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On the taxonomy and distribution of *Papyriscala tricincta* Golikov in Golikov et Scarlato, 1967 (Gastropoda: Epitoniidae)

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ABSTRACT. Additional specimens of *Papyriscala tricincta* were collected for the first time since original description of the species. Comparison of the shells with several similar Indo-Pacific species allowed us to conclude that *P. tricincta* is a junior subjective synonym of the broadly distributed *Epitonium clementinum*.

Introduction

Papyriscala tricincta Golikov in Golikov et Scarlato, 1967 was described on the basis of four empty shells collected in the Posyeta Bay (Peter the Great Bay, Sea of Japan) in 8-19 m. The species was not referred to in the Russian taxonomic literature since original description. It was included in the *Red Data Book of the Russian Federation* [2000] and the *Red Data Book of the Primorsky Krai* [2005] as a species of the 4th category ("species with undefined status").

The original description was illustrated by line drawing, while the photograph of the holotype was first published in Kantor and Sysoev [2006], although no new data were provided in addition to the original description. The mentioned authors [2006] also pointed to the similarity of *Papyriscala tricincta* to *Papyriscala clementina* (Grateloup, 1840), but no formal taxonomic action had been proposed.

Recently, several specimens were collected in Sukhodol Inlet of the Ussuriiskii Bay (Sea of Japan) by S.V. Yavnov in 2004 and placed at the authors' disposal. Specimens were washed alive on shore after the storm and at the time of collecting still have the animal and opercula. Comparison of the shells with that of the holotype undoubtedly proved their conspecificity.

Since the new edition of the Red Data book is in preparation, it is a perfect timing to clarify the position of *P. tricincta*.

Material and methods

Sukhodol Inlet (approximate coordinates 43º12'N, 132º23'E) is situated on the east coast of the Ussuriiskii Bay between the capes Azar'eva and Krasnyi (2.8 miles south from the former) of Peter the Great Bay, Sea of Japan and is approximately 130 km north-east from Posyeta Bay, the type locality of *Papyriscala tricincta.*

Four live specimens were collected, shell length 18.2-20.7 mm (see Table 1). Material deposited in Museum of the Institute of Marine Biology and Zoological Museum of Moscow State University.

Abbreviations and conventions

MIMB – Museum of the A.V. Zhirmunsky Institute of Marine Biology, Far East Branch, Russian Academy of Sciences, Vladivostok, Russian Federation;

NHMUK – Natural History Museum, London, United Kingdom;

SL – shell length;

ZIN – Zoological Institution of Russian Academy of Sciences, St.-Petersburg, Russian Federation.

Taxonomy

Epitonium Röding, 1798

Röding, 1798: 91.

Type species: *Turbo scalaris* Linnaeus, 1758, subsequent designation by Suter, 1913.

Remarks. The status of *Papyriscala* de Boury, 1909 (type species: *Scalaria latifasciata* G.B. Sowerby II, 1874, by original designation) is still ambiguous. While some authors [eg. Nakayama, 2003] accept the taxon as a subgenus of *Epitonium*, the latest publications [Brown, Neville, 2015] consider it as a synonym of *Epitonium*. We follow here the latest opinion.

Epitonium clementinum (Grateloup, 1840)
(Fig. 1)

Scalaria clementina Grateloup, 1840: 170, pl. 3, fig. 4.
? *Scalaria trifasciata* G.B. Sowerby II, 1844: 90, pl. 33, figs 42–44.
? *Scalaria latifasciata* G.B. Sowerby II, 1874: species 117, pl. 15, figs 117 a, b.
Scalaria grateloupeana Nyst, 1871:110. [An unnecessary replacement name for *Scalaria clementina* Grateloup, 1840, that was proposed under the assumption that *S. clementina* was a junior secondary homonym of *Melanopsis clementina* Michelin, 1833: unnumbered page, pl. 29 (fossil)].
Papyriscala tricincta Golikov in Golikov, Scarlato, 1967: 49, fig. 37 [non *Epitonium tricinctum* P. Marshall, 1918: 263, pl. 19, figs. 8, 12 (fossil)].
Epitonium clementinum (Grateloup, 1840). – Cernohorsky, 1978: 167, pl. 59, fig. 6 (syntype illustrated); Brown, 2008: pl. 295, figs 3, 4.
Epitonium (*Papyriscala*) *lalifasciatum* (Sowerby, 1874). – Kilburn, 1985: 305, fig. 117 (lectotype illustrated).
Epitonium (*Papyriscala*) *clementinum* Grateloup, 1840. – Okutani, 2000: 339, pl. 168, fig. 104; Nakayama, 2003: 70, pl. 18, figs 4-6.
Papyriscala clementinum (Grateloup, 1940). – Sirenko, 2013: 156.

Type material: *Scalaria clementina* – NHMUK 1907.11.22.54 (syntype) (Fig. 1 A); *Scalaria latifasciata* – NHMUK 1891.7.28.1 (lectotype) designated by Kilburn (1985: 305) (Fig. 1 B); *Papyriscala tricincta* – ZIN 23012/1 (holotype) (Fig. 1 C-D).

Type localities: *Scalaria clementina* – 'Singapour' [Singapore]; *Scalaria trifasciata* – Masbate, Philippines; *Scalaria latifasciata* – Maheburg, Mauritius, on sandy mud; *Papyriscala tricincta* – Japan Sea, Posyeta Bay.

Remarks. The taxonomy of several similar Indo-Pacific species of *Epitonium* is rather confusing and still is not resolved. Thus, although *Epitonium clementinum* and *E. latifasciatum* are conchologically very similar (Fig. 1 A, B), differing slightly in the number of axial lamellae, they are recognized as two valid species in the current literature [e.g. Kilburn, 1985 and Nakayama, 2003]. The number of axial lamellae per whorl seems to be rather variable (as is the in the four recently collected in Sukhodol syntopic specimens – Table 1, Fig. 1 E-H), producing different shell appearance (compare, e.g. Fig. 1 E and G). The shell shape is also rather variable and the shell diameter/shell length ratio varies from 0.53 to 0.6 in our specimens from the Sea of Japan. It is even higher in *clementina* (0.64) and *latifasciata* (0.63). In the specimen from Japan, illustrated by Okutani [2000] the ratio equals 0.62, being intermediate between the holotype of *tricincta* and the syntype of *clementina*.

Thus, it is difficult to formalize the characters, that allow to distinguish reliably several conchologically very similar species. Here we follow the opinion of Kilburn [1985] in synonymizing *Scalaria clementina* with *Scalaria trifasciata* and questionably consider *Scalaria latifasciata* as a junior synonym of the former species.

Golikov in Golikov and Scarlato [1967] mentioned the similarity of the new species with *latifasciata* and as distinguishing characters pointed to differences in the width and position of spiral color bands as well as details of the sculpture (not specified in the original description). Golikov also considered the specimen, illustrated by Kira [1959: pl. 13, fig. 14] under the name *Epitonium* (*Papyriscala*) *lalifasciatum* as belonging to the different species, which he described as *P. tricincta.*

Comparison of newly acquired specimens with the holotype of *tricincta* and types of *latifasciata* and *clementina* did not reveal any significant differences in either in coloration, nor in shell sculpture and shape. In the absence of any additional data on the anatomy or molecular phylogeny, we consider *Papyriscala tricincta* to be a junior subjective synonym of the broadly distributed Indo-Pacific *Epitonium clementinum*.

In addition to the type material from the Posyeta Bay, A.N. Golikov attributed to *Papyriscala tricincta* two specimens, collected in 1925 in the Amurskyi Bay (43°14'N, 131°51'E, 16.5 m). The specimens were not included into original description, but were identified in the catalogue of the collections of ZIN. The absence of later findings of the species in Peter the Great Bay and its recent discovery in Sukhodol Inlet in 2004 may be connected with the long-term fluctuations of the water temperature. According to the observations of long-term fluctuations of the composition of plankton in Peter the Great Bay, in 1920-1930th the subtropical species were more abundant, than in 1960-th [Brodsky, 1981].

If this is true and the new findings indeed reflect the recent expansion of the distribution area of *E. clementinum* to the north-east, we can expect further expansion of the species northward, reflecting the climate changes, as was already recorded for other tropical and subtropical species, such as *Cellana toreuma* (Reeve, 1855), *Haliotis discus* Reeve, 1846, *Ceratostoma burnettii* (Adams et Reeve, 1848), *Rapana venosa* (Valenciennes, 1846), and many others [Gulbin, 2006; Gulbin, Chaban, 2007].

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Table 1. Measurements of type specimens of *Epitonium clementinum, E. lalifasciatum, Papyriscala tricincta* and newly collected specimens of *E. clementinum*.

Specimen	Shell length (mm)	Shell diameter (mm)	Shell diameter/shell length	Number of axial lamellae on last whorl
Syntype of *Scalaria clementina*	21.8	14.0	0.64	?
Lectotype of *Scalaria latifasciata*	21.6	13.6	0.63	?
Holotype of *Papyriscala tricincta*	17.5	10.5	0.6	27
Sukhodol inlet, spm 1	18.5	10.5	0.57	25
Sukhodol inlet, 2	18.2	10.1	0.55	26
Sukhodol inlet, 3	20.7	11.0	0.53	26
Sukhodol inlet, 4	19.0	10.1	0.53	32

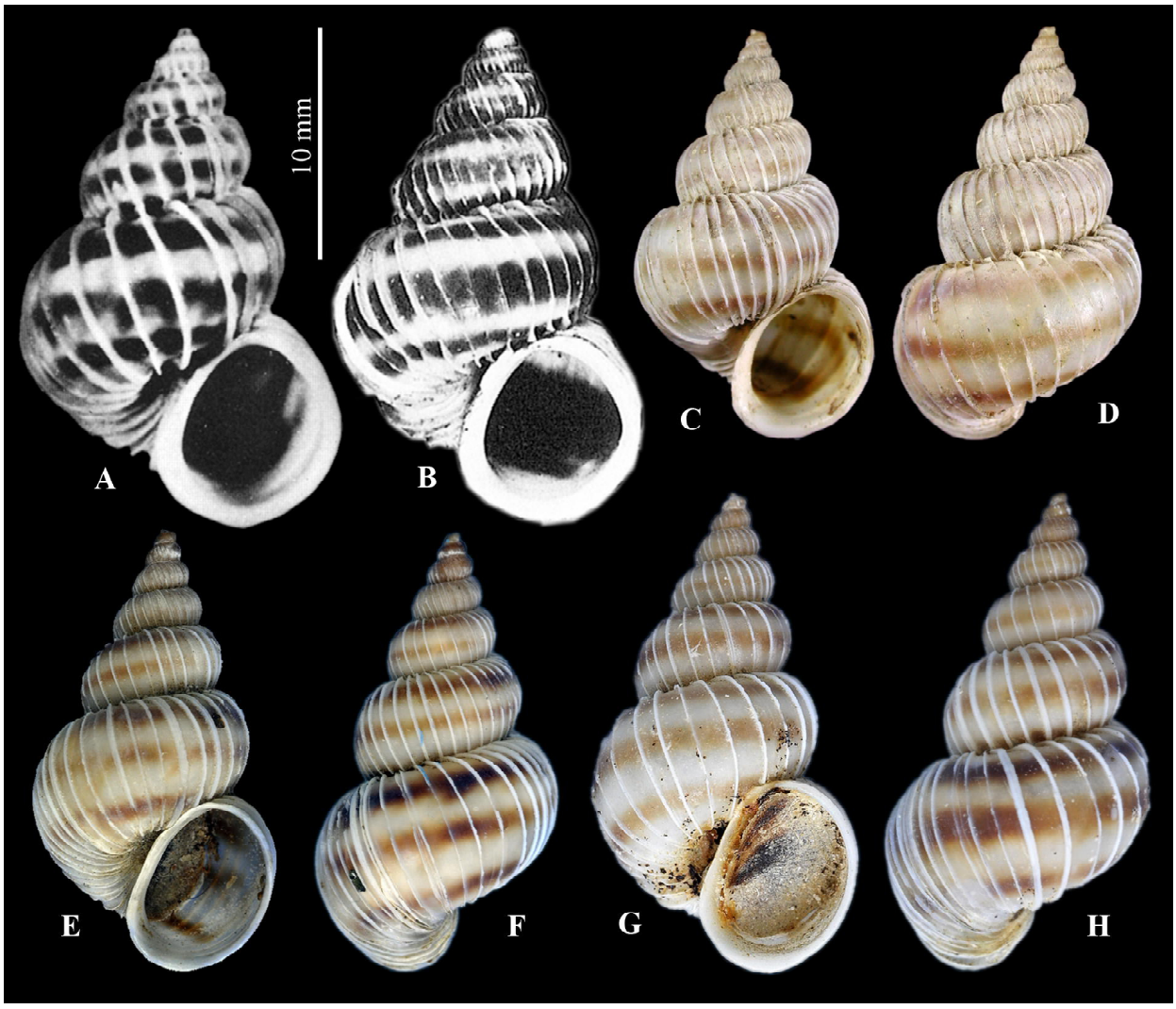

FIG. 1. Shells of *Epitonium* (*Papyriscala*) *clementinum* (Grateloup, 1840). A – syntype of *Scalaria clementina,* NHMUK 1907.11.22.54, shell length (SL) 21.8 mm [after Cernohorsky, 1978]. B – lectotype of *Scalaria latifasciata,* NHMUK 1891.7.28.1, SL 21.6 mm [after Kilburn, 1985]. C-D – holotype of *Papyriscala tricincta,* ZIN 23012/1, SL 17.5 mm. E-H – specimens, collected in Sukhodol Inlet, MIMB 30353, E-F – SL 19.0 mm, G-H, SL 20.7 mm.

РИС. 1. Раковины *Epitonium* (*Papyriscala*) *clementinum* (Grateloup, 1840). A – синтип *Scalaria clementina,* NHMUK 1907.11.22.54, длина раковины (SL) 21.8 мм [по Cernohorsky, 1978]. B – лектотип *Scalaria latifasciata,* NHMUK 1891.7.28.1, SL 21.6 мм [по Kilburn, 1985]. C-D – голотип *Papyriscala tricincta,* ZIN 23012/1, SL 17.5 мм. E-H – экземпляры, собранные в бухте Суходол, MIMB 30353, E-F – SL 19.0 мм, G-H, SL 20.7 мм.

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О таксономическом положении и распространении *Papyriscala tricincta* Golikov in Golikov et Scarlato, 1967 (Gastropoda: Epitoniidae)

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РЕФЕРАТ. Впервые после оригинального описания были собраны дополнительные экземпляры *Papyriscala tricincta.* Живые моллюски были выброшены на берег бухты Суходол Уссурийского залива (залив Петра Великого, Японское море) после шторма. Сравнение раковин с несколькими сходными Индо-Тихоокеанскими видами позволило заключить, что название *P. tricincta* является младшим субъективным синонимом широко распространенного вида *Epitonium clementinum*.