergely & Hunyadi (2013: 5), but for the individual palatal plicae the nomenclature used for Chondrinidae by Gittenberger (1973: 11, fig. 2) and Kerney & Cameron (1979: 79) is accepted, irrespective of non-existent homologies.

In the descriptions of the genital tract, the terms proximal and distal are used in relation to the body wall, in conformity with Páll-Gergely & Hunyadi (2013) but opposite to Páll-Gergely et al. (2015a): nearer the genital orifice is considered proximal. The anatomical data are presented without comments, which would be premature.

The material is kept in the National Biodiversity Centre, Serbithang, Thimphu, Bhutan (NBCB).
Identification key to fully grown shells of Bhutanese species

1a Shell with 5 or 6 undivided palatal plicae (Fig. 7L–Q); > 7 mm wide ............................................. 2
1b Most palatal plicae bipartite (Fig. 7C, G); shell < 7 mm wide ............................................................. 3

2a Shell > 1 cm wide; without hairs . . . . E. pemagatshel
2b Shell < 1 cm wide; with 4 rows of hairs (Fig. 5E) ........................................................... E. spirostriata

3a With < 10 spiral rows of hairs; apertural lip narrowly reflected .................................................... E. blanda
3b With > 10 spiral rows of hairs; apertural lip only partly reflected .............................................. E. bhutanensis

Systematics


Endothyrella blanda (Gude, 1898)

Figures 1, 3, 7A–E

Plectopylis blanda Gude 1898: 264, fig. 70a–f (“Naga Hills, Assam”).


Material. Bhutan, Chhukha district, secondary road from Phuentsholing to Pasakha, shrubs and rocks at a curve in the road; 350 m a.s.l.; 26° 53ʹ N, 089° 25ʹ E; E. Gittenberger, Pema Leda & Leki Dorji leg., 09-iv-2013 (NBCB23/19).

Diagnosis. Shell spire relatively high conical, shell < 6.5 mm broad, with < 10 rows of hairs, outer lip strongly thickened and slightly reflected over its entire length.

Description (n = 19 specimens from Bhutan; Figs 3, 7A–E). The shell is small, sinistral, and discoid, with a low conical spire; it is pale corneous brown, with 5¼–5¾ whorls, including the protoconch. The whorls are dorsally separated by a very deep, narrowly channelled suture. The body whorl descends more steeply shortly before forming the mature aperture and has a strongly thickened, narrowly reflected outer lip and a moderately prominent parietal callus. The umbilicus is deep and relatively narrow (U/B = 28–30%).

The protoconch has 2½–2¼ whorls; the first whorl is nearly smooth but later whors have increasingly prominent wrinkly, raised, radial ridges and 2 or 3 fine, raised, spiral lines near the abapical suture. The teleoconch dorsally has relatively prominent spiral lines, which are crossed by equally strong radial lines, resulting in a rough, reticulate surface. The shell surface between the rounded shoulder and the umbilical bend bears dense, oblique (30° in frontal view) growth lines and regular, widely spaced (3–4/mm on the body whorl), slightly more prominent radial lines, which are accentuated by low periostrostral ridges. This region has an additional 7–9 rows of spirally arranged hairs up to 0.5 mm long; besides these, there is no spiral sculpturing below the shoulder. The umbilicus is densely sculptured with straight, oblique ridges.

Three specimens were used to study the parietal lamella and the palatal plicae. The parietal lamella (Fig. 7A, E) has 2 posterior denticles and is accompanied by a short upper plica and an even less prominent lower plica, which may be elongated as a vague ridge towards the aperture. On the palatal wall (Fig. 7B–D) are 2 undivided plicae, namely a small suturalis and a somewhat larger basalis (Fig. 7D). The other palatal plicae are bipartite. The posterior ends of the palatal plicae are connected by a hardly discernible radial callus, which sometimes appears absent. The posterior parts of the lower palatalis and the infrapalatalis (Fig. 7C) are thickened and curved.

Measurements. B = 5.4–6.0 mm; H = 3.3–3.6 mm (n = 19).

Identification. The shells agree very well with the holotype of E. blanda, as figured by Páll-Gergely et al. (2015a: 33, fig. 17B, 2017: 156, fig. 17B). Those authors mentioned only 7 rows of hairs, but figured a specimen (2015a: 36, fig. 20A; 2017: 158, fig. 20A) with more. However, as that specimen was collected in Silchar Cachar in southern Assam, India, far from the range that is known for typical E. blanda (except for the Naga Hills, but see Distribution), it might belong to another species. See also E. bhutanensis.

Distribution. This species was allegedly described from the Naga Hills. However, Páll-Gergely et al. (2015a: 34, 2017: 154) did not unreservedly accept that locality because most samples are from Sikkim, situated c. 600 km west-north-west from there. Other records listed by Páll-Gergely et al. (2015a: 34, 2017: 154) are from Silchar (Cachar district in southern Assam), c. 500 km south-east of Sikkim, and the Khasi Hills, c. 350 km south-east of Sikkim. The occurrence in Bhutan is located nearly 100 km south-east of Sikkim, showing that the species is at least not a very local endemic.

Endothyrella bhutanensis spec. nov.

Figures 1, 4, 7F–K, 9B, 10

Locus typicus. Bhutan, district Tsirang, 35 km WNW of Gelephu, 1050 m a.s.l., 27° 01ʹ N, 090° 08ʹ E.

Type series. Locus typicus, E. Gittenberger & Pema Leda leg. 23-iv-2016, holotype (NBCB15; 3.0 × 5.3 mm) and paratypes (NBCB16/11); Bhutan, Zhempang district, 2.5 km W of Zhempang, 980 m a.s.l., 27° 13ʹ N, 090° 38ʹ E, E. Gittenberger & Pema Leda leg. 26-iii-2016 (NBCB17/1); Bhutan, Zhempang district, between Dung-mang/Duinmang Tsachu and Gomphu/Gonphu Zero Point, 24 km SE of Zhempang, 335 m a.s.l., 27° 02ʹ N, 090° 38ʹ E.
090° 48ʹ E, scree in warm broadleaf forest, Sherub Sherub & Ugyen Tenzin leg. 08-i-2017 (NBCB18/13); Bhutan, Trongsa district, Langthel, Pangzurmani, 1020 m a.s.l., 27° 18ʹ N, 090° 37ʹ E, dry soil at base of rocky cliff, Karma Wangdi & Rinchen Singye leg. i-2015 (NBCB19/2); Bhutan, Wangduephodrang district, 35 km SE of Wangdue Phodrang, 800 m a.s.l., 27°12ʹ N, 090°03ʹ E, E. Gittenberger & Pema Leda leg. 23-iii-2016 (NBCB20/2); Bhutan, Tsirang district, 42 km WNW of Gelephu, 400 m a.s.l., 27° 03ʹ N, 090° 04ʹ E, E. Gittenberger & Pema Leda leg. 23-iii-2016 (NBCB21/2); Bhutan, Trongsa district, 14 km NW of Zhemgang, 1085 m a.s.l., 27° 19ʹ N, 090° 35ʹ E, E. Gittenberger & Pema Leda leg. 26-iii-2016 (NBCB22/8).

**Diagnosis.** Shell spire depressed conical, shell < 6 mm broad, with c. 12 rows of hairs, outer lip strongly thickened and in its lower half slightly reflected.

**Description** ($n = 40$; Figs 4, 7F–K). The shell is small, sinistral, and discoid, with a very low conical spire; it is yellowish brown and has c. 5½ whorls, including the protoconch. The whors are dorsally separated by a very deep, narrowly channelled suture. The body whorl descends more steeply shortly before forming the mature aperture and has a strongly thickened but little, or only partly, reflected peristome and a moderately prominent parietal callus. The umbilicus is deep and relatively narrow ($U/B = 30–36\%$).

The protoconch consists of 2½ whors and has raised, wrinkly, radial lines; on its final ½ whorl there are additionally 3 fine raised spiral lines. The teleoconch dorsally has dense, wrinkly radial lines and slightly less prominent spiral lines, which result in an irregularly reticulate, rough surface. Between the rounded shoulder and the umbilical bend, the periostracum forms c. 12 spiral rows of hairs; the hairs are c. 0.3 mm long. There is no additional spiral sculpture below the shoulder, only wavy, oblique (30° in frontal view) growth lines and more widely and regularly spaced radial lines (6/mm), accentuated by the periostracum, which continue inside the umbilicus as straight, oblique, prominent ridges.

Nine specimens were used to study the parietal lamella and palatal plicae. The parietal lamella (Fig. 7F, K) has 2 posterior denticles, with the basal denticle more prominent and the adapical one minute or lacking; the lower
parietal plica is elongated as an inconspicuous ridge (Fig. 7K) running towards the apertural margin and there is also a short upper parietal plica. In 6 shells (NBCB16/3, 18/2, 20/1) the palatal wall has (1) a low suturalis (Fig. 7H), (2) a prominent, bipartite suprapalatalis (Fig. 7G, H), (3) a bipartite upper palatalis with a more or less strongly curved posterior part (Fig. 7G–I), (4) a lower palatalis of 2 plicae, the posterior one of which is more or less oblique and posteriorly thickened (Fig. 7I, J), (5) an oblique, curved and posteriorly thickened infrapalatalis, with an anterior straight part (Fig. 7I, J), and (6) a single, simple basalis (Fig. 7J) or 2 small irregular plicae (one of them oblique). There may be additional, irregular, small denticles, for example in between (4) and (5), or an oblique extra anterior plica between (5) and (6). The 2 parts of the bipartite plicae may be more or less clearly connected (compare Figs 7G and 7H). In all 3 shells from locality NBCB22 that were opened the anterior parts of the plicae are lacking.

**Measurements.** B = 4.8–5.7 mm; H = 2.7–3.2 mm (n = 34).

**Differentiation.** The geographically close *E. blanda* might be most closely related. That species differs by having a slightly higher spire, fewer than 10 spiral rows of shorter hairs, less prominent radial riblets on the ventral side, and an apertural edge that is slightly reflected over its entire length. The northeast-Indian *E. robustistriata* Páll-Gergely, 2015, is similar to *E. bhutanensis* in general shell shape, but it is smaller, has a glossy ventral side, a thinner peristome, and a weaker callus, and the entire shell surface lacks hairs.

**Genitalia** (n = 1; Fig. 9B). One animal could be dissected. The uterus contained 4 large embryos so the genitalia may be considered fully developed. There is no genital atrium. A long and narrow proximal part of the penis runs to the body wall, where the vagina also opens. The distal part of the penis is about equally as long as, and 3 times broader than, the proximal part. Where the epiphallus inserts, a penial caecum starts (by definition), which is

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**Figure 3.** *Endothyrella blanda* (Gude, 1898) (NBCB23), secondary road from Phuentsholing to Pasakha. A–D. Four views of one shell; width 5.7 mm. E. Width 5.8 mm. The arrow indicates the location of the umbilical bend.
nearly as long as the penis itself; halfway along the caecum, the penial retractor muscle inserts, close to a very short, rounded thickening. The epiphallus is broader than the narrow part of the penis and somewhat longer. The vas deferens, the bursa copulatrix, and its separate diverticulum all insert near each other near the proximal end of the uterus. The vagina is 1.5 times broader than the penis.

In the 4 Endothyrella species for which data on the genital tract have been published (PÁLL-GERGELY et al. 2015a, 2017), as in E. spirostriata spec. nov. (Fig. 9A), the penial retractor inserts at the distal end of the penial caecum. The rounded thickening on the caecum might be homologous to the “penial thickening” near the base of the caecum described in E. fultoni (Godwin-Austen, 1892) by PÁLL-GERGELY et al. (2015a: 39, 40, fig. 21, 2017: 160–161, fig. 21).

Radula (Fig. 10A–C). There is no clear distinction between lateral and marginal teeth. The unicuspid central tooth is accompanied by 9 bicuspid teeth with uniform, triangular endo- and ectocones; its cusp is about as large as the ectocones of the adjoining teeth. From about the 10th tooth on, which could be considered the 1st marginal tooth, the endocone becomes more elongated and curved and may develop a side-tip, whereas from tooth 14–16 on the ectocone has 2 tips. The incision between the 2 tips of the endocone is deep. The 17th tooth, which has an ectocone with 2 or 3 tips, and a small, irregular, incomplete 18th “tooth” form the border of the radula.

Mandibula (Fig. 10D). The mandibula has the usual horseshoe shape. It is polyplacognathous and composed of c. 25 plates.

Distribution. All records for this species are from southern central Bhutan, from an area between 090° and 091° E and 27°00ʹ and 27°30ʹ N, at 335–1085 m a.s.l.

Derivatio nominis. The epithet bhutanensis refers to the kingdom of Bhutan, where it might be the most common Endothyrella species.

Endothyrella spirostriata spec. nov.
Figures 1, 5, 7L–N, 9A

Locus typicus. Bhutan, Pemagatshel district, 7 km E of village of Pemagatshel, 2300 m a.s.l., 27°01ʹ N, 091°29ʹ E; roadside, in soil along the overgrown border of the forest.

Type series. Locus typicus, E. Gittenberger & Pema Leda leg., 14-iv-2015: holotype (NBCB26; 3.4 × 7.6 mm) and 3 paratypes (NBCB27/3).

Diagnosis. Shell with a low spire, with spiral lines also below the shoulder and 4 rows of long hairs; 5 undivided palatal plicae and a bipartite basalis.
Description \((n = 4; \text{Figs } 5, 7L–N)\). The shell is medium-sized, sinistral, dark brownish, and discoid, with a very low spire with concave “sides” in profile; there are c. 5 whorls, which are separated dorsally by a narrow, deeply incised suture channel. The body whorl descends more steeply shortly before forming the mature aperture; the peristome is moderately thickened and strongly reflected. The parietal callus is moderately prominent. The umbilicus is shallow and broadly funnel-shaped \((U/B = 38–40\%)\).

The protoconch, with c. 2½ whorls, is apically sculptured with raised, radial lines only; away from the apex, there are additionally 9 increasingly strong, raised spiral lines, which are slightly more prominent than the radials after 1½–2 whorls and which result in a conspicuous reticulate sculpture. Abapically, between the sutures of the protoconch, these spirals are more narrowly spaced than adapically. Where the teleoconch begins, it has some radial and more or less strong spiral sculpturing; after c. ½ whorl its sculpture becomes coarsely reticulate. The reticulate sculpture is present on the dorsal part of the shell, including the shoulder; the radial sculpture continues as equally strong, oblique \((40°\text{ in frontal view})\) growth lines on the sides, together with spiral lines, which are less prominent there. On the umbilical bend, and less conspicuously inside the umbilicus, the spirals may be nearly as prominent as on the dorsal part of the shell. At regular distances a radial line is accentuated by the periostracum, which forms 4 spiral rows of hairs \((\text{worn off in all specimens except for the dissected one}); the hairs may be up to 0.7 mm long on the body whorl.

A damaged shell and the shell of the dissected specimen were used to study the internal lamella and plicae. The parietal lamella \((\text{Fig. } 7L, N)\) apically has a forward-pointing knob and is basally, after a rounded curve, elongated somewhat further anteriorly; there are 2 posterior oblique denticles. A lower parietal plica is hardly discernible or absent. There are 6 palatal plicae \((\text{Fig. } 7L–N)\), with the 4 middle ones connected at their posterior, most prominent parts by a narrow, low, radial callus.

Figure 5. *Endothyrella spirostriata* spec. nov., holotype (NBCB26, A–C) and paratype (NBCB27, D, E), 7 km E of village of Pemagatshel. A–C. Width 7.7 mm. D, E. Width 5.4 mm, juvenile, 3¾ whorls, with 2 rows of palatal denticles.
Five of the palatal plicae are undivided: (1) a very short, simple suturalis, (2) a more than 5 times longer, regularly tapering anteriorly, suprapalatalis, (3) a clearly shorter upper palatalis, (4) a short, transverse, lower palatalis, and (5) a slightly larger transverse infrapalatalis. Additionally there is a bipartite basalis, composed of a minute knob that is situated in line with the other plicae and a much longer, lamella-like part running parallel with the suprapalatalis, but somewhat shorter than that plica. Plicae (3)–(5) are rather short and knob-like.

**Measurements.** B = 7.6–8.2 mm; H = 3.4–3.8 mm (n = 4).

**Differentiation.** In shape and size and by its long hairs, *E. spirostriata* recalls *E. dolakhaensis* Budha & Páll-Gergely, 2015 from central Nepal, but in the latter species the 4 middle palatal plicae are bipartite and the basalis is undivided (Páll-Gergely et al. 2015a: 23, fig. 9g, h, 2017: 146, fig. 9g, h). In *E. dolakhaensis* the radial sculpture on the ventral side of the shell is more prominent than in *E. spirostriata* and there are 5 spiral rows of hairs instead of 4 in *E. spirostriata*, which has more prominent spiral sculpture.

**Genitalia** (n = 1; Fig. 9A). One animal could be dissected. The uterus contains 3 large embryos so that the genitalia may be considered fully developed. The genital atrium is about as broad as the broadest part of the penis and, like nearly the entire vagina, connects to the body wall with small fibres. The penis is elongated spindle-shaped, apart from a short, narrow, proximal part; it tapers distally towards its caecum, at the tip of which the penial retractor muscle inserts. There is an additional retractor muscle (?) inserting near the unclear transition of the epiphallus to the slightly narrower vas deferens, on the broad middle part of the penis. The twisted epiphallus is about as long as the penis and partly attached to it; it inserts at some distance from the retractor muscle. The vas deferens inserts close to the bursa copulatrix and its separate diverticulum. The vagina is somewhat broader generally and clearly longer than the penis. The relatively simple male part of the genitalia is very similar to that of *E. nepalica* Budha & Páll-Gergely, 2015 (Páll-Gergely et al. 2015a: 53, fig. 25, 2017: 173, fig. 25).

**Distribution.** Only known from the type locality.

**Derivatio nominis.** The name *spirostriata* refers to the characteristic spiral sculpturing of the shell.

*Endothyrella pemagatshel* spec. nov.

**Locus typicus.** Bhutan, Pemagatshel district, NW side of village of Pemagatshel, 1750 m a.s.l., 27° 02ʹ N, 091° 25ʹ E; roadside, in soil along the overgrown border of the forest.

**Type series.** Holotype, fully grown but without periostracum (NBCB24; 7.1 × 18.3 mm) and 2 damaged paratypes.
Figure 7. Denticles and lamellae inside the last whorl. A–E. *Endothyrella blanda* (Gude, 1898), secondary road from Phuentsholing to Pasakha: (A) posterior side of parietal lamella and palatal plicae, with b = basalis, ip = infrapalatalis, lp = lower palatalis, pl = parietal lamella, s = spiralis, sp = suprapalatalis and up = upper palatalis; (B) suprapalatalis and upper palatalis; (C) upper palatalis, lower palatalis, and infrapalatalis; (D) infrapalatalis and basalis; (E) parietal lamella with posterior denticles. F–K. *Endothyrella bhutanensis* spec. nov., (F, G, K) 35 km WNW of Gelephu; (H–J) between Dungmang/Duinmang Tsachu and Gomphu/Gonphu Zero Point: (F) posterior side of parietal lamella and palatal plicae; (G) the 4 middle palatal plicae, with the anterior part of the infrapalatalis missing; (H) spiralis, suprapalatalis, and upper palatalis; (I) upper palatalis, lower palatalis and infrapalatalis; (J) lower palatalis, infrapalatalis and basalis; (K) lower parietal plica running to the apertural margin. L–N. *Endothyrella spirostriata* spec. nov., 7 km E of village of Pemagatshel: (L) posterior and (N) anterior side of parietal lamella and palatal plicae, with (M) a detail of the posterior denticle of the basalis, situated in front of the lamellar part of the basalis. O–Q. *Endothyrella pemagatshel* spec. nov., NW side of village of Pemagatshel: (O) posterior and (P, Q) anterior side of parietal lamella and palatal plicae.
(NBCB25/2), with internal lamella and plicae present, but without apertural border; with remains of the periostracum in 1 specimen. E. Gittenberger & Pema Leda leg., 15-iv-2015.

**Diagnosis.** Shell > 15 mm broad, with a very wide umbilicus, without hairs, palatal plicae undivided.

**Description** \((n = 3; \text{Figs } 6, 7O–Q)\). The shell is large, sinistral, hairless, and discoid, with a very low spire with slightly concave sides in profile; there are 6¼ whorls in total, which are separated by a deeply incised suture. The shell is yellowish brown with reddish brown radial stripes in the paratype that still has parts of the periostracum, which is hairless. The body whorl descends more steeply shortly before forming the mature aperture and has a thickened, broadly reflected peristome and a moderately prominent parietal callus. The umbilicus is shallow and very broadly funnel-shaped (U/B = 45%).

The protoconch has a conspicuously small apical semicircle and consists of 3¼ whorls, with prominent, raised, radial lines and very fine, raised spiral lines, the latter becoming increasingly discernible on only the final ½ whorl. The teleoconch dorsally has coarse radial lines, which are crossed by spiral lines, resulting in an irregularly reticulate, rough surface. Between the rounded shoulder and the umbilical bend, the convex sides have very dense, oblique \((45^\circ \text{ in frontal view})\) growth lines, which may be somewhat more prominent at a regular spacing; these are crossed by very fine spiral lirae, resulting in a rather granular surface, which is only discernible where it is not covered by the thick periostracum and the surface is not worn. Some more prominent spirals are seen at the umbilical bend. Inside the umbilicus are very dense, fine, wrinkly, radial periostracal ridges.

Two damaged specimens were used to study the parietal lamella and the palatal plicae. The lamella apically bears an anterior-pointing knob and is here hardly or not curved backwards (Fig. 7O–Q); basally, after a rounded curve, it is elongated as far as the accompanying lower plica; two denticles lie behind the lamella and a third one lies in line with the lower plica. The 6 palatal plicae are undivided (Fig. 7O–Q), with the 4 middle ones connected at their posterior, most prominent parts by a narrow, low, radial callus: (1) a short, simple suturalis, (2) a more than 2 times longer suprapalatalis, which is slightly thickened or thickened with a bifurcation posteriorly, (3) a little lower but equally long upper palatalis, which is thickened posteriorly, (4) a short but prominent, rather cup-like, lower palatalis, (5) a cup-like infrapalatalis with a short anterior elongation, and (6) a short, simple, basalis.

**Figure 8.** Parietal and palatal callosities on the shell wall in *Endothyrella pinacis* (Benson, 1859), after Gude (1914: 87, fig. 35). The length of the scale bar is not indicated, but according to Gude the shell measures 15 mm in diameter. It is from “Darjeeling”.

**Figure 9.** Genital tracts of *Endothyrella* species. **A.** *Endothyrella spirostriata* spec. nov., 7 km E of Pemagatshel (NBCB26G). **B.** *Endothyrella bhutanensis* spec. nov., 35 km WNW of Gelep (NBCB15G). Abbreviations: a = genital atrium; b = bursa copulatrix; c = penial caecum; d = diverticulum; e = epiphallus; p = penis; rm = penial retractor muscle; rma = ? accessory retractor muscle; u = uterus; v = vagina; vd = vas deferens.
Measurements. $B = 18.3$ mm; $H = 7.1$ mm ($n = 1$).

Differentiation. At first sight, *E. pemagatshel* is most similar to *E. pinacis* (Benson, 1859), which is also hairless and widely umbilicate, but *E. pemagatshel* is larger, with fewer (i.e. less densely coiled) whorls and less oblique, more regularly convex sides (more rounded body whorl). According to the photographs in Páll-Gergely et al. (2015a: 52, fig. 24d–f, 2017: 172, fig. 24d–f), the holotype of *Helix pinacis* Benson, 1859 is c. 14.8 mm broad and has over 7 prominently shouldered whorls, with moderately convex, oblique sides; 2 more shells, measuring 13.1 and 14.0 mm in width, are very similar to the holotype. Three additional shells of *E. pinacis* that were measured by Páll-Gergely et al. (2015a: 51; 2017: 171) are 13.6–14.1 mm wide, resulting in a range of 13.1–14.8 mm for shell width in this species, which is well in agreement with the 14 mm indicated by Benson (1859) and clearly smaller than in *E. pemagatshel*.

Gude (1914: 87, fig. 35) figured the parietal and palatal callosities on the shell wall in *E. pinacis* (Fig. 8). In that species the lower parietal plica is not accompanied by a denticle in line with it and it reaches further anteriorly than the lower elongation of the parietal lamella. Only in *E. pinacis* is the adapical end of the parietal lamella conspicuously curved backwards, and both the suturalis and the basalis are relatively longer than in *E. pemagatshel*; that is they are equally long or even longer than the other palatal plicae rather than about half as long. It is uncertain to what extent these differences may be considered diagnostic.

*Endothyrella nepalica* Budha & Páll-Gergely, 2015 is usually smaller than *E. pemagatshel*, has a more domed dorsal side with a more regularly rounded body whorl, and
a strongly oblique aperture. Moreover, its palatal plicae, at least the lower palatalis and the infrapalatalis, are divided, and it lacks the striped colouration of the dorsal side.

**Distribution.** Only known from the type locality near the village of Pemagatshel in eastern Bhutan.

**Derivatio nominis.** The name *pemagatshel* is a noun in apposition, after the district of Pemagatshel.

**Discussion**

With an area of 38,394 km², the Kingdom of Bhutan is a relatively small country, but it covers an extreme variety of climatic zones and habitats. In the south its lowest point is hardly 100 m a.s.l. and in the north the highest mountain reaches 7,570 m a.s.l. High mountain chains and deep valleys result in fragmentation of the environment. This condition might trigger allopatric differentiation and speciation. Because of the complex geography and the associated problematic road conditions in various parts of the country, the inventory of molluscs, which started in 2012, has remained very incomplete. Statements about the degree of endemism and numbers of species would be premature because large parts of the country could not yet be studied. Figure 1 suggests that in Bhutan *Endothyrella* species are restricted to the lower, that is the Indo-Malayan, part of the country. Apart from that, the figure says more about human activities than about real distributional patterns. Neither *E. pemagatshel* nor *E. spirostriata* were restricted to any one particular habitat and might be more widespread, at least in the district of Pemagatshel, which is an area with limestone soils that could be visited only briefly. Because it is uncertain when a molluscan inventory of Bhutan can be continued, this article is published in its present form.

**Acknowledgements**

We are grateful to Leki Dorji, Rinchen Singye, Ugyen Tenzin, Ugyen Tenzint, and Karma Wangdi, who contributed to the collecting. We also thank Ir H.P.M.G. Menkhorst for linguistic advice and Mr E.-J. Bosch, who provided the distribution map. Two anonymous referees are gratefully acknowledged for their constructive remarks, enabling us to improve the manuscript. This work has been supported by the Global Exploration Fund of the National Geographic Society (grant GEFNE 131-14) and the Bhutan Trust Fund for Environmental Conservation (grant MB0149Y15). We also thank the Programme Director and head of the Biodiversity Information Management Programme of the National Biodiversity Centre, Dr Tashi Yangzome Dorji, who contributed in various ways to this project.

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Manuscript submitted 9 March 2018

Revised manuscript accepted 10 September 2018