

# Amazing *Paralaoma servilis* (Gastropoda, Pulmonata, Punctidae) in Nepal

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most interesting distributional data are added, together with some notes about invasiveness. A list of synonyms that are considered trustworthy is given; an exhaustive review of the distributional data is beyond the scope of this article.

The finding of *Paralaoma servilis* in a remote area along a Beni-Jomsom walking trail in Mustang district (Nepal) in 1973 is published for the first time. This is the first record for the entire Himalaya. The species has not conspicuously extended its range since then. Its occurrence in Nepal has not even been confirmed recently. Some references to the literature about this widely distributed gastropod are added. The factors underlying its impressive regional invasiveness are still unclear. A list of synonyms is provided, and a short overview is given on its worldwide distribution.

Key words: *Paralaoma*, invasiveness, distribution, Nepal, Himalaya.

## INTRODUCTION

Striking cases of convergent evolution or just synonymy, that was the issue when the first author discussed the status of several small punctid shells from biogeographically distinct parts of the world with the late Alan Solem, some decades ago. A final conclusion could not be reached those days. Meanwhile there is a general consensus that *Paralaoma servilis* (Shuttleworth, 1852) is one of the most widespread terrestrial gastropod species on earth. Here we publish the first record for Nepal and maybe even for the Himalaya, since we are not aware of any sample of *P. servilis* that is reported from that mountain range. Data regarding the native range of *P. servilis* and references to some of the

## SYSTEMATIC PART

Abbreviations: ANSP = Academy of Natural Sciences, Philadelphia, U.S.A.; NHMUK = The Natural History Museum, London, United Kingdom; NMBE = Naturhistorisches Museum der Bürgergemeinde Bern, Switzerland; SMF = Senckenberg Naturmuseum, Frankfurt am Main, Germany; ZMB = Zoologisches Museum für Naturkunde Berlin, Germany; ZMZ = Zoologisches Museum der Universität Zürich, Switzerland.

### Superfamilia Punctoidea Morse, 1864

#### Familia Punctidae Morse, 1864

#### Subfamilia Laominae Suter, 1913

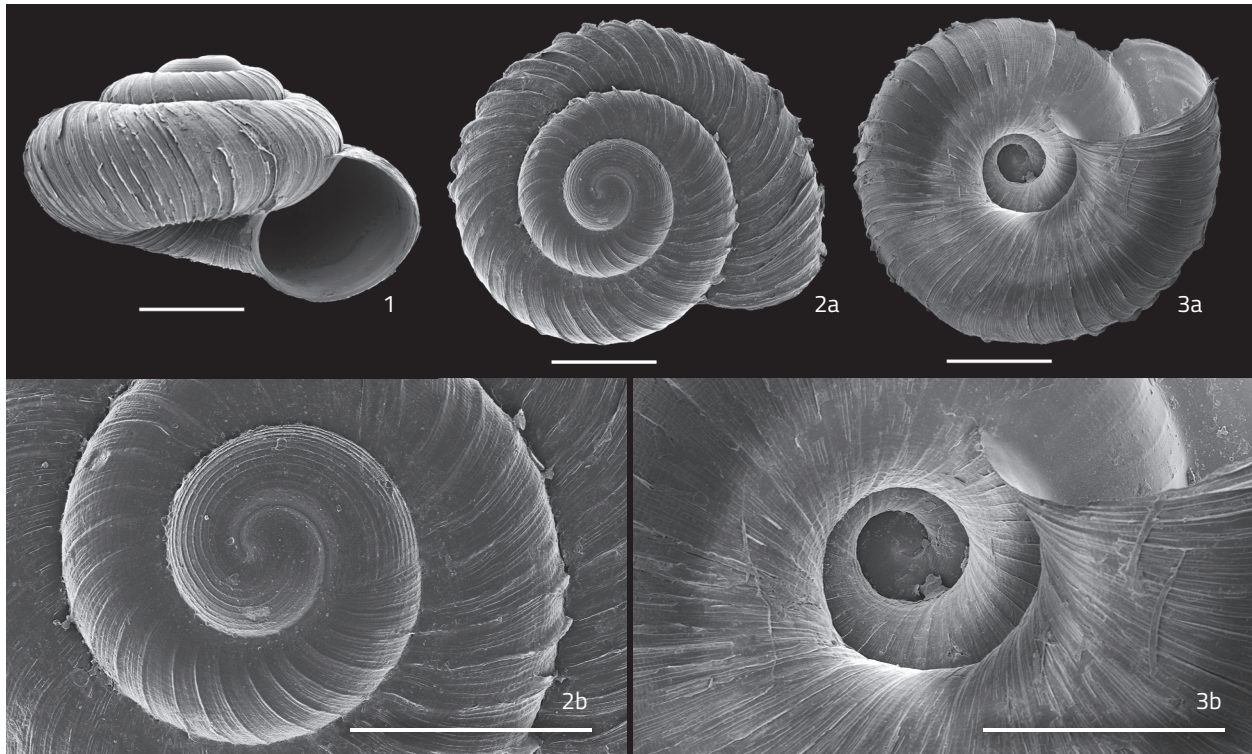
#### Genus *Paralaoma* Iredale, 1913

*Paralaoma* Iredale, 1913: 380-381. Type species (selected by Iredale, 1937: 313): *Paralaoma raoulensis* Iredale, 1913 (= *Helix servilis* Shuttleworth, 1852).

*Toltecia* Pilsbry, 1926: 116. Type species (by monotypy): *Thysanophora [Toltecia] jaliscoensis* Pilsbry, 1926 (= *Helix servilis* Shuttleworth, 1852).

*Pleuropunctum* Germain, 1928: 47. Type species (by monotypy): *Helix micropleuros* J. Paget, 1854 (= *Helix servilis* Shuttleworth, 1852).

*Subfectola* Powell, 1939: 238. Type species (by original designation): *Helix caputspinulae* Reeve, 1852.



**Figs 1-3.** *Paralaoma servilis* (Shuttleworth, 1852). Nepal, near Ghasa in the valley of the Kali Gandaki, c. 2000 a.s.l. next to a brooklet and a small wall; P.G.N. Kramers & E. van der Pol leg., iv.1973. Photos (each position from a different shell) by Ms B.J. van Heuven. All scale bars: 500  $\mu$ m.

***Paralaoma servilis* (Shuttleworth, 1852)**

(Figs 1-3)

*Helix* [*Helicella*] *pusilla* R.T. Lowe, 1831: 46, pl. 5 fig. 17 (shell).

Type locality: “in Maderae sylvis”. Primary homonym of *Helix pusilla* Vallot, 1801 and *Helix pusilla* Fleming, 1828.

*Helix tenuicostata* L. Pfeiffer, 1846: 68. Type locality: “Sardinia”. Primary homonym of *Helix tenuicostata* Philippi, 1845. Note: name attributed to Shuttleworth.

*Helix servilis* Shuttleworth, 1852: 140. Type locality: “Ad saxa prope Garachico, Teneriffa, et in Palma”. Syntypes NMBE 20370/51 + NMBE 20744/1 + ZMZ 503343/6 (Neubert & Gosteli, 2003: 49, pl. 15 fig. 3; Neubert & Gosteli, 2005: 24).

*Helix caputspinulae* Reeve, 1852: pl. 133 fig. 818 + explanation of plate (not paginated). Type locality: “New Zealand”. Lectotype (see Brook & Ablett, 2019: 69, pl. 8 fig. A) NHMUK 1962724 (note: lectotype fixed by inference of holotype (ICZN Article 74.6) by Climo, 1981: 9-10).

*Helix epsilon* L. Pfeiffer, 1853: 97. Type locality: “in Nova Seelandia”. Syntype NHMUK 1962724 = lectotype *Helix caputspinulae* Reeve, 1852 (see Brook & Ablett, 2019: 70, pl. 8 fig. A).

*Helix micropleuros* J. Paget, 1854: 454. Type locality: “on the dead holly leaves on some waste ground, called the Bois de la Moures, about a quarter of a mile south of the high-

road between Montpellier and Mauguio, in the south of France”.

*Helix* [*Euromphala*] *pusilla* var. *annulata* R.T. Lowe, 1855: 176. Type locality: not specified, but for the species “in Madera et in Ins. Des. Majore” is mentioned.

*Helix poupillieri* Bourguignat, 1863: 181-182, pl. 19 figs 5-8 (shell). Type locality: “Habite sous les feuilles, sous les pierres, dans les endroits humides le long de la Rassauta, près d’Alger”.

*Helix conspectum* Bland, 1865: 163-164, fig. 7 (shell). Type locality: “San Francisco, California”.

*Helix* (*Patula*) *cryophila* E. von Martens, 1865: 182-183. Type locality: “Abyssinische Provinz Simen, bei Bayeta, 10000 F. über dem Meer” [= Ethiopia: Beieda east of Ras Dashen]. Holotype ZMB (Verdcourt, 1991: 353, 354, 372 fig. 1a-c).

*Helix salaziensis* G. Nevill, 1870: 405. Type locality: Bourbon (= Réunion), Salazie.

*Helix* [*Patula*] *hypocrita* Dohrn, 1869: 1-2. Type locality: “Habitat in insulis S. Antao, S. Vicente, S. Nicolau in locis humidis, sub lapidibus occulta, 2-4000’ supra mare” [Cabo Verde archipelago].

*Patula lederi* O. Boettger, 1880: 380. Type locality: not mentioned (title: “in regione caspia Talysch”). Lectotype (selected by Zilch in Neubert, 1998: 368, 369, figs 57-59) SMF 225643 from “Lenkoran”.

*Microphysa* (?) *pumila* Hutton, 1883: 134-135. Type locality: “Eyreton, North Canterbury”; “Christchurch”.

*Helix hottentota* Melvill & Ponsonby, 1891: 239. Type locality: “Port Elizabeth”.

*Patula atoma* Gredler, 1892: 2. Type locality: China, prov. Hunan. Lectotype (selected by Zilch, 1974: 184, pl. 8 fig. 19) Franziskaner-Gymnasium in Bolzano.

*Punctum conspectum* var. *pasadenae* Pilsbry, 1896: 21-22. Type locality: “found by Hon. Delos Arnold crawling upon a cement walk in front of his residence in Pasadena, California”. Lectotype + paralectotypes ANSP 68149.

*Punctum lederi* var. *meridionalis* O. Boettger, 1905: 102. Type locality: “im Sarus-Genist bei Adana”. Lectotype (selected by Zilch in Neubert, 1998: 368-369, figs 60-62) SMF 225176.

*Trachycystis rutilans* Melvill & Ponsonby, 1908: 135-136, pl. 7 fig. 9 (shell). Type locality: “Alexandra Park, Maritzburg, Natal”.

*Paralaoma raoulensis* Iredale, 1913: 381, pl. 18 fig. 7 (shell). Type locality: “Sunday Island, Kermadec Group”.

*Paralaoma ambigua* Iredale, 1913: 381-382, pl. 18 fig. 5 (shell). Type locality: “Sunday Island, Kermadec Group”.

*Punctum conspectum alleni* Pilsbry, 1919: 326, footnote 6. Type locality: “in a meadow at the west end of Oswego, Clackamas Co., Oregon”. Holotype ANSP 111413a.

*Thysanophora* [*Toltecia*] *jaliscoensis* Pilsbry, 1926: 116, 124-125, fig. 39 (shell). Type locality: “Mexico: Guadalajara, Jalisco”. Holotype ANSP 44927.

*Zilchogyra cleliae* Weyrauch, 1965: 124, pl. 7 fig. 3 (not 2!). Type locality: “Argentinien: Buenos Aires, nahe dem Zoologischen Garten, in einem Park zwischen Avenida Sarmiento und Avenida Figueroa, unter der losen Rinde eines Eukalyptus-Stammes”. Holotype Instituto Miguel Lillo 977.

Several other synonyms have been proposed for *P. servilis* by Smith (1992: 282-283) and Staniscic et al. (2010: 566), all from the Australian region, the region that was proposed to belong to the native area of *P. servilis*. However, all of these mentioned synonyms belong to other *Paralaoma* species (Staniscic et al., 2018: 126-127, 574). All eastern Australian records of *P. servilis* turned out to belong to *P. morti* (Cox, 1864). Apart from Tasmania, there are no confirmed records of *P. servilis* from Australia so far.

## DISTRIBUTIONAL DATA

Asia, Himalaya, Nepal. – In April 1973, nearly half a century ago, Messrs P.G.N. Kramers and E. v. d. Pol collected 13 shells of *P. servilis* in a bottom sample from near Ghasa in Nepal, in the valley of the Kali Gandaki, at approximately 2000 m altitude, next to a brooklet on a small wall.

The specimens (Figs 1-3) have the characteristic small size, discoid shape and sculpture, with microspirals that are most prominent on the protoconch and radial riblets that are restricted to the teleoconch. In 1973 the locality, situated along one of the most important trekking routes of Nepal, could only be reached via the walking trail. Only some years ago a feeder road was constructed. There are some hotels for the tourists now, but it is still a remote area. As far as known, this is the only record for *P. servilis* for the entire Himalaya. It cannot be excluded however, that the species has been mentioned from that mountain range with another name. More recent investigations in Nepal (Budha, Naggs & Backeljau, 2015) and Bhutan (Gittenberger et al., 2017) have not resulted in any records of this species. It is uncertain whether *P. servilis* still occurs near Ghasa.

Native range. – The native range of *P. servilis* has been disputed for some time. Its occurrence in Holocene sediments in New Zealand (Jones, 1984; Brook, 1999) shows that it should be considered a New Zealand element (present on North, South, Stewart, Chatham, Three Kings, Kermadec islands – see Brook & Ablett, 2019: 69). The occurrence in Pleistocene deposits in Queensland, Australia (Price & Webb, 2006: 958 – as *P. caputspinulae*) most likely belongs to *P. morti* (Cox, 1864), which is nowadays widespread in eastern Australia. The species has been reported from Réunion as being native (Griffiths & Florens, 2006: 108, 174). We consider it more likely that it is introduced in Réunion, as it is missing on the other Mascarene Islands (Mauritius, Rodrigues), and since it has not been reported from Madagascar.

Northern Asia. – The species has been reported from the eastern fringe of Northern Asia, where it has been found on Simushir and Kunashir Island (Kurile Islands), Sakhalin Island, Primorsky, as well as southern Kamchatka (Sysoev & Schileyko, 2009: 112 – as *Punctum conspectum*).

Central Asia. – The only record so far, that of Gissar Range (western Tajikistan) by Sysoev & Schileyko (2009: 113 – as *Punctum micropleuros*) is so far the closest locality to Nepal, but still c. 1800 km (as the crow flies) away from it.

Eastern Asia. – There are some conditional records for China, far away from the Himalayan region. According to Gittenberger, Menkhorst & Raven (1980: 12), *Patula atoma* Gredler, 1892, from the province of Hunan (Zilch, 1974: 184), could be *P. servilis*. Roth (1986: 25) refers to specimens from two localities in the province of Zhejiang, in the collection of the California Academy of Sciences, San Francisco, that might belong to “*Punctum* (*Toltecia*) *pusillum*” = *P. servilis*. These samples were labelled in the collection as “*Punctum orphana* [Heude]”.

Southeastern Asia. – While reconfirming the occurrence of *P. servilis* in Bali, where it is found in “primary and secondary forests on volcanic and calcareous soils at altitudes from sea level to 2900 m” (Vermeulen & Whitten, 1998: 94,

149), Nurinsiyah & Hausdorf (2019: 95) found that contrary to the opinion of Gittenberger, Menkhorst & Raven (1980: 12), *P. javana* (Möllendorff, 1897) is a distinct species.

Western Asia. – Reported from Azerbaijan (Lenkoran – described by Boettger 1880: 380 as *Patula lederi* and reported by Sysoev & Schileyko 2009: 113 as *Punctum micropleuros*), Turkey (first mentioned by Boettger 1905: 102 under the name *Punctum lederi* var. *meridionalis* from the province of Adana, but since 2000 also mentioned from the provinces Antalya, Izmir, Muğla), Jordan (Neubert et al., 2015: 195), Israel (Heller, 2009: 314) and Saudi Arabia (Asir mountain region: Baha – see Neubert, 1998: 369 as *Toltecia pusilla*).

Northern Africa. – Mentioned for the first time by Bourguignat (1863: 181-182) as *Helix poupillieri* from Algeria. In Algeria it seems to be widespread, as Seddon & Holyoak (1993: 326 – as *Toltecia pusillum*) mention they have material from “a scattered range of localities in Algeria from Oran to Annaba”. They also mention it from Morocco (debris of the Oued Martin near Tetouan).

Subsaharan Africa. – Known from Eritrea (Enjelal, Nakfa, and Mekarka = Mek’erka 20 km NNW Asmara) (Jickeli, 1874: 55 – as *Helix (Punctum) cryophila*; Neubert, 1998: 368, 370 – as *Toltecia pusilla*) and Ethiopia (described by von Martens, 1865: 182-183 as *Helix (Patula) cryophila* from Beieda). Additional records from these two countries are summarized by Bacci (1951: 78 – as *Punctum cryophilum*). Wronski & Hausdorf (2010: 94) mentioned *P. servilis* from Kenya, Tanzania and Uganda. Gittenberger, Menkhorst & Raven (1980: 12) suggested that *Helix hottentota* Melvill & Ponsonby, 1891, from southern Africa, is another junior synonym of *P. servilis*. If so, it is also distributed in South Africa, Mozambique, Congo and Malawi, with *Trachycystis rutilans* Melvill & Ponsonby, 1908 as an additional synonym (Herbert & Kilburn, 2004: 224, as *Paralaoma hottentota*; van Bruggen & Van Goethem, 2001: 161). Several other names introduced for Afrotropical “*Punctum*”-like taxa, which are sometimes referred to as probably belonging to *P. servilis*, needs to be re-investigated (de Winter, 2017: 210).

Pacific islands. – *Paralaoma servilis* once inhabited Easter Island, where it “was undoubtedly introduced since European contact” (Kirch, Christensen & Steadman, 2009: 107). Its occurrence in the Hawaiian Island was reported by Christensen, Yeung & Hayes (2012). However, the shell depicted by Christensen et al. is quite different from that of *P. servilis*, thus questioning the reliability of the record.

Atlantic islands. – The species is common on the Cape Verdes (Groh, 1983: 177-178, as *Pleuropunctum pusillum*), the Azores (Backhuys, 1975: 118-120, as *Pleuropunctum pusillum*), Madeira (including Porto Santo and Deserta Grande) (Seddon, 2008: 49, as *Paralaoma servilis*) and the Canaries (Wollaston, 1878: 331-332, as *Patula pusilla*). It has in addition been reported from St. Helena (Wollaston, 1878: 540-

541, as *Patula pusilla*), but has not been found subsequently by others (Solem, 1977: 567, as *Punctum pusillum*).

America. – Roth (1986: 25) called attention to the fact that “*Punctum pusillum*” (= *Helix conspecta* Bland, 1865; = *P. servilis*) in its wide range in North America, is on the one hand “evidently indigenous” in various remote localities, but on the other hand “distinctly anthropophilic” in its “urban occurrences” in “disturbed habitats”. It is known from Alaska, Canada (British Columbia – see Forsyth, 2004: 75-76), the western part of the United States (Washington, Idaho, Montana, Oregon, California) (e.g. Burke, 2013: 228) and Mexico (described by Pilsbry 1926: 124 as *Thysanophora [Toltecia] jaliscoensis*).

Hausdorf (2002: 128) reported its occurrence in Colombia “at the edge of native and disturbed forests, as well as in arid wasteland”. Virgillito & Miquel (2013) published additional data for South America, where *P. servilis* is known now from at least Argentina (described by Weyrauch, 1965: 124 as *Zilchogyra cleliae*), Bolivia, Brazil, Colombia, and Peru. In Cuba *P. servilis* occurs at some places in the coastal vegetation (Maceira et al., 2013: 98). It is also known from Jamaica (Rosenberg & Muratov, 2006: 140, 151).

Europe. – Welter-Schultes (2012: 203) published a distribution map for Europe while referring to this species as “Possibly worldwide or Australasian and introduced to Europe and Atlantic islands”. More detailed maps have been published for example for Spain (Cadevall & Orozco, 2016: 298) and for The Netherlands (Jansen, 2015: 85). The species is known from Sweden, Great Britain, The Netherlands, Germany, France (including Corsica), Andorra, Germany, Spain (including the Balears), Portugal, Italy (including Sardinia and Sicily), Greece (including the Aegean Islands and Crete), Cyprus, Slovenia, Croatia, Montenegro and Albania.

## DISCUSSION

Invasiveness. – *Paralaoma servilis* may expand its range very quickly. In 1979, in the first edition of the well-known fieldguide to the land snails of Britain and north-west Europe by Kerney & Cameron (1979) the species is not even mentioned. In the following Dutch edition (Kerney, Cameron & Gittenberger, 1980: 115) “*Toltecia pusilla*” is mentioned from one locality only, viz. France, Hautes-Pyrénées, Argèles-Gazost. The further spread of *P. servilis*, still referred to as *Toltecia pusilla*, can be followed in the successive German edition (Kerney, Cameron & Jungbluth, 1983: 136) and French edition (Kerney, Cameron & Bertrand, 1999: 188) of that fieldguide. In The Netherlands *P. servilis* was discovered for the first time in 2001, to get the status as a common species there within less than two decades (Jansen, 2015: 85). This cannot be explained by only

an increased awareness of the local malacologists. For Germany Schmid (2002) noticed a connection between the occurrences of *P. servilis* and transport of Mediterranean plants and particularly bamboo.

*Paralaoma servilis* may be called anthropophilic, without being restricted to the neighbourhood of human settlements. Next to extensive areas with many records, like also the Iberian peninsula (Cadevall & Orozco, 2016: 298), the species has been reported from isolated, single localities like for example the present record for the Himalaya and some occurrences in North America (Roth, 1986: 25). Apparently it has not conspicuously expanded its range in Nepal since 1973 and might even be extinct there now. Without additional fieldwork in the area, that's all to be said.

In comparison with other punctid species, *Paralaoma servilis* is nothing special to the human eye. It is unclear what specific properties, in addition to being euryoecious, make it an amazingly successful global hitch-hiker that reached both Easter Island and a remote place along a walking trail in the Nepalese Himalaya.

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