

PUPINIDAE OF JAVA (GASTROPODA: CAENOGASTROPODA)

Ayu Savitri Nurinsiyah¹, Putri Afin Nurhayati², Nova Mujiono³, Alfiah³, and Bernhard Hausdorf⁴

¹Research Center for Biosystematics and Evolution, National Research and Innovation Agency, Km.46, Jl. Raya Bogor, Cibinong, West Java, 16911 Indonesia

²Graduate Program of Animal Biosciences, Department of Biology, Faculty of Mathematics and Natural Sciences, IPB University, Bogor, West Java, 16680 Indonesia

³Museum Zoologicum Bogoriense, Directorate of Scientific Collection Management, Deputy of Infrastructure for Research and Innovation, National Research and Innovation Agency, Km.46, Jl. Raya Bogor, Cibinong, West Java, 16911 Indonesia

⁴Leibniz Institute for the Analysis of Biodiversity Change and Universität Hamburg, Martin-Luther-King-Platz 3, 20146 Hamburg, Germany

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ABSTRACT

The systematics and distribution of the family Pupinidae (Gastropoda: Cyclophoroidea) in Java is reviewed. The family is represented in Java by four species of the genus *Pupina*, *P. bipalatalis*, *P. compacta*, *P. junghuhni*, and *P. treubi*. The shells of the species are described and figured, and the distribution data of the species are summarized. We have synonymized *Pupina verbeeki* Möllendorff, 1897 with *Pupina treubi* Boettger, 1890. All of the species except *P. treubi*, which is also known from Sumatra, are endemic to Java. Most previous records of *Pupina* from Java were from the western part of the island. Our new records show that the *Pupina* species are also more widespread in the drier central and eastern parts of Java. Their conservation status is therefore Least Concern.

Key words: distribution, land snail, *Pupina*, systematics

INTRODUCTION

The Pupinidae Pfeiffer, 1853 is a family of the terrestrial operculate Cyclophoroidea (Gastropoda: Caenogastropoda) characterized by usually small, smooth, longish conical or ovoid shells with a circular aperture with a thickened peristome, which is usually interrupted by canals (Kobelt, 1902; Jirapatrasilp et al., 2022). The Pupinidae are widely distributed from southern and eastern Asia and tropical Australia to Melanesia and Micronesia (Kobelt, 1902). The oldest representative of Pupinidae is known from Mid-Cretaceous Burmese amber from northern Myanmar (Yu et al., 2018; Yu et al., 2023).

About 50 species belonging to ten genera of the Pupinidae were recorded from Indonesia (Hausdorf, 2019), but only five *Pupina* species, *P. bipalatalis*, *P. compacta*, *P. junghuhni*, *P. treubi*, and *P. verbeeki* are represented among the 263 land snail species known from Java and adjacent islands (Nurinsiyah, 2021). The current study reviews the systematics and distribution of Pupinidae from Java.



MATERIAL AND METHODS

The study is based on specimens collected in 2013–2015, and 2022 as well as the collections of the Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB), the Senckenberg Museum, Frankfurt, Germany (SMF), and Naturalis, The Netherlands (RMNH; including the former Zoologisch Museum, Amsterdam (ZMA)).

The terminology of the apertural structures follows Jirapatrasilp et al. (2022). We measured shell height (H), shell diameter (D), height of aperture (ha) and diameter of aperture (da) with an ocular micrometer (accurate to 0.05 mm) or a digital calliper, and counted the number of whorls (W) with an accuracy of 0.25 whorls following the method described by Kerney & Cameron (1979). Stacked images of the type specimens were taken with the Passport Imaging System (Dun, Palmyra, Virginia) with a Canon EOS 6D camera and processed with Helicon Focus and Adobe Photoshop software in the Zoologisches Museum of Hamburg. Voucher specimens were photographed in the Museum Zoologicum Bogoriense using a DMC5400 camera with L.A.S V4.13.0 software adapted to a Z6 APO (all from Leica Microsystems, Heerbrugg, Switzerland).

RESULTS

A total of 129 specimen lots of Pupinidae from recent fieldwork in Java and museums in Indonesia and Europe were examined. The specimens comprised four species i.e., *Pupina bipalatalis*, *P. compacta*, *P. junghuhni*, and *P. treubi*. The systematics and description of the four species are as follows.

Class Gastropoda

Subclass Caenogastropoda

Family Pupinidae Pfeiffer, 1853

Pupina Vignard, 1829

Pupina Vignard, 1829: 439, 440. Type species (by monotypy): *Pupina keraudrenii* Vignard, 1829.

Remarks: The *Pupina* species from Java were often classified in the subgenus *Tylotoechus* Kobelt & Möllendorff, 1897 (type species: *Pupina destructa* Heude, 1885; type locality Tchen-k'ou (= Cengkou), China). However, the delimitation of the subgenera of *Pupina* and their monophyly remained questionable (Jirapatrasilp et al., 2022). Therefore, we follow Jirapatrasilp et al. (2022) in using *Pupina* in a wide sense.

Key to the *Pupina* species from Java:

- 1a. Shell height ≥ 7.7 mm 2
- 1b. Shell height ≤ 7.1 mm 3
- 2a. Shell conical-ovoid; peristome slightly expanded,
anterior canal hole-shaped *Pupina compacta*
- 2b. Shell conical, peristome strongly expanded, anterior canal slit-like *Pupina junghuhni*
- 3a. Shell with two palatal teeth; anterior canal deep, slit-like *Pupina bipalatalis*
- 3b. Shell with one indistinct palatal tooth *Pupina treubi*

Pupina bipalatalis Boettger, 1890

Fig. 1a-b, 2a, Table 1

Pupina (Eupupina) bipalatalis Boettger, 1890: 156, pl. 6 fig. 6 (“Gunung Gedeh”).

Pupina (Tylotoechus) bipalatalis—Kobelt 1902: 309.

Pupina bipalatalis—Rensch 1934: 744.

Pupina (Tylotoechus) bipalatalis—Paravicini 1935: 174.

Pupina bipalatalis—van Benthem Jutting 1948: 583, figs 34A, 38.

Pupina (Tylotoechus) bipalatalis—Zilch 1957: 45, pl. 3 fig. 19.

Pupina treubi—Heryanto 2012: 196 (non Boettger, 1890).

Pupina verbeecki—Heryanto 2012: 196 (non Möllendorff, 1897).

Pupina bipalatalis—Heryanto 2020: 3.

Pupina compacta—Heryanto 2020: 3 (non Möllendorff, 1897).

Shell. Conical-ovoid; with 4.5–5 whorls separated by a shallow suture; protoconch smooth; teleoconch smooth; corneous; glossy; subtranslucent; aperture rounded; upper insertion of the peristome slightly descending towards aperture; upper part of palatal wall receding; peristome hardly expanded, strongly thickened; upper third of the palatal margin of peristome with two teeth; lower palatal tooth extending into a palatal fold; upper palatal tooth forming a narrow posterior canal with the high parietal tooth; parietal tooth connected with the columellar tooth by a thin callus; gutter-shaped columellar tooth separated from the palatal wall by a deep, slit-like anterior canal; umbilicus closed.

Habitat. Forests (also in agroforests, combinations of wood vegetation and agriculture) and bamboo in karst and volcanic areas at 200–1700 m a.s.l.

Type material. Indonesia, Java, West Java: Mt. Gede, 1350 m a.s.l. 06°44'29"S 107°00'06"E (lectotype [designated by Zilch 1957] SMF 110822); Mt. Salak 06°44'41"S 106°42'37"E (paralectotype, SMF 110823).

Other material. Indonesia, Java, West Java: Mt. Gede, 1000 m a.s.l., 6°50'S 106°55'E (SMF 110827); Pos 1 Jalur Gunung Putri, Gunung Gede Pangrango National Park 6°46'03"S 107°00'05"E 1880 m a.s.l. (MZB 23487); Pos 2 Jalur Gunung Putri, Gunung Gede Pangrango National Park 6°46'11"S 106°59'53"E 1999 m a.s.l. (MZB 23445); Rarahan near Cibodas, Mt. Gede, 6°43'S 107°00'E (SMF 201089, ZMA 68755, voucher to van Benthem Jutting 1948); Cibodas, Cibeureum waterfall, 1700 m a.s.l., 6°45'14"S 106°59'09"E (SMF 201090); Cisarua, 1300 m a.s.l. 06°50'55"S 106°58'25"E (MZB 4159); Mt. Salak, Pasir Gede, 1246 m a.s.l., 06°44'17"S 106°42'53"E (MZB 20003, voucher to Nurinsiyah et al., 2019); Mt. Salak, Pasir Kaso, 1185 m a.s.l., 06°44'51"S 106°42'45"E (MZB 20035, voucher to Nurinsiyah et al., 2019); Telaga Warna, 6°42'07"S 106°59'48"E (ZMA 317769); Ciampea, Cibodas Hill, 6°33'05"S 106°41'09"E (ZMA 68760, voucher to van Benthem Jutting 1948); Jasinga, Janlappa nature reserve 6°25'26"S 106°38'36"E (ZMA 317768); Pelabuhan Ratu/Palabuan, 6°59'S 106°33'E (SMF 110825); Cisolok, near Pelabuhan Ratu, 6°56'S 106°27'E (ZMA 68764, voucher to van Benthem Jutting 1948); Mt. Tangkuban Prahau, 1000 m a.s.l., 6°45'S 107°37'E (ZMA 68759,

68763, voucher to van Benthem Jutting 1948); Rancabali, Kawah Putih 07°09'15"S 107°22'15"E (MZB 14379, 14380); Ciwidey, 1100 m a.s.l. 7°05'S 107°27'E (ZMA 68761, voucher to van Benthem Jutting 1948); Mt. Burangrang 06°44'07"S 107°35'05"E

(ZMA 317767); Garut, Talaga Bodas, 7°11'S 108°03'E (MZB 18018, 18026 vouchers to Heryanto 2020); Mt. Cikuray, 1500 m a.s.l. 7°19'S 107°52'E (SMF 110826, voucher to van Benthem Jutting 1948); Karangnunggal, 237 m a.s.l., 07°40'00"S 108°07'00"E (MZB 20566); Mt. Malabar, 7°8'S 107°38'E (Paravicini 1935). – Central Java: Mt. Slamet, Batu Raden 07°19'S 109°12'E (MZB 15494, vouchers to Heryanto 2012). – Yogyakarta: Kulonprogo, Sibolong Hill, 721 m a.s.l., 07°45'00"S 110°07'00"E (MZB 21296; ZMH 148303); Kulonprogo, Watu Blencong, 700 m a.s.l. 07°46'00"S 110°06'56"E (MZB 22888).

Distribution. *Pupina bipalatalis* is endemic to Java Island. It was previously known only from West Java. Our new records show that the species is distributed eastwards to Central Java and Yogyakarta (Fig. 2a).

Pupina compacta Möllendorff, 1897

Fig. 1c, 2b, Table 1

Pupina compacta Möllendorff, 1897: 92 (“Java”).

Pupina (Tylotoechus) compacta—Kobelt 1902: 310.

Pupina compacta—Rensch 1934: 758.

Pupina compacta—van Benthem Jutting 1948: 583, figs 34B, 39.

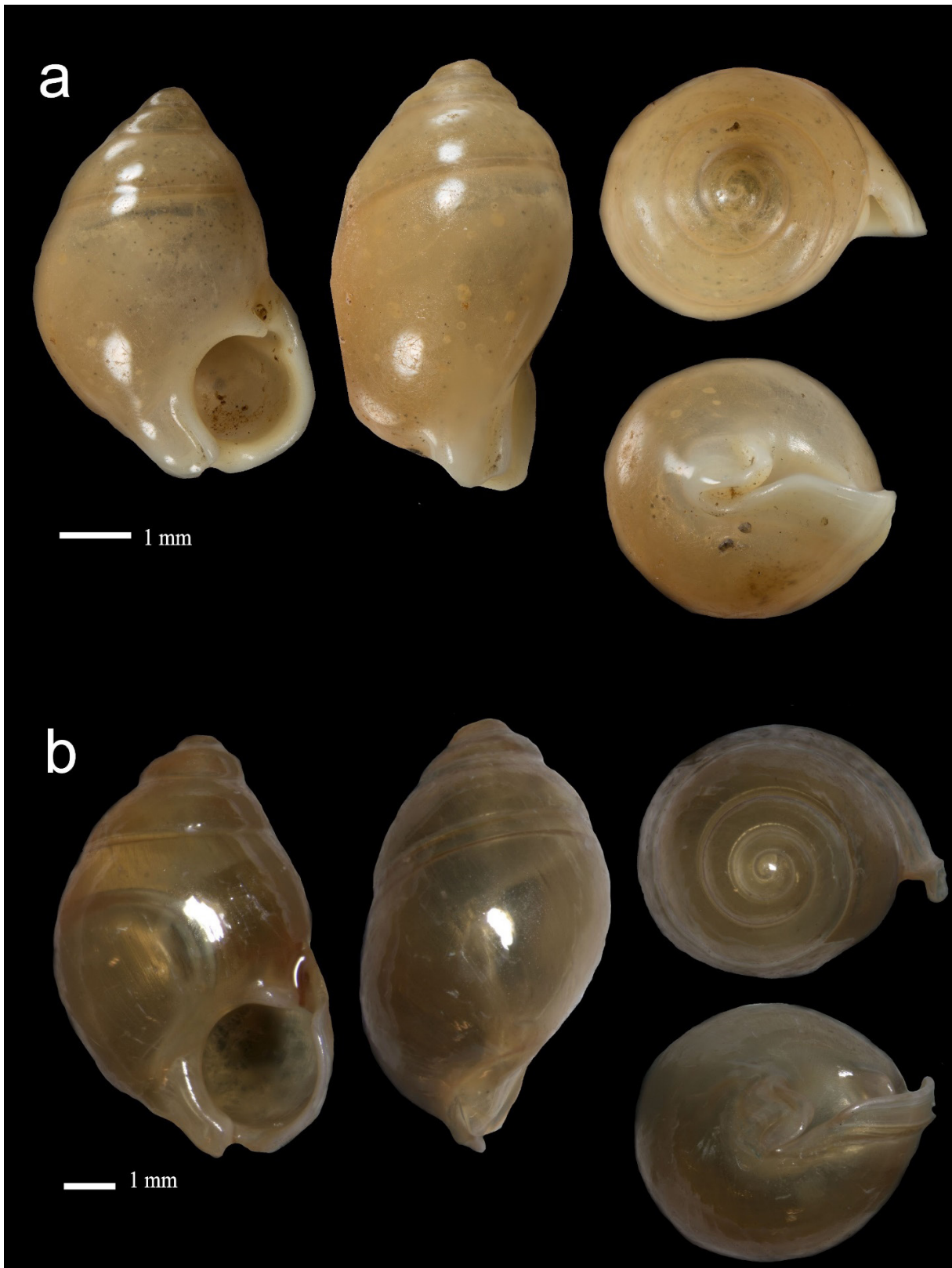
Pupina (Tylotoechus) compacta—Zilch 1957: 45, pl. 3 fig. 20.

Shell. Conical-ovoid; with 5 whorls separated by a shallow suture; protoconch smooth; teleoconch smooth; corneous; glossy; subtranslucent; aperture rounded; upper insertion of the peristome slightly descending towards aperture; upper part of palatal wall slightly receding; peristome slightly expanded, thickened; upper palatal margin of peristome forming a posterior canal with the low parietal tooth; parietal tooth connected with the columellar tooth by a thin callus; gutter-shaped columellar tooth separated from the palatal wall by a hole-shaped anterior canal; umbilicus closed.

Habitat. Forests at 700–2100 m a.s.l.

Type material. Indonesia, Java, East Java: Tengger Mountains 7°55'00"S 112°55'00"E (lectotype SMF 110830; paralectotypes SMF 110831/5).

Other material. Indonesia, Java, West Java: Pelabuhan Ratu/Palabuan 6°59'S 106°33'E (SMF 110825). – Yogyakarta: Kulonprogo, Watu Blencong, 700 m a.s.l. 07°46'00"S 110°06'56"E (MZB 21360)– East Java: Tengger Mountain, 1220 m a.s.l. 7°55'00"S 112°55'00"E (SMF 110832, voucher to van Benthem Jutting 1948); Dieng Plateau, 2000 m a.s.l. 7°13'00"S 109°54'00"E (SMF 110833, voucher to Rensch 1934); Ranu Pane, Mt. Semeru, 2100 m a.s.l. 8°0'43"S 112°57'8"E (MZB 22491); Coban Trisula, Mt. Semeru, 1500 m a.s.l. 08°00'7"S 112°52'14"E (MZB 22492); Taman Hutan Raya, Coban Watu Ondo 07°44'02"S 112°31'44"E (MZB 22885); Gantasan, Ijen Geopark, 959 m a.s.l. 08°07'40.31"S 114°14'51.95"E (MZB 22886; 22887).



Figures 1a-b: *Pupina bipalatalis* Boettger, 1890 (a) West Java: Mt. Gede, 1350 m a.s.l (lectotype SMF 110822). (b) West Java: Mt. Gede, 1350 m a.s.l (MZB 23445).



Figure 1c-d: (c) *Pupina compacta* Möllendorff, 1897, East Java: Tengger Mountain (lectotype SMF 110830); (d) *Pupina junghuhni* Martens, 1867, West Java: Mt. Salak (lectotype of *P. sucinacia* Boettger, 1890 SMF 110822).

Distribution. *Pupina compacta* is endemic to Java Island. It was previously only known from the Dieng and Tengger Mountains (van Benthem Jutting, 1948). The new records show that the species is distributed from West to East Java and also occurs at lower altitude as in Pelabuhan Ratu or Kulonprogo (Fig 2b).

Pupina junghuhni Martens, 1867

Fig. 1d, 2c, Table 1

Pupina (Rhegistoma) junghuhni Martens, 1867: 156 (“Java”).

Pupina (Eupupina) sucinacia Boettger, 1890: 157, pl. 6 fig. 7 (“Gunung Salak”).

Pupina junghuhni—Schepman 1898: 84.

Pupina (Tylotoechus) junghuhni—Kobelt 1902: 316.

Pupina (Tylotoechus) sucinacia—Kobelt 1902: 322.

Pupina junghuhni—van Benthem Jutting 1948: 580, figs 33, 34C, 35.

Pupina (Tylotoechus) junghuhni—Zilch 1957: 47, pl. 3 fig. 21.

Pupina junghuhni—Heryanto 2001: 767.

Pupina junghuhni—Heryanto 2012: 196.

Pupina compacta—Heryanto 2012: 196 (non Möllendorff, 1897).

Pupina junghuhni—Heryanto 2017: 63.

Shell. Conical; with 5 whorls separated by a shallow suture; protoconch smooth; teleoconch smooth; yellowish; glossy; subtranslucent; aperture rounded; upper insertion of the peristome slightly descending towards aperture; upper part of palatal wall slightly receding; peristome strongly expanded, thickened; upper palatal margin of peristome forming a posterior canal with the low parietal tooth; parietal tooth connected with the columellar tooth by a thin callus; columellar tooth separated from the palatal wall by a low, slit-like anterior canal; umbilicus closed.

Habitat. Forests on volcanic and limestone hills at 0–1500 m a.s.l.

Type material. Indonesia, Java, West Java: Mt. Salak 06°44’41”S 106°42’37”E (lectotype of *P. sucinacia* [designated by Zilch 1957] SMF 110794; paralectotypes of *P. sucinacia* SMF 110795/3, 110796/5, SMF 110797/2).

Other material. Indonesia, Java, Banten: Mt. Karang 700 m a.s.l. 06°15’55”S 106°04’48”E (ZMA 2503349, voucher to van Benthem Jutting 1948). – West Java: Mt. Salak 1000 m a.s.l. 06°44’41”S 106°42’37”E (SMF 110798, RMNH 156393, voucher to van Benthem Jutting 1948); Cigarehong, Sirnaresmi, Halimun Salak National Park 6°48’55”S 106°27’14”E (MZB 12041, 12057 vouchers to Heryanto, 2001); Sirnaresmi, Halimun Salak National Park 06°50’14”S 106°26’57”E (MZB 11517, vouchers to Heryanto, 2001); Purasari, Cianten, Halimun Salak National Park 6°41’56”S 106°36’06”E (MZB 12056, vouchers to Heryanto, 2001); Cisolok, Ciptarasa, Halimun Salak National Park 06°51’S 106°31’E (MZB 12058, vouchers to Heryanto, 2001); Cikaniki, Halimun Salak National Park, 06°44’S 106°32’E (MZB 20108, voucher to

Nurinsiyah et al., 2019; Qodri et al, 2020); Mt. Gede, 06°44'29"S 107°00'06"E (SMF 110808); Puncak Pas, 1000 m a.s.l. 6°43'S 107°00'E (RMNH 156394); Cisarua, 1000 m a.s.l. 06°41'S 106°57'E (ZMA 317779); South Cisarua, 800 m a.s.l. 06°41'57"S 106°56'55"E (ZMA 68765, voucher to van Benthem Jutting 1948); Ciapus, Sukamantri 06°35'48"S 106°44'50"E (MZB 9758); Cigudeg 06°27'S 106°31'E (MZB 12051, 12250); Jampang, 600 m a.s.l. 07°05'S 106°49'E (SMF 110799); Sukanegara 07°05'53"S 107°07'51"E (MZB 495); Jampang, limestone hill 07°06'S 107°08'E (ZMA 68766, voucher to van Benthem Jutting 1948); Jasinga, Dungus Iwul 06°31'S 106°24'E (ZMA 31777); Central Jampang, Wangun, 800 m a.s.l. 07°06'48"S 106°47'19"E (SMF 110810, ZMA 317778, voucher to van Benthem Jutting 1948); Mt. Jampang, 1100 m a.s.l. 07°26'S 107°37'E (SMF 110800); Sukabumi, 700 m a.s.l. 06°55'23"S 106°55'37"E (MZB 636, SMF 110806, 171615, ZMA 317776); Pelabuhan Ratu/Palabuan 6°59'S 106°33'E (MZB 9824, SMF 110801, ZMA 423108); Cisolak, Pelabuhan Ratu, 200 m a.s.l. 6°56'S 106°27'E (ZMA 33970, 68768, voucher to van Benthem Jutting 1948); Pelabuhan Ratu, Cisarakan forest, 400-500 m a.s.l. 07°04'17"S 106°34'38"E (MZB 7195); Mt. Cikuray, 1500 m a.s.l. 7°18'S 107°52'E (SMF 110802); Cisewu, 600 m a.s.l. 07°22'39"S 107°31'24"E (SMF 110805); slope of Mt. Galunggung 1400 m a.s.l. 7°16'S 108°04'E (MZB 635, RMNH 156395, voucher to van Benthem Jutting 1948); Ciamis, Mt. Sawal wildlife reserve 7°12'39"S 108°15'21"E 1031 m asl (MZB 16514, 16518, vouchers to Heryanto 2017); Mt. Sawal near Ciamis 800 m a.s.l. 7°11'S 108°16'E (RMNH 156392, voucher to van Benthem Jutting 1948). – Central Java: Mt. Slamet 7°19'S 109°12'E (MZB 15424, 15502, vouchers to Heryanto 2012). – East Java: Malang 450 m a.s.l. 07°58'47"S 112°37'49"E (ZMA 33971, voucher to van Benthem Jutting 1948).

Distribution. *Pupina junghuhni* is endemic to Java Island and distributed from Banten to East Java (Fig 2c).

Pupina treubi Boettger, 1890

Figures 1e-g, 2d, Table 1

Pupina (Eupupina) treubi Boettger, 1890: 157, pl. 6 fig. 8 (“Gunung Gedeh”).

Pupina verbeeki Möllendorff, 1897: 92 (“Java”).

Pupina (Tylotoechus) treubi—Kobelt 1902: 324.

Pupina (Tylotoechus) verbeeki—Kobelt 1902: 324.

Pupina (Tylotoechus) treubi—Leschke 1914: 215.

Pupina (Tylotoechus) treubii [sic]—Paravicini 1935: 174.

Pupina treubi—van Benthem Jutting 1941: 275.

Pupina treubi—van Benthem Jutting 1948: 581, figs 34D, 36.

Pupina verbeeki—van Benthem Jutting 1948: 582, figs 34E, 37.

Pupina (Tylotoechus) treubi—Zilch 1957: 45, pl. 3 fig. 23.

Pupina (Tylotoechus) verbeeki—Zilch 1957: 48, pl. 3 fig. 23.

Pupina artata—van Benthem Jutting 1959: 73 (non Benson, 1856).

Pupina treubi—Maassen 2002: 282, text-fig. 5, pl. 30 fig. 2.

Pupina treubi—Heryanto 2001: 767.

Pupina treubi—Heryanto 2008: 362.

Pupina treubi—Heryanto 2012: 196.

Pupina treubi—Heryanto 2017: 63.

Shell. Conical-ovoid; with 4.5-5 whorls separated by a shallow suture; protoconch smooth; teleoconch smooth but sometimes minutely punctured; greenish or yellowish; glossy; subtranslucent; aperture rounded; upper insertion of the peristome slightly descending towards aperture; upper part of palatal wall slightly receding; peristome hardly expanded, thickened; upper palatal margin of peristome with a weak palatal tooth forming a narrow posterior canal with the inclined sometimes vertical, pointed parietal tooth; parietal tooth connected with the columellar tooth by a thin callus; tongue-shaped columellar tooth separated from the palatal wall by anterior canal; umbilicus closed.

Habitat. Forests on volcanic and limestone areas at 34–1600 m a.s.l.

Remarks. The delimitation of *P. treubi* Boettger, 1890 and *P. verbeeki* (Möllendorff, 1897) has to be reconsidered. The lectotype of *Pupina verbeeki* differs from *P. treubi* in its smaller size and the vertical parietal tooth, which is inclined in *P. treubi*. However, *P. treubi* is variable in size (Table 1). We have not found any specimens with a vertical parietal tooth corresponding to *P. verbeeki* during recent fieldwork in Java or in museum collections, except for the type series of *P. verbeeki*. Therefore, *P. verbeeki* might be based on unusual specimens of *P. treubi* and is here provisionally considered a synonym of *P. treubi*. The issue is further complicated by the occurrence of similar forms on Sumatra. Maassen (2002) identified a form with a vertical parietal tooth from West and North Sumatra resembling *P. verbeeki* as *P. treubi*. He also reported this taxon from Gunung Singgalang, the type locality of *Pupina turgidula* Dohrn, 1881. On the other hand, Maassen (2002) figured a form with an inclined parietal tooth resembling *P. treubi* as *P. turgidula*. The type material of *P. turgidula* is lost. Specimens from Gunung Singgalang should be re-examined to assess the variability of the taxon and a neotype of *P. turgidula* should be designated to clarify its identity. If *P. turgidula* is found to be conspecific with *P. treubi*, then *P. turgidula* would be the valid name for this species.

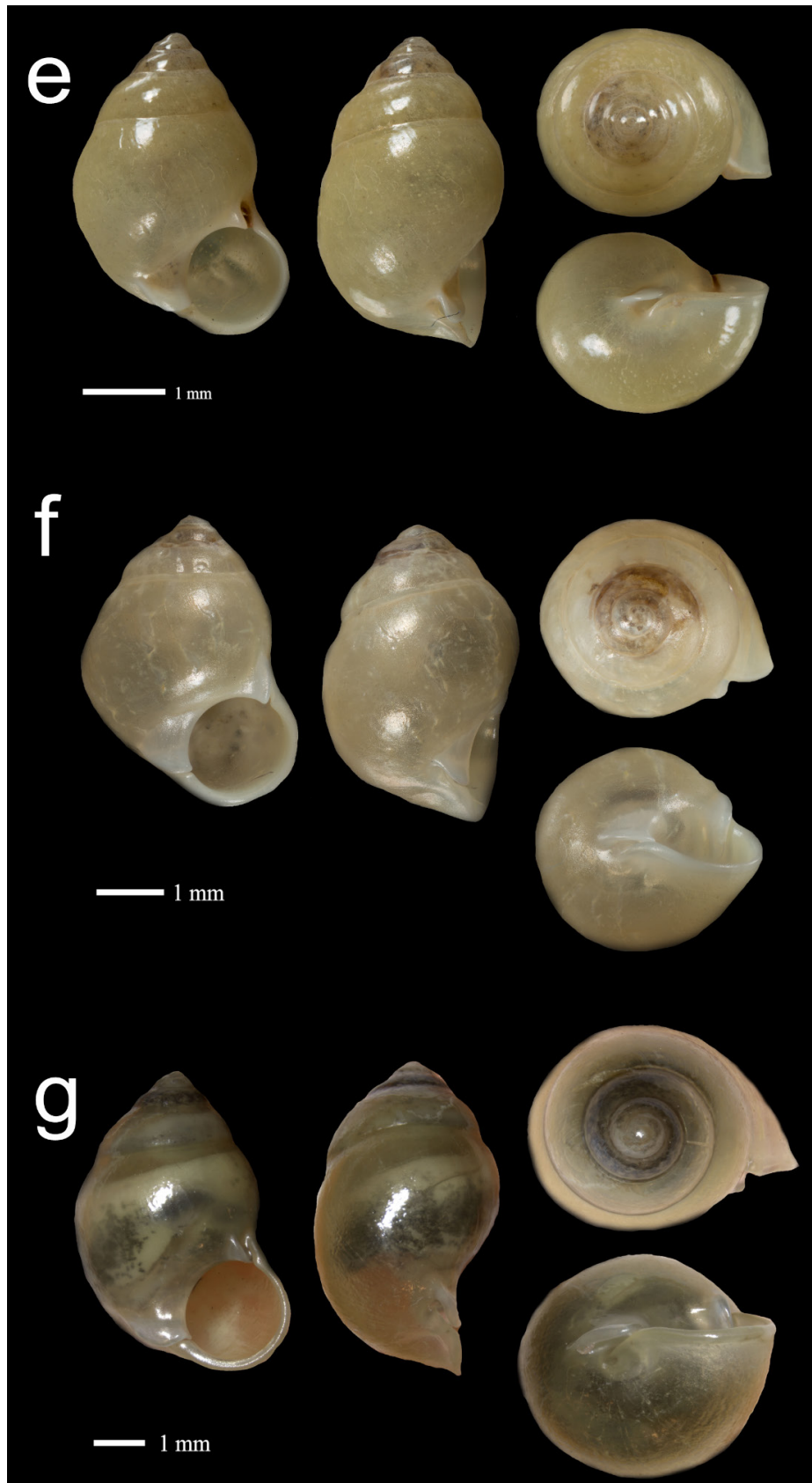
Type material. Indonesia, Java, West Java: Mt. Gede, 06°44'29"S 107°00'06"E (lectotype of *P. treubi* [designated by Zilch 1957] SMF 110811; paralectotypes SMF 110812/5, 155492/98); Mt. Salak 06°44'41"S 106°42'37"E (paralectotypes of *P. treubi* SMF 110813/3, 110814/8, 110815/2, 110816/6). Indonesia, Java (lectotype of *P. verbeeki* [designated by Zilch 1957] SMF 110837; paralectotypes SMF 110838/6, ZMA 34012/2).

Other material. Indonesia, Java, Banten: Sawarna, Kadir Cave, 34 m a.s.l. 06°58'42"S 106°19'18"E (MZB 20832). – West Java: Mt. Gede, 900 m a.s.l. 06°47'S 106°59'E (SMF 110818, 110839, voucher to van Benthem Jutting 1948 (described as *P. verbeeki*)); Mt. Gede, Cibodas, 1400 m a.s.l. 6°45'S 107°01'E (ZMA 317803, 68786, 68783, voucher to van Benthem Jutting 1948); Pancoran Mas, 1400 m a.s.l. 6°42'S 106°59'E (ZMA 68782, ZMH 28234, voucher to van Benthem Jutting 1948); Pos 1 Jalur Gunung Putri, Gunung Gede Pangrango National Park 6°46'03"S 107°00'05"E 1880 m a.s.l. (MZB 23446, 23447, 23448); Telaga Warna 6°42'07"S 106°59'48"E (ZMA 317805 described as *P. verbeeki*); Mt. Pangrango, 6°46'S 106°58'E

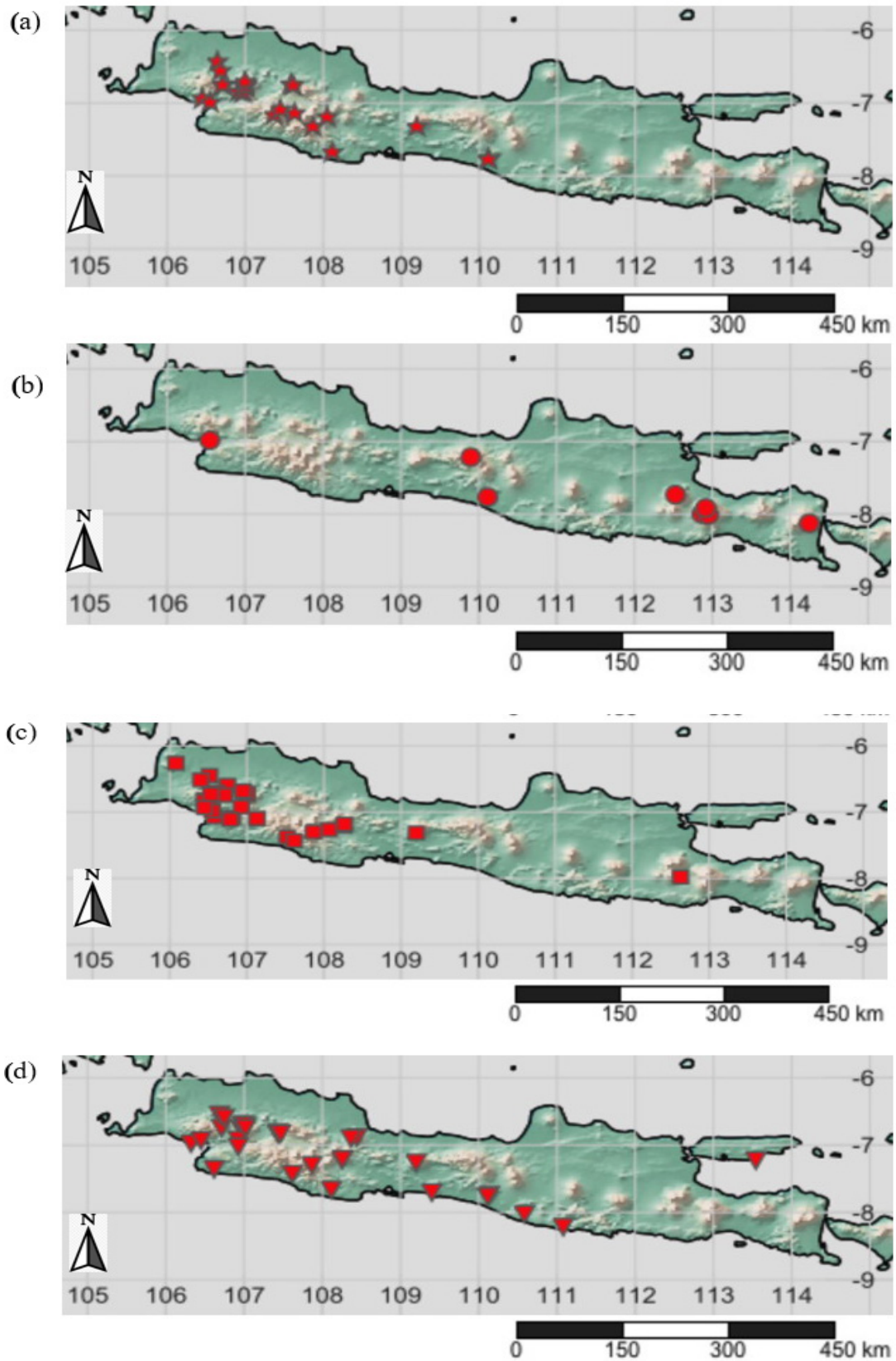
(Paravicini 1935); Mt. Salak, Blok Pameungpeuk, 1208 m a.s.l. 06°44'41''S 106°42'37''E (MZB 19984, voucher to Nurinsiyah et al., 2019); Sukabumi 6°55'23''S 106°55'37''E (RMNH 156629, SMF 110821); Sukabumi, Siluman Cave 7°01'31''S 106°55'35''E (MZB 13721); Cibitung, Cikaso Waterfall, 58 m a.s.l., 07°21'37''S 106°37'05''E (MZB 20563); Cisolok, Pelabuhan Ratu 6°56'S 106°27'E (ZMA 68784, voucher to van Benthem Jutting 1948); Ciampea, 6°33'05''S 106°41'09''E (ZMA 33997, voucher to van Benthem Jutting 1948); Sukamantri, Ciapus 6°35'48''S 106°44'50''E (MZB 9757); Padalarang 6°50'S 107°28'E (RMNH 46114); Mt. Masigit, 500 m a.s.l. 6°50'S 107°26'E (ZMA 68787, voucher to van Benthem Jutting 1948); Mt. Pawon 6°49'S 107°26'E (ZMA 68788, voucher to van Benthem Jutting 1948); Mt. Cikuray, 1400 m a.s.l. 7°18'S 107°52'E (SMF 110820); Garut, Mt. Jampang, 1100 m a.s.l. 7°26'S 107°37'E (SMF 110819); Karangnunggal, Sela Dower Cave, 237 m a.s.l. 07°40'00''S 108°07'00''E (MZB 20564); Ciamis, Mt. Sawal, 7°13'S 108°15'E (MZB 16430, MZB 16474 vouchers to Heryanto 2017); Majalengka, Argamukti, Mt. Ciremai National Park, 6°54'S 108°22'E (Heryanto, 2008);

Linggarjati Village, Kuningan, Gunung Ciremai National Park 6°53'20''S 108°26'30''E (Heryanto, 2008). – Central Java: Mt. Slamet 7°16'S 109°12'E (MZB 15466, vouchers to Heryanto 2012); Karangbolong, Petruk Cave 104 m a.s.l., 07°42'21''S 109°24'03''E (MZB 20565). – Yogyakarta: Gunungkidul, Mulo Village 08°01'45''S 110°35'10''E (MZB 13772); Kulonprogo, Sibolong 716 m a.s.l., 07°44'44''S 110°08'02''E (MZB 17696, 20369, ZMH 148142); Kulonprogo, Watu Blencong, 700 m a.s.l. 07°46'00''S 110°06'56''E (MZB 21632). – East Java: Pacitan, Teleng 08°13'08''S 111°04'50''E (MZB 13434); Madura Island, Jumiang 07°13'53''S 113°32'33''E (van Benthem Jutting, 1941).

Distribution. *Pupina treubi* is widespread throughout Java. It is also reported from West and North Sumatra (Maassen, 2002) and Enggano Island (van Benthem Jutting, 1959) (Fig 2d).



Figures 1e-g: *Pupina treubi* Boettger, 1890 (e), West Java: Mt. Gede, (lectotype of *Pupina treubi* Boettger, 1890 SMF 110811); (f) Java (lectotype of *Pupina verbeeki* Möllendorff, 1897 SMF 110837); (g) West Java: Mt. Gede, (MZB 23446).



Figures 2: Distribution of *Pupina* species in Java. (a) *Pupina bialatalis* Boettger, 1890; (b) *Pupina compacta* Möllendorff, 1897; (c) *Pupina junghuhni* Martens, 1867; (d) *Pupina treubi* Boettger, 1890.

Table 1. Shell measurements of *Pupina* species (in mm). Abbreviations: D = shell diameter; H = shell height; da = diameter of the aperture; ha = height of the aperture; max = maximum; min = minimum; n = number of measured specimens; std= standard deviation; W = number of whorls.

	D	H	da	ha	W
<i>Pupina bialatalis</i> , n=15					
min	2.8	4.4	0.9	1.1	5.0
max	4.2	5.9	1.4	1.7	5.0
mean	3.4	5.2	1.1	1.4	5.0
std	0.4	0.4	0.2	0.2	0.0
<i>Pupina compacta</i> , n=10					
min	5.0	7.7	2.0	2.4	5.0
max	6.2	8.6	2.6	3.3	5.0
mean	5.4	8.2	2.3	2.9	5.0
std	0.4	0.3	0.2	0.2	0.0
<i>Pupina junghuhni</i> , n=17					
min	5.7	7.8	2.45	2.9	5.0
max	9.1	10.6	4.0	4.3	5.0
mean	7.1	9.4	2.8	3.5	5.0
std	0.9	0.8	0.4	0.0	0.0
<i>Pupina treubi</i> , n=11					
min	3.6	5.1	1.4	1.7	4.5
max	4.9	7.1	2.1	2.4	5.0
mean	4.3	6.2	1.7	1.9	5.0
std	0.4	0.5	0.2	0.2	0.0

DISCUSSION

Most previous records of *Pupina* from Java were from the western part of the island. Our new distribution records show that all four *Pupina* species are also widespread in the drier central and eastern parts of Java. *Pupina bialatalis*, for example, was previously recorded only from the western part of Java. The current study showed that the species has wider distribution to central part of Java. Given that all four *Pupina* species from Java are widespread and common on the island, we classify their conservation status as Least Concern.

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