

The rediscovery of Müller's type material: resolution of the status of *Buccinum zebra* O.F. Müller, 1774, with additional notes on *Buccinum fasciatum* O.F. Müller, 1774 and *Helix exilis* O.F. Müller, 1774 (Mollusca, Gastropoda, Orthalicidae, Ariophantidae)

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ABSTRACT

The rediscovery in the Copenhagen museum of type material of *Buccinum zebra* O.F. Müller, 1774 enables us to resolve its status after more than two centuries, with the designation of a lectotype. It confirms the earlier suggestion of Rehder that this taxon is identical to *Orthalicus maracaibensis* L. Pfeiffer, 1856, which thus becomes a junior subjective synonym of Müller's taxon. *Zebra gruneri* Strebel, 1909 is now also placed in the synonymy of *Orthalicus zebra* (O.F. Müller, 1774). We also provide a note on the material of *Buccinum fasciatum* var. α O.F. Müller, 1774, corresponding to the nominate *Liguus fasciatus* (O.F. Müller, 1774). Finally type material of *Helix exilis* O.F. Müller, 1774 was found, enabling us to identify it as *Ariophanta exilis* (O.F. Müller, 1774), with *Nanina bistrialis* H. Beck, 1837 as a junior synonym (new synonymy).

Key words: historical collection, type material, *Ariophanta*, *Orthalicus*, *Liguus*.

INTRODUCTION

The Copenhagen museum is known to have a rich historical collection, which was studied, e.g., in the 18th century

by Otto Frederik Müller (1730–1784), Johann Hieronymus Chemnitz (1730–1800), and in the 19th century by Henrik Henricksen Beck (1799–1863). The work of Müller especially, as a post-Linnaean author, is traceable in zoological nomenclature today. Among them are two Orthalicidae taxa which formed the impetus for an inquiry.

The genus *Orthalicus* Beck, 1837 is wide-spread in the Neotropics, with 54 species (Richardson, 1993), the type species by subsequent designation (Herrmannsen 1847 [1847–1849]: 159) being *Buccinum zebra* O.F. Müller, 1774. These tree snails have rather large, ovate-conical shells, typically with a colour pattern of usually axial or zigzag stripes, more or less modified by three equidistant spiral bands. This pattern has many variations, both in expression of the pattern and the colouration, and as a consequence the delimitation among many species is extremely confusing, leading to an additional 100 available names in Richardson (1993). Stated differently, a given nominal taxon has often been interpreted in many different ways by different authors due to infraspecific variation in the colour pattern of the species in this group.

Müller (1774) named several other iconic species, one of which, *Buccinum fasciatum*, which has likewise led to much confusion, with numerous forms being described as subspecies, while it is at the same time the type species of another genus in the Orthalicidae, viz. *Liguus* Montfort, 1810.

Inquiries to the Natural History Museum of Denmark, University of Copenhagen (herein abbreviated NHMD) has led to the discovery of Müller's type material in their collection, including material of his taxon *Helix exilis*.

Consequently, we are now able to resolve the identity of these taxa.

***Buccinum zebra* O.F. Müller, 1774**

Figures 1–5

Lectotype designated herein: Natural History Museum of Denmark, University of Copenhagen (NHMD-873804). New synonymies: *Orthalicus maracaibensis* L. Pfeiffer, 1856, *Zebra gruneri* Strebel, 1909.

Müller (1774: 138) introduced this taxon based on material in “Museo Spengleriano” and with reference to various figures of pre-Linnean authors, among them Seba (1759: pl. 39 figs 50–51, 54–55). “La synonymie ne peut donc être d'aucune utilité pour arriver à l'identification du type spécifique de Müller” [The synonymy can therefore be of no use in identifying the specific type of Müller] (Fischer & Crosse, 1873 [1870–1878]: 442). Unfortunately, Müller's specimens lacked locality data; they were in the collection of Lorenz Spengler (1720–1807), a cabinet maker at the Danish court (Gouk, 1983). This may have hampered a correct identifica-

tion and later authors placed other species in its synonymy (or vice versa) and attributed Müller's taxon to different regions, e.g. “Am. Æquin.” (Beck, 1837 [1837–1838]: 59), “Nicaragua, Panama, Costa Rica, Veragua, Pernambuco, West Indies” (Reeve, 1849: pl. 15 fig. 90), “am Maranhonfluss” [Peru] (Albers, 1850: 225), and Mexico, Florida, Cuba and Jamaica (Fischer & Crosse, 1873 [1870–1878]: 442). Von Martens (1865: 45–46), after having discussed the confusion in the previous literature, even suggested “Der Artnahme zebra dürfte am besten, als zu viel umfassend, ganz aufgegeben werden” [The species *zebra* might best be abandoned altogether, as much too comprehensive]. Pilsbry (1899: 104–105) concluded “I would therefore uphold the conclusion of Dr. von Martens (Malak. Blätter xii, p. 44 [sic], 1865), that the name *zebra* be wholly given up. The data are too indefinite to permit us to fix upon any of the modern species as the true *zebra* of Müller, either by the process of elimination or otherwise”. It even led him to replace the name *Orthalicus* with *Oxystyla* Schlüter, 1838, a junior synonym.

In a foreword to Rehder (1945) Pilsbry admitted that the revival of *Oxystyla* had been the simplest solution of



Figures 1–5. *Orthalicus zebra* (O.F. Müller, 1774). 1–3. *Buccinum zebra* O.F. Müller, 1774, lectotype NHMD 873804, height 46.0 mm. 4. 19th century label, ‘Sp.’ denotes the provenance of the Spengler collection. 5. 20th century labels, showing the old registration code.

the puzzle. Rehder looked anew “to the question whether *Buccinum zebra* Müller, 1774, is a recognizable species, and if so, what it is. *Buccinum zebra* was described rather well by Müller, considering the times (...) [he] described a flammulate specimen (“fasciis longitudinalibus obscure fuscis”) as the principal form, and a three-banded one as a variety”, without indicating formal varieties. Rehder concluded that Chemnitz (1786: 24–25), who studied the Spengler collection, had fixed the species “although he used a specimen from his own collection for his figure” (Chemnitz, 1786: pl. 118 figs 1015–1016). It may be noted that Chemnitz restricted Müller's reference to Seba's (1759) figures to figs 54–55, i.e. the flammulate form. Rehder concluded that this form was closest to *Orthalicus maracaibensis* L. Pfeiffer, 1856.

A request for information about Müller's type specimens to the NHMD has revealed that there are two lots originating from the Spengler collection under the name of *Buccinum zebra*, NHMD-90707 and 90696 respectively. The latter lot also contains an old label bearing the name *Helix cinerarius*, which we have been unable to find in the literature. The two specimens in this lot are faded in colour but are still recognisable as “flammulated”. The first lot (NHMD-90707, formerly registered as ZMUC-GAS-280), which contains four specimens, are equally identifiable as this form and thus confirm Rehder's conclusions and also his observation “we must of course keep in mind the fact that the figures in these early works are not always exact”. We have designated one specimen from this lot as the lectotype (NHMD-873804). This specimen measures shell height 46.0 mm (top damaged), diameter 26.4 mm.

While Breure & Schouten (1985: 55), unaware of the NHMD specimens, considered Müller's taxon still as a *nomen inquirendum* [this is currently also the status in MolluscaBase (2021)], we may now consider *Orthalicus zebra* (O.F. Müller, 1774) as a valid species and *Orthalicus maracaibensis* L. Pfeiffer, 1856 as a junior subjective synonym. Pfeiffer (1856: 184) described his taxon, based on an unknown number of specimens, from the collection of Gruner; he did not give a figure in his original publication, nor in later works, but gave dimensions as “Long. 67, diam. 34 mill.” Strebel & Pfeiffer (1882: 27: pl. 3 fig. 8c) noted “Der mir vorliegende Typus, auf welchem Pfeiffer seine Art begründete, ist leider nicht nur ein aussergewöhnlich grosses, sonder auch ein schlecht erhaltenes Stück” [The type I have, on which Pfeiffer based his species, is unfortunately not only an exceptionally large piece, but also a poorly preserved one]. Martens (1873: 188, pl. 1 fig. 7) cited this species and illustrated a specimen, also originating from Gruner's collection, which was somewhat smaller than Pfeiffer's shell (shell height 57.4 mm, diameter 31.8 mm; see Breure, 2013: 21, figs 20E–F, 20iii), but otherwise similar in characteristics. The specimen figured by Martens was described later as *Zebra gruneri* by Strebel (1909). Richardson (1993) regarded *Orthalicus gruneri* as a separate species but gave no evidence or further remarks. As Strebel's

shell comes from the same locality as *O. maracaibensis* and may have come from the same lot in Gruner's collection, it is likely to fall within the variation of *O. maracaibensis*, also given the remark by Strebel & Pfeiffer (1882) quoted above. *Zebra gruneri* is now regarded as junior subjective synonym of Pfeiffer's taxon and thus also a junior subjective synonym of *Orthalicus zebra* (O.F. Müller, 1774).

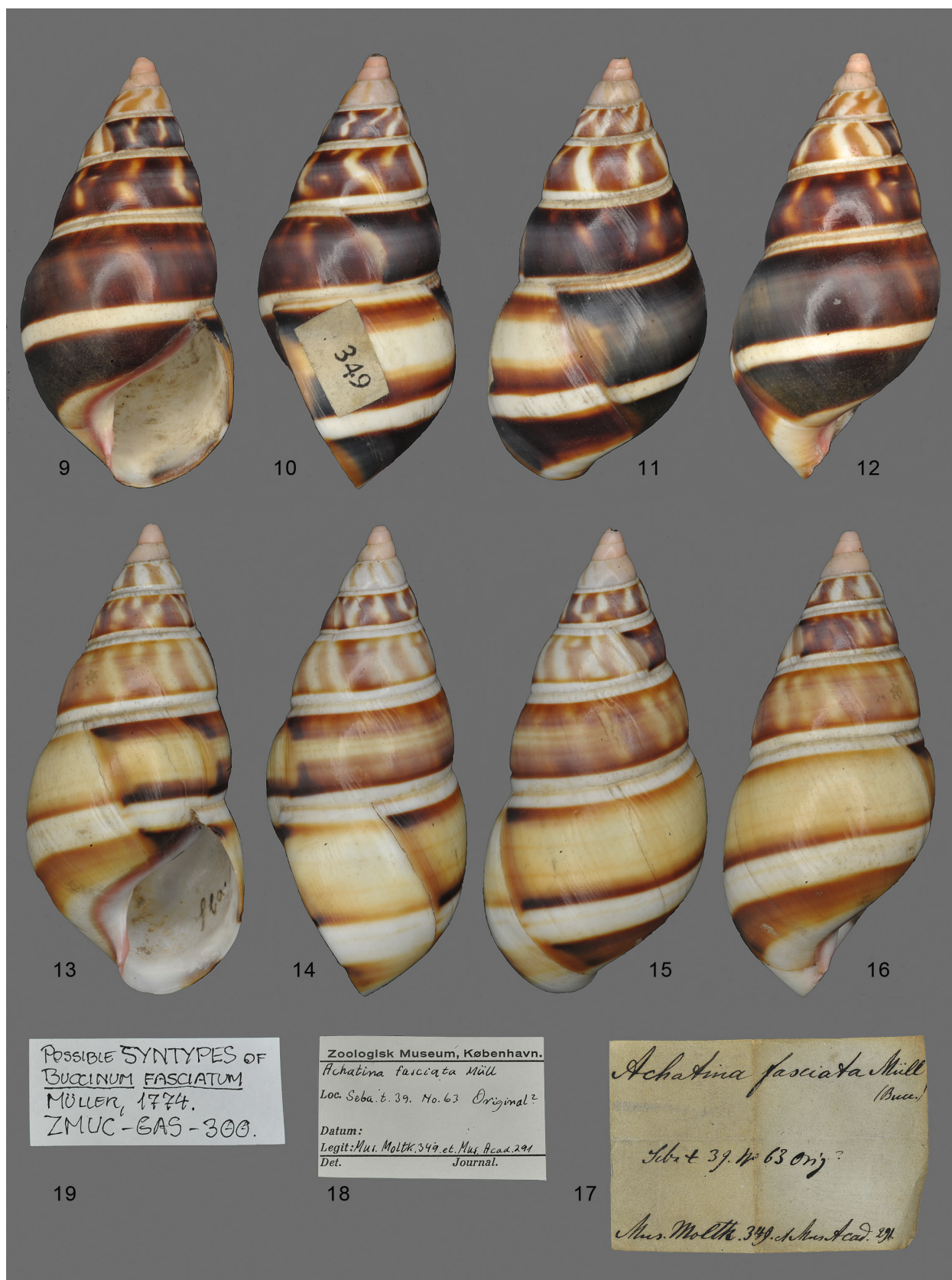
Buccinum fasciatum O.F. Müller, 1774

Figures 6–19

Type locality restricted: Cuba, southern Sancti Spíritus province. Iconotype: Seba, 1759: pl. 39 figs 62, 74 (Pilsbry, 1929: 141).



Figures 6–8. *Buccinum fasciatum* O.F. Müller, 1774. **6a.** Original text from Müller with the single reference to Seba's figures. **6b.** Original text of Müller's variety α , with reference to Seba's figures. **7.** Seba, 1759: pl. 39 fig. 74. This figure was selected by Pilsbry (1929) as the type of the species. **8.** Seba, 1759: pl. 39 fig. 63. This figure was referred to in Müller's description of var. α .



Figures 9–19. *Liguus fasciatus* (O.F. Müller, 1774). **9–16.** *Buccinum fasciatus* O.F. Müller, 1774, presumably his variety α, NHMD-90727, height 51.0 respectively 56.0 mm. **17.** 19th century label with reference to Seba's figure 63 (original with question mark), Moltke's collection number 349 and the first University museum (Mus. Acad.) number 291. Note the different genus name. **18.** 20th century label with the same information copied. **19.** 20th century label with the original basionym and the old registration code.

This taxon was introduced (Müller, 1774: 145) with a very brief description and a reference to Seba (1759: pl. 39 figs 62, 74) (Fig. 6a) along with three varieties with more extensive descriptions: α , β , and γ which each also referred to Seba (1759). The first one (“alba, fasciis caeruleis”) to pl. 39 figs 62–63 (Figs. 6b, 8), var. β (“alba, fasciis fulcis”) to fig. 67, and var. γ (“alba, fasciis variegatis”) to fig. 68. Müller did not give a source for his specimens of *Buccinum fasciatum*, and the locality was given as “in Indiis” [referring to the West Indies]. As explained by Breure et al. (2014: 13) Seba's figure 74 was selected as the type of the taxon by Pilsbry (1929); see Figure 7. In his earlier monograph (Pilsbry, 1899: 166–174, pl. 55 fig. 54, pls 57–60) Pilsbry's treatment of *Liguus fasciatus* is somewhat confusing. “The typical *L. fasciatus* is a solid, strong shell with the columella heavy and generally truncated, and a rich color-pattern of dark zones and lines on a white or light ground, as shown in figures 70–74 of plate 57”. Figures 70–72, however, show a resemblance with shells from the southern Sancti Spiritus province, while his figures 73–74 represent the greyish shells from central-western Cuba (cf. González Guillén et al., 2018: 117 ff. vs. 85 ff.). In his 1929 publication Pilsbry acted as First Reviser and thus selected Seba's figure as the iconotype of *Buccinum fasciatum*, as Seba's collection was widely dispersed after being auctioned in 1752 (Boeseman, 1970). Interestingly, this author indicated (Boeseman, 1970: 202) that part of the material of Seba's collection ended up in the Copenhagen museum via one of the brokers active at the auction. It is, however, not clear which specimens these were.

Clench (1934) reported on a large collection of Cuban *Liguus* and described several subspecies. Although he cited (1934: 102) the correct reference to Müller (1774) and acknowledged the type selection of Pilsbry (1929), Clench identified shells from Monserrate, Matanzas (1934: pl. 6 fig. 10) as *Liguus fasciatus fasciatus*. However, his figure is clearly different from Seba's figure 74 (Fig. 7) and he thus wrongly located the typical form of the species in the Havana-Matanzas region. This has misled later authors.

When we compare Seba's figures 63 and 74 (Figs 7–8) we see a similar colour pattern which resembles much more the shells from southern Sancti Spiritus province (González Guillén et al. 2018: 124, 128), which are unlike the greyish shells from central-western Cuba (González Guillén et al. 2018: 89–96). Seba's figures thus strongly resemble what these authors called *Liguus fasciatus goodrichi* Clench, 1934 from the Cienfuegos area and *L. f. form guitarti* Jaume, 1952 specimens from Cagüeyras in Sancti Spiritus province. With the knowledge above we may restrict typical *L. f. fasciatus* to the latter region.

Lot NHMD-90727 (formerly registered as ZMUC-GAS-300) contains two specimens of *Buccinum fasciatum* O.F. Müller, 1774 originating from the collection of the first Copenhagen University museum and Adam Gottlob Moltke (1710–1792), court dignitary with King Frederick

V of Denmark and Norway (Bentham Jutting 1964: 169). “Actually one of the shells has a glued-on label with the number 349. The change from University museum to Moltke's collection is due to the sad state of the museum in the beginning of the 1800s. Moltke bought the whole thing, merged it with his own collection and donated it back to the University in a well ordered state” (T. Schiøtte, pers. comm., April 2021). The labelling of these two specimens suggests that they correspond with Seba's figure 63 and also to Müller's variety α (white background with bluish banding). As such, given that specimens which the author [i.e. Müller] “refers to as distinct variants (e.g. by name, letter, or number)” (Art. 72.4.1, ICZN, 1999), they cannot be considered as types of the nominate taxon. However, if we compare the specimens to Seba's figure 63 (Fig. 8), only one of them (Figs 9–12) seems to fit; the other one (Figs 13–16) is undoubtedly the same colour form but in a lighter tint. Whether these specimens can be traced to Seba's collection or not is unclear, and hence the question mark on the labels (Figs 17–18) seems correct. Both Müller's specimens may be identified as *Liguus fasciatus fasciatus* from the Trinidad-Ermita-Guayacanes-Banao region in southern Sancti Spiritus province. We know these south-central Cuban *Liguus* were sent to Europe in the late 16th/early 17th century from still-life paintings (Breure & de Heer, 2015). However, these shells in the Copenhagen museum are probably the oldest collected *Liguus* from Cuba now extant in museum collections.

In the scheme of González Guillén et al. (2018) the shells from Havana-Matanzas provinces should be re-named *Liguus fasciatus xanthus* lineage (pp. 85–116, including the *L.f. viridis* strand), the *L. f. goodrichi* lineage from Cienfuegos-Santi Spiritus provinces (pp. 117–144) should be renamed to *Liguus fasciatus fasciatus* lineage.

***Helix exilis* O.F. Müller, 1774**

Figures 20–27

New synonym: *Nanina bistrialis* H. Beck, 1837.

The search for Müller type material also turned up a specimen of this taxon, described without a locality or reference to a figure (Müller, 1774: 22). The species was based on material “in Museo clariss. Fabricii, Oeconomiae Professoris Havinensis”, which denotes the collection of Johan Christian Fabricius (1745–1808), who was professor at Copenhagen university and lectured on political economy (Papavero, 1971: 27). We know that Fabricius in the 1760s had travelled extensively in Europe and visited several collections (Papavero, 1971: 26–27). Hence, we assume he received the material from one of his colleagues. The specimen is registered NHMD-90908 (formerly ZMUC-GAS-563) and the label (Fig. 25), written by H. Beck, denotes the provenance from Fabricius. The original dimensions were given as



Figures 20–27. *Ariophanta exilis* (O.F. Müller, 1774). 20–24. *Helix exilis* O.F. Müller, 1774, syntype NHMD-90908, diameter 21.8 mm. 25. 19th century label, “Ex Orig. C. Fb 835 | H. rufa Lesson t13f2 | H. [illegible]” in handwriting Beck. 26. 20th century label with basionym and provenance to Fabricius collection. 27. 20th century label with old registration code.

“diam. 10 lin.”, i.e. (German) Linien, equivalent to 21.8 mm; the measurement diameter is 22.0 mm. We have identified it as *Ariophanta exilis* (O.F. Müller, 1774), with *Nanina bistrialis* H. Beck, 1837 as junior synonym (new synonymy); the latter is endemic to India and Sri Lanka (Raheem et al., 2014).

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