

TURBO BIDENS LINNAEUS 1758 (GASTROPODA: CLAUDILIIDAE) MISIDENTIFIED FOR 250 YEARS

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Abstract The nomenclatural history and the identity of the nominal species *Turbo bidens* Linnaeus 1758 (Gastropoda: Pulmonata: Clausiliidae) is discussed. It is shown that it has been incorrectly identified with the species known as *Papillifera papillaris* (O.F. Müller 1774) based on a misinterpretation of the original diagnosis. As the name has been placed on the Official List in Opinion 2176, it requires a valid neotype designation to fix its identity in an unequivocal manner. It is shown that the neotype designation by Falkner et al. (2002) is invalid. A neotype is proposed, which will render the name *Turbo bidens* Linnaeus 1758 a senior subjective synonym, and the valid name for the species hitherto known as *Cochlodina* (*Procochlodina*) *incisa* (Küster 1876). The nominal species *Turbo bidens* Linnaeus 1758 has been cited as the type species of *Clausilia Draparnaud* 1805, *Cochlodina Férussac* 1821 and *Marpessa Gray* in Turton 1840, but in all cases *Turbo bidens* Linnaeus 1758 was misidentified. The type species of *Papillifera Hartmann* 1842 is usually assumed to be *Clausilia solida Draparnaud* 1805 through subsequent designation by Lindholm (1924), but the earlier designation of *Helix papillaris* O.F. Müller 1774 by von Martens 1860 is shown to be valid.

Key words *Clausilia*, *Cochlodina*, *Marpessa*, *Papillifera papillaris*, *Cochlodina bidens*, *type species*, *neotype*

INTRODUCTION

Linnaeus (1758) introduced two nominal species belonging to the Clausiliidae under the names of *Turbo bidens* and *Turbo perversus*. The latter has been consistently interpreted as the species now known as *Balea perversa*, but the name *Turbo bidens* had been identified variably with *Cochlodina laminata* (Montagu 1803), *Clausilia bidentata* (Ström 1765) and *Papillifera papillaris* (O.F. Müller 1774). In current literature the names *Papillifera papillaris* (O.F. Müller 1774) and *Papillifera bidens* (Linnaeus 1758) still compete as the purportedly valid names of a common Mediterranean clausiliid species. The underlying reason for the 250 year-long difference of opinion amongst experts lies in the perceived incompatibility of Linnaeus' brief original diagnosis with his bibliographic reference to a figured species. A first attempt to fix the meaning of the nominal species *Turbo bidens* Linnaeus 1758 was made by Falkner et al. (2002) by designating a neotype for *Turbo bidens* so as to render the names *Turbo bidens* and *Helix papillaris* O.F. Müller subjective synonyms. This was opposed by Giusti & Manganelli (2005) for the reason that the characters of a so defined taxon were incompatible with the characters described by Linnaeus (1758) for *Turbo bidens* and by Gualtieri (1742) which Linnaeus cited as a

bibliographic reference; they applied to the ICZN to achieve nomenclatural stability by suppressing the name *Turbo bidens*. In Opinion 2176 the ICZN rejected this application, and instead placed the name *Turbo bidens* on the Official List of Specific Names in Zoology. Unfortunately this ruling did not fix the identity of the nominal species *Turbo bidens* Linnaeus 1758. This question will again be discussed in this contribution, and a definitive nomenclatural solution will be proposed.

The nominal species *Turbo bidens* had been associated with the type species of the genus group names *Clausilia* Draparnaud 1805, *Cochlodina* Férussac 1821, *Marpessa* Gray 1840 and *Papillifera* Hartmann 1842. The manner of establishing their type species, and the their correct names are also investigated.

THE FACTS OF THE MATTER

THE ORIGINAL PUBLICATION OF THE NOMINAL SPECIES *TURBO BIDENS* LINNAEUS 1758 (: 767)

"[*Turbo*] *bidens*. 566. T[urbo]. esta turrata pellucida : anfractibus contrariis, sutura subcrenata, apertura postice bidentata.

Gualt. test. t. 4 f. C.

Habitat in Europa australi; terrestris."

Translation: "[A species of the genus] *Turbo* with a translucent turreted shell; with sinistral

["contrarian"] whorls, a subcrenellate suture, and an aperture which is two-toothed in the rear.

Gualtieri [1742]: pl. 4 Fig. C.

Lives in southern Europe; terrestrial"

Gualtieri's Fig. C is here reproduced in Figs 1 and 3a. It shows a sinistral clausiliid shell with very finely crenellate sutures. There is, however, only one 'tooth', viz. the parietal lamella, visible in the aperture. The legend to this figure reads: "Turbo terrestris rufescens ore denticulato, a dextra in sinistram convolutus."

Translation: "[A species of the genus] Terrestrial Turbo, reddish, with a denticulate aperture, coiled from right to left."

A locality is not given; Gualtieri (1742) illustrated mollusc shells from all over the world assembled in "Gualtieri's Museum", although many of the land snails illustrated by him occur in Italy.

THE ORIGINAL PUBLICATION OF THE NOMINAL SPECIES *HELIX PAPILLARIS* O.F. MÜLLER 1774 (:120–121, NO. 317)

"*Helix papillaris*.

Helix testa turrita albida, sinistrorsa, juncturis spirarum punctatis; apertura canaliculata.

Turbo terrestris papillis albis in spirarum commissuris distinctus. Gualt. test. t.4 f. D & E.

Gin. op. post. Tom. 2. p. 59, t. 3 f. 23

Buonanni ricreat. p. 184, t. 41.

Dan. den vortede links – snekke

Ital. Turbine minore.

Long. 5 ½ lin. lat. 1 lin.

Proxime praecedentes refert.

Testa glabra, oculo absque striis, cinerea; Anfractus novem; intersectiones anfractuum fuscescunt, punctis elevatis sive papillis parvis candidis pulchre interstinctae. Apertura & labrum uti in praecedentibus. Faux cum H. bidente convenit, lamella vero elastica integra est, non emarginata, nec angulo inferiori plicae insidet, sed basi in ligamentum longum liberum circa axin descendens producta est; margo ejus dexter plicae dextrae, quae nihil aliud quam axis productio est, quasi connatus adhaerere videtur, sinister vero parieti testae tam prope admovetur, ut lamella haec valvulae instar ostium sive aperturam cochlearem arcte claudat. Hinc limax egrediendo non potest non adprimere ligamentum elasticum axi testae, quod, quo propius limax ostio accedit, eo magis valvulam removet, ac portam aperit. Scalae pel-

lucidissimae & hyalinae sunt. Caeterum hae tres species multum conveniunt, & in tanta earum copia satis singulare est, conchyliologos flexurae in sinistram partem obstupuisse, & ob hanc rationem, falsam certe, nomine l'unique (unicam) dixisse, structurae vero faucis vere admirabili supersedisse. Tantum homini recta aberrare. In Italia."

There is no need to analyse the description and the bibliographic references of Müller in detail. Thanks to the detailed description and the bibliographic references, the identification of this species was never in doubt. Buonanni's figure (1681: Fig. 41) is here reproduced as Fig. 2, and Gualtieri's (1742) Figs D–E in Figs 1 and 3a. The identity of the nominal species *Helix papillaris* O.F. Müller is fixed by the designation of a neotype (Giusti & Manganeli, 2005: 132, Fig. 1).

The two preceding species mentioned by Müller are *Helix bidens* (Linnaeus 1758) (:116–118, no. 315) and *Helix perversa* (Linnaeus 1758) (:118–120, no. 316). These species are now known as *Cochlodina laminata* (Montagu 1803) and *Balea perversa* (Linnaeus 1758).

SUBSEQUENT INTERPRETATIONS OF THE NOMINAL SPECIES *TURBO BIDENS* LINNAEUS 1758
Linnaeus 1767 (: 1240, no. 649, as *Turbo bidens*)

This is a verbatim repeat of the text given in 1758, but the reference to Buonanni (1681: Fig. 41) is added. Buonanni's figure, here reproduced in Fig. 2, represents probably *Papillifera papillaris* (O.F. Müller), but shows its external markings less distinctly and less realistically than Gualtieri's.

O.F. Müller 1774 (: 116–118, no. 315, as *Helix bidens*) [= *Cochlodina laminata*].

Müller provides a detailed description; he quotes Linnaeus, 1758 and Gualtieri's Pl. 4. Fig. C but includes 5 additional references which do refer to NW European taxa. On p. 215 he cites specifically Frederiksdal near Copenhagen as a locality for "*Helix bidens*". The shell is described as smooth; there is only one common clausiliid species in NW Europe whose shell could be so described, viz. *Cochlodina laminata* (Montagu 1803). Many subsequent authors agreed with the synonymy of *bidens* O.F. Müller and *laminatus* Montagu, but adopted the name *bidens* Linnaeus for *Cochlodina laminata*, e.g. Draparnaud (1805) (q.v.).

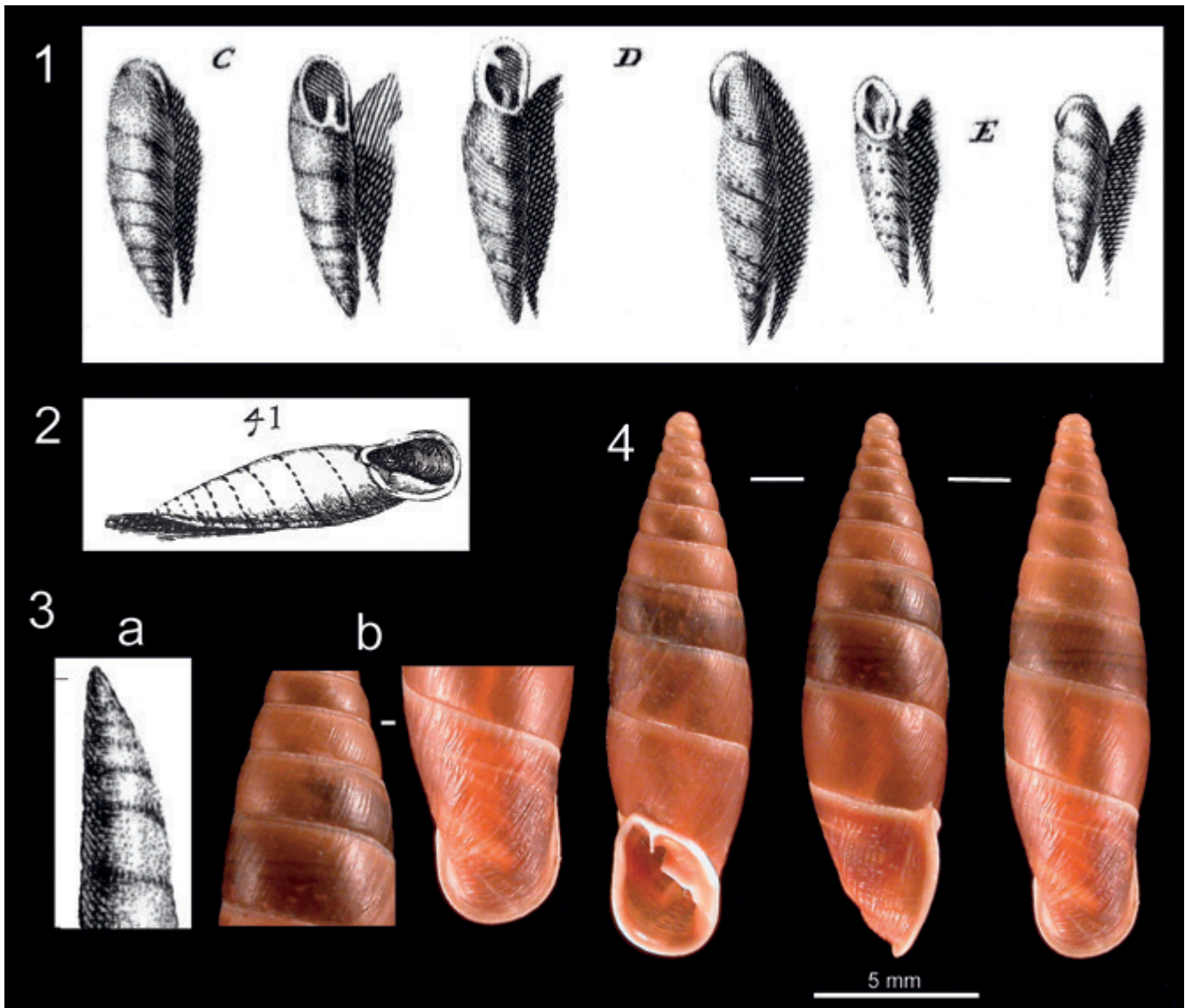


Figure 1 Reprint of Gualtieri's (1742) figures C–E of plate 4. Shell length in original print: Fig. C 22 mm; fig. D 24 mm (apertural view), 25 mm (dorsal view); fig. E 18 mm (apertural view), 16 mm (dorsal view). Fig. C depicts a syntype of *Turbo bidens* Linnaeus 1758, here interpreted as *Cochlodina (Procochlodina) bidens* (Syn. *Clausilia incisa* Küster 1876). Figs D–E depict syntypes of *Papillifera papillaris* (O.F. Müller 1774). The specimen (no longer existing) illustrated in fig. E was invalidly designated the neotype of *Turbo bidens* Linnaeus 1758 by Falkner *et al.* (2002).

Figure 2 Reprint of Buonanni's (1681) fig. 41 from part 3 of his work. Original length of printed figure 50.5 mm. The shell appears dextrally coiled, as all gastropod shells in Buonanni's work are depicted as mirror images. The figure represents a syntype of *Helix papillaris* O.F. Müller 1774.

Figure 3 *Cochlodina (Procochlodina) bidens* (Linnaeus 1758). Enlarged figures to show the faint crenellation of the suture. a) Gualtieri's (1742) pl.4 fig. C; b) details of the neotype.

Figure 4 *Cochlodina (Procochlodina) bidens* (Linnaeus 1758). Neotype. Florence: Giardino di Boboli, 60 m above sealevel, UTM= 32TPP8148; collected by S. Cianfanelli & S. Vanni on 11.05.2005 (ex Coll. Cianfanelli: 20311/4635). Shell height 16.4 mm. MZUF (Museo di Storia Naturale dell'Università degli Studi di Firenze, Sezione Zoologica "La Specola"), inventory no. 24438.

Schröter 1784 (as *Turbo bidens*) [= *Papillifera papillaris*].

In a review of the Linnean mollusc species, Schröter (1784: 55–56) proposes to correct the bib-

liographic reference given by Linnaeus (1758) for *Turbo bidens* to Gualtieri's Pl. 4 Figs D–E, because the Fig. C had no indentations ("Einkerbungen") at the suture. A close inspection of Gualtieri's

Fig. C (here reproduced in Fig. 3) reveals, however, that Schröter overlooked the fine crenellations visible in Fig. C, which were adequately referred to by Linnaeus as 'subcrenata'. Schröter's term "Einkerbungen" describes indentations of any kind, and does not reflect the delicate nature of this character. Gualtieri's Figs D–E are here reproduced in Fig. 1. They clearly represent *Papillifera papillaris*, as quoted by Müller in the original publication of the name *Helix papillaris*. Thus, Schröter (1784) shifted the taxonomic concept of Linnaeus' *Turbo bidens* to a species conspicuously different from the one described by Linnaeus.

How arbitrarily Schröter interpreted the species, is shown, for example, by his illustration of *Turbo bidens* (1783: Pl. 3, Fig. 22), which shows a ribbed clausiliid without colour markings, although the latter are obvious on Gualtieri's Figs D–E; as to ribbing, neither Gualtieri's Fig. C nor Figs D–E show any.

Montagu 1803 (as *Turbo bidens*) [= *Clausilia bidentata*].

Montagu's species (1803: 357–358, Pl. 11, Fig. 7) is the small ribbed species now generally named *Clausilia bidentata* (Ström 1765); the identity of this nominal species, and the availability of the name have been demonstrated by Ökland (1925). Only a few authors after 1803 have accepted Montagu's interpretation of the Linnean *bidens*; most thought the correct name was either *Clausilia rugosa* (Draparnaud 1801) or *Clausilia nigricans* (Maton & Rackett 1807). The nominal species *Pupa rugosa* Draparnaud 1801 was redefined by Holyoak & Seddon (1988) and Nordsieck (1990), who both interpreted it as a separate species. *Clausilia nigricans* (Maton & Rackett) is based on specimens from England and is conspecific with *C. bidentata* (Ström).

Draparnaud 1805 (as *Clausilia bidens*) [= *Cochlodina laminata*].

Draparnaud described a *Clausilia bidens* (1805: 68–69, Pl. 4, Figs 5–7), referencing, i.a. *Helix bidens* O.F. Müller and Gualtieri's Pl. 4, Fig. C. Draparnaud's description and figures refer to *Cochlodina laminata* (Montagu). *Clausilia papillaris* is also described (1805: 71, Pl. 4, Fig. 13), with, i.a. *Turbo bidens* Linnaeus and Gualtieri's Figs D–E as references. This procedure, which violates the law of priority, has nonetheless been followed by many subsequent authors, e.g. Férussac (1821),

Lamarck (1822), Michaud (1831), Charpentier (1837), Gray (1847). These authors cited either Müller as the author of the name *bidens* (meaning Müller gave the name a new definition), or Draparnaud (1805) (the author of the combination *Clausilia bidens*). As a consequence *Clausilia bidens* was cited as the type species of the genus-group names *Clausilia* Draparnaud 1805, *Cochlodina* Férussac 1821 and *Marpessa* Gray 1840, albeit as a misdetermination; see further discussion below.

L. Pfeiffer 1848 (as *Clausilia bidens*) [= *Papillifera papillaris*].

L. Pfeiffer adopted the name *Clausilia laminata* (Montagu 1803) for the species hitherto usually named "*C. bidens* Draparnaud", and the name *Clausilia bidens* (Linnaeus 1758) for *C. papillaris* (O.F. Müller 1774), providing extensive synonymies and diagnoses. He appears to have had considerable authority, because the usage of the names *C. bidens* and *C. papillaris*, as understood by Müller and Draparnaud, ceased almost immediately. Indeed, the name *C. bidens* was virtually never again used for *Cochlodina laminata*, whereas some authors still accepted the name *C. papillaris* instead of *C. bidens* (e.g. H. & A. Adams (1855: 180), von Martens (1860: 278), Mousson (1863: 288), A. Schmidt (1868: 107)).

Hanley 1855 (implicitly as *Clausilia bidens*) [= *Papillifera papillaris*].

In his analysis of the Linnean collection, Hanley (1855: 351) describes possible syntypes: "Of that genus [*Clausilia*] I found three or four species in the collection (some possibly added since), of which one alone agrees with the expression "sutura subcrenata". As the catalogue proves that our author possessed the described shell, it is this individual, which alone of the contents of his cabinet accords with the description, that should be regarded as the type. It ... is the *Cl. papillaris* of modern writers.

"Of the cited figures that of Bonanni [sic] is the preferable; and, when its details are corrected by the description, is sufficiently illustrative to have been referred to in an age when the general effect, and not a careful attention to specific character, was alone expected from the engraver. Gualtieri's [sic] drawing [Pl. 4, Fig. C] exhibits only a single hornlike plica, and must certainly be omitted from any future synonymy."

This account is all the more invaluable, as presently syntypes no longer exist (Dance, 1967; Linnean Society, 2007).

Points of note are:

- Hanley found three or four species, which he failed to identify bar one, *Papillifera papillaris*. As this was the only one with a subcrenelate suture, the distinct possibility exists that *Cochlodina laminata* was amongst the others.
- Hanley was unsure which specimens were original Linnean specimens, but believed that at least a part of the sample consisted of such. Notes in Linnaeus' own copies of the *Systema naturae* (the "catalogue") supported, in Hanley's opinion, this view, but see Dance (1967).
- Hanley's proposal to regard Buonanni's figure (1681: Fig. 41) as representation of the typical form, and to expunge Gualtieri's (1742: Pl. 4, Fig. C) from the references for *Turbo bidens*, are obviously invalid.

Forcart 1965 (: 122, as a synonym of *Cochlodina laminata* (Montagu 1803)).

Forcart dismissed Schröter's suggestion (1784) that Linnaeus (1758) quoted Gualtieri's figures incorrectly, and noted that Gualtieri's Fig. C was later identified as *Cochlodina laminata*. Although, if this was correct, the name *bidens* Linnaeus, 1758 would have had priority, Forcart maintained the usage of the established name *laminata* Montagu 1803, mentioning the inclusion of the latter on the Official List of Specific Names in Zoology by Opinion 336 (1953). He appears to imply that this listing protected it from being replaced by the putative senior subjective synonym *bidens* Linnaeus 1758. However, article 80.6.4 of the Code states that the Law of Priority still applies to such names. The neotype designation for *Turbo bidens* proposed below will, however, remove any nomenclatural conflict with the established name *Cochlodina laminata* (Montagu 1803). As a consequence of Forcart's review, the name *Papillifera papillaris* became again increasingly used as the valid name of the species hitherto usually named *P. bidens*.

Falkner *et al.* 2002 (: 112–113, as *Papillifera bidens bidens*).

The authors discuss the identity of *Turbo bidens* Linnaeus 1758 and fully accept Schröter's (1784) opinion that Linnaeus' diagnosis and quoted figure do not match, and that Linnaeus

intended to quote Gualtieri's Figs D–E. They reject Forcart's (1965) conclusion and, "pour mettre fin à l'instabilité nomenclaturale entraînée par le travail de Forcart", designate the specimen illustrated by Gualtieri (1742) in Pl. 4, Fig. E as the neotype of *Turbo bidens* Linnaeus 1758.

Falkner *et al.*'s implication that the name *P. bidens* has been generally applied to the species also known as *Papillifera papillaris* prior to the paper of Forcart (1965) ("L'espèce à suture crénelée appelée *Papillifera papillaris* (Müller 1774) reprend donc le nom *P. bidens* (Linnaeus 1758) avec lequel elle avait été désignée jusqu'en 1965 ...") applies only to the period 1848–1965, and even in this period the name *P. papillaris* was occasionally used.

Giusti & Manganelli 2005 (: 130–133, as an unidentified clausiliid species, possibly *Cochlodina incisa* (Küster 1876)).

Giusti & Manganelli (2005) rejected the conclusions of Falkner *et al.* (2002) on the grounds that the nominal species *Turbo bidens* Linnaeus 1758 was not the same as *Papillifera papillaris* (O.F. Müller). Moreover, they pointed out that Gualtieri's Fig. C does show faint crenellations, and hence no discrepancy between Linnaeus' diagnosis and the cited figure exist. They suggested that Gualtieri very likely collected many land snails in the vicinity of his home town Florence; consequently the species he depicted on Pl. 4, Fig. C would not be *Cochlodina laminata*, but possibly *Cochlodina incisa* (Küster 1876). Original material could not be found in Gualtieri's collection, now in the Pisa Museum. The authors applied to the Commission to suppress the name *Turbo bidens* Linnaeus 1758 and to place the name *Helix papillaris* O.F. Müller as defined by a neotype on the Official List. As a neotype they proposed and figured a specimen (2005: 132, Fig. 1) from Florence, Giardino di Boboli.

This application received both supporting (Kadolsky, 2006; Gittenberger, 2006) and opposing (Welter-Schultes, 2006; Hölling, 2006) comments, and a reply by Giusti & Manganelli (2006). Of the opposing commentators, Welter-Schultes (2006) defended the view taken by Schröter (1784) and Falkner *et al.* (2002), while Hölling thought that the neotype designation by Falkner *et al.* (2002) stabilized the taxonomic concept of *Turbo bidens* Linnaeus, 1758, and rendered therefore Giusti & Manganelli's application unnecessary.

International Commission on Zoological Nomenclature 2007: Opinion 2176 (: 195, implicitly as *Papillifera bidens*).

The commission ruled that (1) the specific name *Helix papillaris* O.F. Müller 1774 is not conserved, and (2) the specific name *Turbo bidens* Linnaeus 1758 is placed on the Official List. In the abstract *Turbo bidens* Linnaeus 1758 is referred to as a senior subjective synonym of *Helix papillaris* O.F. Müller 1774. No reference is made to the neotype designation by Falkner *et al.* 2002.

THE TYPE SPECIES OF *CLAUSILIA* DRAPARNAUD 1805
In Opinion 1455 (ICZN, 1987) all previous type species designations for *Clausilia* were set aside under the plenary powers of the Commission and *Pupa rugosa* (Draparnaud 1801) designated as type species. This decision put an end to a considerable tangle:

Turton (1831: 6) designated "*Turbo bidens* Montagu" as type species of *Clausilia* Draparnaud 1805; as he placed (:75) "*Turbo bidens* Montagu" as a synonym of *Clausilia rugosa* (Draparnaud 1801), it is clear that he wanted to designate *Turbo bidens* sensu Montagu as type species, and thought *Clausilia rugosa* (Draparnaud 1801) to be the correct name. This is an invalid action as *Turbo bidens* sensu Montagu was not an originally included species in *Clausilia*. Draparnaud (1805) included *Clausilia bidens* in the genus *Clausilia*, but understood it in the sense of Müller (1774), i.e. *Cochlodina laminata* (Montagu 1803). *Clausilia rugosa* would have been an eligible species, but was not expressly so cited, and this designation is therefore invalid.

The earliest type species designation which would have been valid under the Code is that of Anton [1838] (: 45), who designated *Pupa plicata* Draparnaud 1801 as type species. This was overlooked by Melville (1986), who applied to the ICZN to designate *Pupa rugosa* Draparnaud 1801 as type species. *Pupa plicata* Draparnaud 1801 is the type species of *Laciniaria* Hartmann 1844 and is currently classified as *Laciniaria plicata* (Draparnaud 1801).

Gray (1847: 177, no. 475) gives *Turbo bidens* as type species of both *Clausilia* and *Marpessa*. Gray's concept of *Turbo bidens* is explained in his papers of 1825 (: 13) and 1840 (in Turton: 212–213, pl. 5 f. 53), where he gives *Turbo laminatus* Montagu as a synonym. Thus, Gray's designation would have

restricted the name *Clausilia* to the taxon now known as *Cochlodina*.

THE TYPE SPECIES OF *COCHLODINA* FÉRUSSAC 1821
AND *MARPESSA* GRAY 1840

Férussac's work was published in parts, of which Kennard's (1942) detective work revealed the exact dates of publication. The name *Cochlodina* was first introduced in livraison 9 (: 29), which was published 6 April 1821. Here a brief diagnosis is given ("Une ou deux gouttières; péristome généralement continue") and four subgroups are listed; three of them are undefined, and the fourth is *Clausilia* Draparnaud 1805. The genus name is available from this publication, but is without originally included nominal species. These are provided in livraison 11 (: 61–63, 13 July 1821). From these, Pilsbry (1922: 31) designated "*Clausilia bidens* Draparnaud" as type species of *Cochlodina*. This name was included by Férussac in the synonymy of *Helix* (*Cochlodina*) *derugata* Férussac 1821 (folio: 63, quarto: 67), together with *Helix bidens* Müller, "*Turbo laminatus*, des Anglais" and others. *Helix* (*Cochlodina*) *derugata* Férussac 1821 is thus an unnecessary junior synonym of the species now known as *Cochlodina laminata* (Montagu 1803). Of course, Draparnaud did not introduce a new species "*Clausilia bidens*", but refers to *Helix bidens* of Müller who refers to *Turbo bidens* of Linnaeus. Draparnaud thought that Müller misinterpreted the Linnean species, but nonetheless accepted the name *bidens* as valid, although he treated it like a new species proposed by Müller. The Linnean *Turbo bidens* was then relegated to the synonymy of *Clausilia papillaris*, ignoring the law of priority. Férussac (1821) and others continued this practice. According to article 69.2.4 ICZN, the type species of *Cochlodina* Férussac 1821 is "*Turbo bidens* sensu Draparnaud, 1805, non Linnaeus, 1758 (currently *Cochlodina laminata* (Montagu, 1803) [*Turbo*])" by subsequent designation (Pilsbry, 1922).

The name "*Marpessa* Gray, 1821" (: 239) has for a long time been used instead of *Cochlodina*. Lindholm (1925: 262) reinstated the name *Cochlodina* as he thought it was published in January 1821, while Gray's paper dated from March 1821. The name *Cochlodina* has since been universally accepted, but Kennard's revision of Férussac's publication dates suggests that it was published on April 6, 1821. Thus, the name *Cochlodina* Férussac 1821 loses its priority

over *Marpessa* Gray 1821, but this has no consequences as *Marpessa* is to be regarded as a nomen nudum.

The name *Marpessa* was published by Gray (1821) solely with the words: "*Clauselia* [sic] *Marpessa bidens hyalina*" in a list of "new British species of Mollusca". Thus, the only included nominal taxon is *hyalina*, which is treated as a variety of *Clausilia bidens*. *Clausilia bidens* sensu Gray is *Cochlodina laminata*. This nominal species is not an originally included species in Gray's list as it would in 1821 not be new to the British fauna. The only included nominal taxon being a nomen nudum, the new subgeneric name *Marpessa* becomes also a nomen nudum. The name was made available by Gray in Turton (1840: 212) as a subgenus of *Clausilia*. The only included species is *Clausilia bidens* sensu Müller, in whose synonymy the nominal species *Turbo laminatus* Montagu and *Helix* (*Cochlodina*) *derugata* Férussac are included. Herrmannsen (17.7.1847: 23) designated *Turbo laminatus* Montagu as type species of *Marpessa*, thus preceding Gray (post Nov. 1847: 177, no. 475), who designated *Turbo bidens*. The type species of *Marpessa* Gray in Turton 1840 is thus *Turbo laminatus* Montagu 1803 by subsequent designation by Herrmannsen (1847).

THE TYPE SPECIES OF *PAPILLIFERA* HARTMANN 1842 Hartmann (1842: 156) introduced the name *Papillifera* for the 9th section of the genus *Clausilia* as defined by Pfeiffer (1841). Hartmann does not provide a diagnosis, nor does he cite any included species by name. Nonetheless the name *Papillifera* is available from this publication under article 12.2.5 of the Code, which stipulates that a bibliographic reference to one or more available specific names constitute an indication for a genus group name.

Pfeiffer's sections of *Clausilia* (1841: 31–35) are neither numbered, named nor diagnosed; they are indicated by the subdivision of a list of species in the genus *Clausilia* by asterisks. Amongst other species, "*Clausilia papillaris* Draparnaud" is included in the fifth section, and *Clausilia solida* Draparnaud 1805 in the ninth.

The type species of *Papillifera* Hartmann 1842 is generally cited to be *Clausilia solida* Draparnaud 1805, designated by Lindholm (1924: 59, 71). Lindholm assumed that only the nominal species listed in Pfeiffer's Section 9 were originally

included species, which alone were eligible as type species. However, article 67.2.3 of the Code stipulates that a bibliographic reference to a publication containing the name of a species does not constitute an express reference of a nominal species to a nominal taxon of the genus group. *Papillifera* was thus established without included nominal species; the first subsequently and expressly included nominal species are deemed to be the only originally included species (article 67.2.2 of the Code).

The first authors to include nominal species expressly in *Papillifera* were H. & Adams (1855: 180 as a subgenus of *Clausilia*), who included, i.a., *Clausilia solida* Draparnaud and *C. papillaris* (O.F. Müller). Von Martens (1860: 278) designated "*Clausilia papillaris* Müller" as type species. Thus, the type species of *Papillifera* Hartmann, 1842 is *Helix papillaris* O.F. Müller, 1774 through subsequent designation by von Martens (1860). The change of type species does not cause a change in the current taxonomic concept of *Papillifera*.

DISCUSSION

THE CONTENT OF THE ORIGINAL PUBLICATION OF THE NAME *TURBO BIDENS* LINNAEUS 1758

The root of the long-lasting divergence of opinion is the remark by Schröter (1784) that Linnaeus' diagnosis mentioned a character ('sutura subcrenata') which was not represented in the cited figure. It is astonishing that this view was maintained up to the present (e.g. Nordsieck, 2007), when a simple inspection of Gualtieri's Fig. C on Pl. 4 could have revealed that faint sutural crenellations are indeed depicted in this figure. It is just as astonishing that authors who therefore identified Linnaeus' species with the *Helix papillaris* of Müller, thought that the presence of distant, conspicuous white subsutural papillae in the latter species was adequately described with the words 'sutura subcrenata', and that the fact that Linnaeus did not mention in his diagnosis the whitish hue of the shell of *P. papillaris*, and a conspicuous brown subsutural band interrupted by the white papillae, was irrelevant to the identification of the species named *bidens*. In fact, the early authors who unequivocally describe *Papillifera papillaris*, employ the term 'papillae' (Gualtieri, 1742; Müller, 1774; Draparnaud, 1805).

Curiously, an apparent discrepancy between Linnaeus' diagnosis and Gualtieri's Fig. C was not commented on by any author except Hanley (1855): the presence of two apertural 'teeth' in the diagnosis vs. the depiction of just one in the figure. It is here proposed to regard this as an inaccuracy of the drawing, because Gualtieri's depictions of the apertural folds of clausiliid species (Pl. 4, Figs C–E) are generally not accurate; for example, for *Papillifera papillaris* he illustrates one specimen with a conspicuous second fold (Fig. D) and one with a much reduced fold of very different shape (Fig. E), both of which bear no similarity to its actual position and shape. At this time certainly nobody had a notion of the taxonomic importance of these folds, and consequently paid little attention to their details.

As Linnaeus could not have deduced the character 'apertura postice biplicata' from Gualtieri's figure, it has to be assumed that Linnaeus had material of a clausiliid species with two apertural folds at hand, with which he associated Gualtieri's figure. In any case Linnaeus ignored the missing second apertural fold in Gualtieri's figure, or interpreted this figure as being inaccurate.

The assumption that Linnaeus had actual specimens at his disposal could also explain why he did not assign species names to every figure in Gualtieri's work: He quoted bibliographic references only to the extent that they appeared to describe or illustrate the species of which he had actual specimens at his disposal. Hanley's (1855) observations leave the possibility open that these specimens included *Cochlodina laminata*.

It is confusing that Linnaeus subsequently (1767) associated Buonanni's figure of *Papillifera papillaris* with his *Turbo bidens*. It seems likely that Linnaeus acquired a shell or shells of this species after 1758, and he did not register the differences between these and any other clausiliid species he may have had as species differences. The action of Linnaeus (1767) has no bearing on the interpretation of the original publication of the name *Turbo bidens* Linnaeus 1758.

Giusti & Manganelli's suggestion (2005), that Gualtieri illustrated a clausiliid occurring in the vicinity of Florence, and that the species known as *Cochlodina incisa* (Küster, 1876) is the most likely candidate for this species, must therefore be considered as the most reasonable interpreta-

tion of the nominal species *Turbo bidens* Linnaeus 1758.

THE VALIDITY OF FALKNER *ET AL.*'S (2002)

NEOTYPE DESIGNATION FOR *TURBO BIDENS*

This neotype designation is invalid under the Code for several reasons:

- a) It is based on a published figure, and not on an actually existing specimen. The Code (article 75) does not expressly state this as a requirement, but it is implied as most of the qualifying conditions cannot be fulfilled when an actual specimen is not available. Furthermore, the designation of an inaccurate figure without a locality as a neotype defies the purpose of a neotype designation.
- b) Article 75.3.3 requires 'data and description sufficient to ensure recognition of the specimen designated': Falkner *et al.* (2002) have not seen the 'neotype' specimen and therefore cannot provide information serving to recognize it.
- c) Article 75.3.4 requires the authors' reasons for believing the name-bearing type specimen(s) were lost or destroyed, and the steps taken to trace them. Falkner *et al.* (2002) quote Dance (1967) and Wallinn (1997), who state that no specimens exist in the Linnean collections in London and Uppsala. They made, however, no comment on Gualtieri's collection.
- d) Article 75.3.5 requires evidence that the neotype is consistent with what is known of the former name-bearing type from the original description and from other sources. As amply discussed above, Falkner *et al.*'s neotype designation alters the taxonomic concept of Linnaeus' species to one which is neither consistent with the original diagnosis nor with the bibliographic reference. The sole 'justification' for this shift is a misinterpretation of the diagnosis and an alleged error in Linnaeus' bibliographic reference.
- e) Article 75.3.7 requires a statement that the neotype is, or will become, property of a recognized scientific or educational institution. No such statement was made, and could not be made, as this 'neotype specimen' does not exist.

THE CONSEQUENCES OF OPINION 2176

On superficial reading the conclusion could be drawn from Opinion 2176 that the species

known as *Papillifera papillaris* (O.F. Müller) has to take the name *P. bidens* (Linnaeus 1758) on the grounds of priority and the fact that the name *bidens* is placed on the Official List. This is, however, not the case, because:

- (1) this Opinion did neither endorse Falkner *et al.*'s (2002) invalid neotype designation, nor made any other pronouncement on the name-bearing type of the nominal species *Turbo bidens*;
- (2) the name *Helix papillaris* O.F. Müller was not suppressed in this Opinion.

It is astonishing that the Commission described *Papillifera papillaris* as a junior subjective synonym of "*Turbo*" *bidens*, despite Giusti & Manganeli (2005) having demonstrated that this is not the case. No reason or reference is given for this taxonomic opinion of the Commission. In the Introduction to the Code (1999: xix), it is stressed that the Code is concerned with the names for taxa that are correct under particular taxonomic circumstances, and that the "Code refrains from infringing upon taxonomic judgment, which must not be made subject to regulation or restraint." Obviously it is contrary to the spirit of this Introduction for the ICZN to make an unsupported statement about the taxonomic interpretation of a species name, and to restrain its interpretation contrary to the evidence presented to the Commission.

Likewise, Article 80.6.2 states: "The status of a name entered in an Official List is subject to the ruling(s) in any relevant Opinion(s) [...]; all other aspects of its status derive from the normal application of the Code [...]." Thus, as no ruling was made on the name-bearing type of *Turbo bidens* Linnaeus, a valid fixation of this type remains to be made under the 'normal application of the Code'.

The ruling "that the specific name *papillaris* Müller, 1774, as published in the binomen *Helix papillaris*, is not conserved" only makes sense if the name *papillaris* is synonymous with the name *bidens* Linnaeus, 1758. As this is not the case, and the name *papillaris* is not suppressed, this ruling has no consequences, and has, in fact, no object.

An unavoidable consequence of the rulings given in Opinion 2176 is that, because of its seniority, the name *Turbo bidens* Linnaeus 1758 must necessarily in every case displace an established, but junior name in the family Clausiliidae.

CONCLUSION: PROPOSAL OF A NEOTYPE FOR *TURBO BIDENS* LINNAEUS 1758

The placement of the name *Turbo bidens* Linnaeus 1758 on the Official List in Opinion 2176 prohibits to ignore it as an unidentifiable name (*nomen dubium*), and its continuous (albeit incorrect) use in the recent literature prohibits to treat it as a *nomen oblitum*. The loss of all syntypal material, and the continuing disagreement about the correct identification of the species require the proposal of a neotype. According to the foregoing, everything that can be deduced from Linnaeus' original publication of *Turbo bidens* is consistent with the identification of that nominal species with the species known as *Cochlodina incisa* (Küster 1876), occurring in the vicinity of Florence, and a specimen of that species is here designated the neotype of *Turbo bidens* Linnaeus 1758 (Figs 3b, 4). With this action the two clausiliid species figured by Gualtieri (1742) have the same neotype locality near his home town Florence.

The species *Cochlodina incisa* has a limited distribution in Italy and is not very often cited in the literature so that Article 23.9 of the Code (reversal of precedence) is not applicable. Replacement of that name with the name *Cochlodina bidens* (Linnaeus 1758) is therefore deemed a tolerable nomenclatural change.

Alternatively, to fix the meaning of the name *Turbo bidens* Linnaeus to the species to which Linnaeus' own material may have belonged, viz. *Cochlodina laminata* (Montagu 1803), is out of the question as the name *Cochlodina laminata* is in widespread and uncontested use, and is placed on the Official List. *A fortiori*, the species does not have crenellate sutures and does not live in southern Europe, as Linnaeus' diagnosis indicates.

The qualifying conditions of the Code (article 75.3) for the proposal of a neotype are fulfilled as follows:

Art. 75.3.1. The purpose of the neotype designation is to fix the meaning of the species name *Turbo bidens*, which is widely used in a sense incompatible with the original description, and which cannot be unequivocally identified, nor its precise type locality determined from published data.

Article 75.3.2. The species defined by its neotype is hitherto known as *Cochlodina* (*Procochlodina*)

incisa (Küster 1876). A description under that name, with indications of the differences to other species of the subgenus *Cochlodina* (*Procochlodina*), is provided by Nordsieck (1969: 24, 25, f. 8). The differences to *Papillifera papillaris* (Müller), with which this species is confused in the literature, are discussed by Giusti & Manganelli (2005) and in this paper.

Article 75.3.3. The neotype specimen of *Cochlodina bidens* (Linnaeus 1758), here figured in Figs 3b and 4, was collected in the Giardino di Boboli, in Florence, 60 m above sealevel, UTM=32TPP8148, by S. Cianfanelli & S. Vanni on 11.05.2005 (ex Coll. Cianfanelli: 20311/4635). The height of the shell is 16.4 mm. The specimen is now kept in the collection of the MZUF (Museo di Storia Naturale dell'Università degli Studi di Firenze, Sezione Zoologica "La Specola") with inventory no. 24438. The neotype of *Papillifera papillaris* is from the same locality, where it lives on walls; *Cochlodina bidens* lives in leaf litter, on walls with mosses and on trees.

Article 75.3.4. Original material of *Turbo bidens* is neither extant in the Linnean collections in London or Uppsala (Falkner *et al.*, 2002; Linnean Society of London, 2007), nor in the remains of the Gualtieri collection in the Museum of Calci in Pisa (Giusti & Manganelli, 2005).

Article 75.3.5. As discussed above, the neotype corresponds in all aspects to Linnaeus' diagnosis, viz. a sinistral shell with a subcrenellate suture and two folds visible in the aperture. It also agrees with essential aspects of the shell described and figured by Gualtieri (1742), viz. a reddish-brown, sinistral shell with a subcrenellate suture without axial ribbing.

Article 75.3.6. An original locality is not given, but Gualtieri (1742) figured many land snails living in Italy, and having made collections in the vicinity of his home town Florence is deemed a reasonable assumption.

Article 75.3.7: The neotype is property of a recognized scientific or educational institution; see Article 75.3.3.

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