

## A Note on *Strombus coronatus* Defrance, 1827 and *Strombus coronatus* Röding, 1798 (Mollusca: Gastropoda)

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*Abstract.* *Strombus coronatus* Defrance, 1827 is considered a *nomen protectum*, and the cerithiid *Strombus coronatus* Röding, 1798 is demonstrated to be a *nomen oblitum* in accordance with the ICZN Article 23.9.1. The Late Miocene to Early Pliocene *Strombus coronatus* Defrance is shown to belong to *Persististrombus* Kronenberg & Lee, 2007, and its relation with other Neogene strombids is briefly addressed. A lectotype for *Strombus coronatus* Defrance is designated.

Key Words: Gastropoda, Cerithiidae, Strombidae, *Persististrombus*, homonymy, Miocene, Pliocene.

### INTRODUCTION

While reviewing literature in the course of our research on strombid taxa from the Miocene Central Paratethys Sea, the nominal taxon *Strombus coronatus* Defrance, 1827 was frequently encountered. Although the identity and stratigraphic range of this species varies considerably in the literature (ranging from Late Oligocene to Late Pliocene) this name is treated as the valid name for a species of the family Strombidae Rafinesque, 1815. Nevertheless, the binomen *Strombus coronatus* was first introduced by Röding (1798) for an extant Indo-Pacific cerithiid. At that time the generic concept of *Strombus* differed fundamentally from the modern usage, and an analogous situation exists involving *Strombus granulatus* Röding, 1798 (a cerithiid) and the strombid *Strombus granulatus* Swainson, 1822 (Kronenberg and Lee, 2005).

### NOMENCLATORIAL STATUS AND HISTORY

#### 1. *Strombus coronatus* Röding, 1798

When introducing *Strombus coronatus*, Röding (1798:98, species 1270) referred to *Murex aluco* Gmelin (1791, sp. 134) and Martini (1777:figs. 1478–1479). Houbriek (1978:104–105) pointed out that Röding's (1798) reference to Martini (1777) involves two species, which are now established as *Pseudovertagus aluco* (Linnaeus, 1758) [fig. 1478 of Martini (1777)] and *Rhinoclavis vertagus* (Linnaeus, 1758) [fig. 1479 of

Martini (1777) respectively]. Although Houbriek (1978) did not explicitly designate a lectotype for *Strombus coronatus* Röding, 1798, he synonymized *Strombus coronatus* Röding, 1798 with *Murex aluco* Linnaeus, 1758 [= *Pseudovertagus aluco* (Linnaeus, 1758)] by stating: "I here restrict *Strombus coronatus* [of Röding, MH and GCK] to fig. 1478 and place it into the synonymy of *Pseudovertagus aluco* ..." (Houbriek, 1978:104–105). Röding's *coronatus* soon disappeared from the literature, and the authors know of no 20th century reference to this binomen as a valid species name.

#### 2. *Strombus coronatus* Defrance, 1827

Defrance (1827) introduced the primary homonym *Strombus coronatus*, 29 yr after Röding, referring to the illustration of a fossil strombid illustrated in Walch (1768:116, pl. C (38), figs. 1–2). Walch (1768) described the shell as a rare species present in collection cabinets of the time and suggested that it was collected in the Turin region of Italy. Defrance (1827) provided an adequate description of the shell, compared its morphology briefly with the extant *Strombus gigas* Linnaeus 1758, and remarked that it is frequently found in the Siena region in Italy. He seems to have doubted the Turin origin suggested by Walch (1768) and emphasized that the origin of that specimen was unknown. Indeed, the large-sized species is very common in the Italian Pliocene and was already known to science in the 17th century when Aldrovandi (1648)

identified it as *Murex albus*. After the definition by Defrance (1827), the nominate taxon was cited frequently from Pliocene deposits throughout the Mediterranean and Eastern Atlantic regions.

Unfortunately, the species name was also applied to several Miocene and even Oligocene specimens from central and southern Europe. Most notably among others, Hörnes (1856) and Hoernes & Auinger (1884) identified Middle Miocene specimens of what is here provisionally called the *Persististrombus lapugyensis-exbonellii* group as *Strombus coronatus* Defrance, 1827. Subsequently, many stout and strongly sculptured fossil strombids with long shoulder-spines have been treated as *Strombus coronatus* (e.g., Baldi, 1973; Schultz, 1998).

### 3. *Strombus coronatus*, Defrance, 1827 – a *nomen protectum*

Herein, we refer to the International Commission for Zoological Nomenclature (ICZN) Article 23.2, which pleads for nomenclatural stability and perpetuation of long-accepted names, and to ICZN Article 23.9.1. To our knowledge, the name *Strombus coronatus* Röding, 1798 has not been used as a valid name after 1899, which meets the requirements of ICZN Article 23.9.1.1. (“the senior homonym has not been used as a valid name after 1899”). ICZN Article 23.9.1.2. states that “the junior homonym has been used as its presumed valid name in at least 25 works, published by at least 10 authors in the immediately preceding 50 yr and encompassing a span of not less than 10 yr.” Accordingly, we document that *Strombus coronatus* Defrance, 1827 was used between 1956–2006 in 33 papers by 33 authors (see references below), which meets the requirements of Article 23.9.1.2. Thus, we invoke ICZN Article 23.9.1 to make the name *Strombus coronatus* Defrance, 1827, a *nomen protectum* and *Strombus coronatus* Röding, 1798 a *nomen oblitum*.

### CURRENT STATUS OF *STROMBUS CORONATUS* DEFRANCE, 1827 – SYSTEMATICS AND PALEOBIOGEOGRAPHY

Recently, Kronenberg & Lee (2007) introduced *Persististrombus* (type species by original designation: *Strombus granulatus* Swainson, 1822) as a new genus for a group of strombids which experienced its acme in the European Miocene and is now represented by *Persististrombus latus* (Gmelin, 1791) in the African Eastern Atlantic Province and by *P. granulatus* (Swainson, 1822) in the Panamic Province.

Although this grouping would make *Persististrombus* seemingly paraphyletic (see the consensus tree presented by Latiolais et al. (2006:440)), we here advocate the possibility of a distinct lineage, with hardly any morphological change since the Early Miocene, with two distinct side branches, one leading to *Strombus*

(here used in the strict sense, i.e., represented by the Recent species *S. pugilis* Linnaeus, 1758 (type species); *S. alatus* Gmelin, 1792; *S. gracilior* Sowerby, 1825) and one to *Lobatus* Iredale, 1921 (type species by monotypy: *Strombus bituberculatus* Lamarck, 1822 = *Strombus raninus* Gmelin, 1791). Moreover, the tree presented by Latiolais et al. (2006) is a consensus tree, based on 325 bp nuclear histone H3, where indeed *P. granulatus* plots out as the sister taxon of *Strombus* s.s. (Latiolais, 2003:fig. 1). These clades are sister to *Lobatus* for 640 bp mitochondrial COI. *S. granulatus* plots out as sister taxon of *Lobatus* (Latiolais, 2003:fig. 2) and these two are sister to *Strombus* s.s.

*Persististrombus* is characterized by “... moderate size for family, fusiform, shoulder knobs distinct on body whorl, slightly expanded outer lip with sharp, unglazed rim and no extensions, regularly divided callus on columella, anterior canal short, posterior canal or groove absent or obsolete. Protoconch with four to five smooth whorls. Adaxial side of outer lip smooth, plicate, or granulate.” (Kronenberg and Lee, 2007). *Strombus coronatus* fits within this definition except for its low, concave spire and the number of protoconch whorls. A preliminary analysis of the *Persististrombus lapugyensis-exbonellii* group (Harzhauser and Kronenberg in prep.) reveals that there is a gradual change in spire height, i.e., from high-spined specimens in the early Langhian to lower spired specimens in the Serravallian of the Central Paratethys. Therefore we allocate both *S. coronatus* and the Pliocene to Recent *S. latus* Gmelin, 1791 to *Persististrombus*. As the protoconch in all examined specimens was poorly preserved, the number of whorls may have been slightly higher than the approximately three observed by us (see below). On the other hand, reduction of the number of protoconch whorls may have occurred in the Proto-Mediterranean, which would call for a minor adjustment in the description of *Persististrombus* as far as the number of protoconch whorls is concerned.

### Genus *Persististrombus* Kronenberg and Lee 2007

Numbers in front of references refer to citations which are relevant for ICZN Article 23.9.1.2 (references before 1958 are found in the text above).

*Persististrombus coronatus* (Defrance, 1827)  
nov. comb.

Pl. 1, Figures 1–5, 7–9

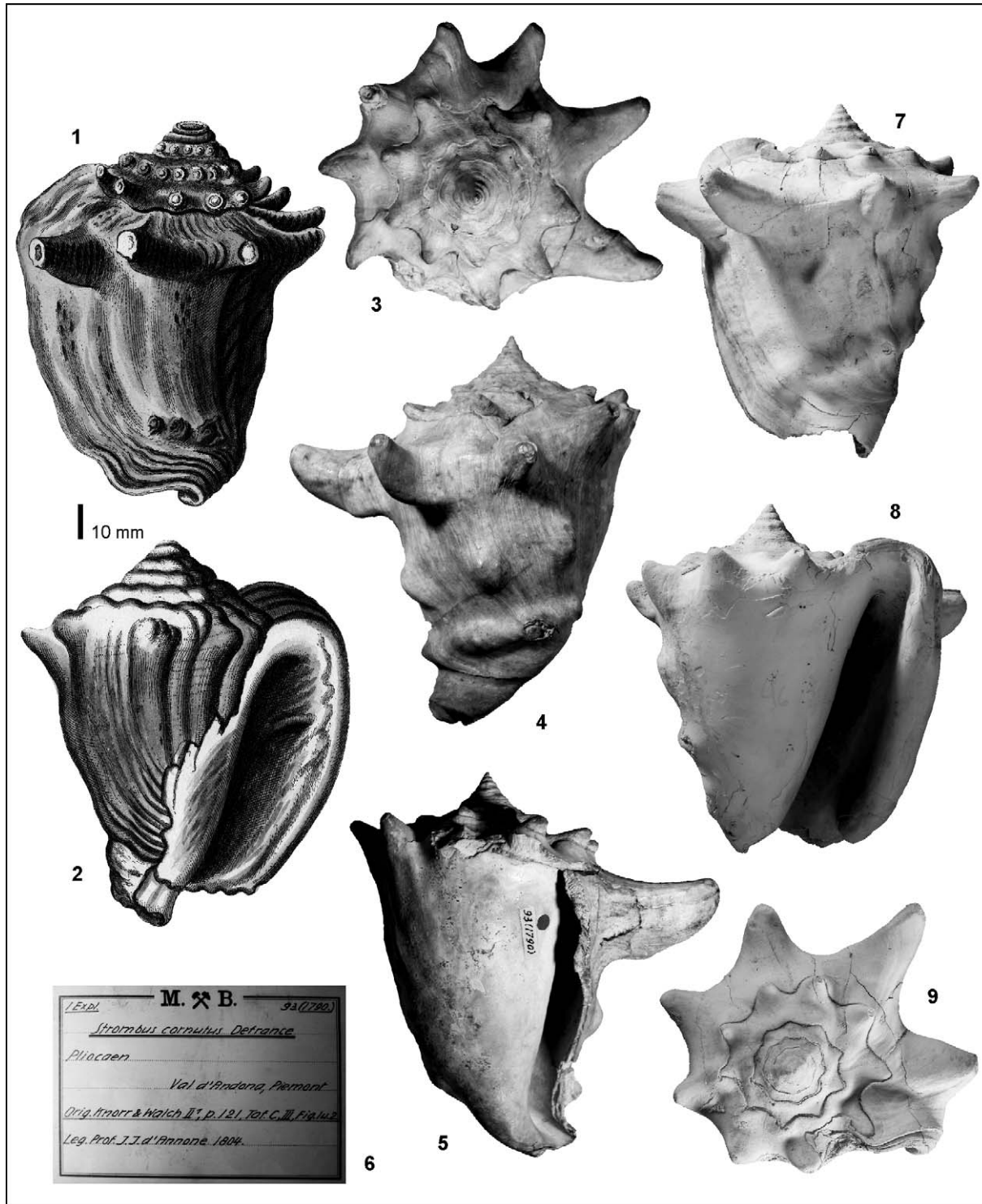
*Murex albus* Aldrovandi, 1648:472, fig. 2.

*Porphyroides* Lancisi, 1771: 298, fig. 1.

stumpfgestachelte dicklippige Flügelschnecke Walch, 1768:116, pl. C (38), figs. 1–2.

***Strombus coronatus* Defrance, 1827:124.**

*Strombus coronatus* Defrance, Rutsch, 1936:34–35.



Figures 1–2. Copy of the illustration of the lectotype (designated herein) of *Strombus coronatus* DeFrance, 1827 in Walch (1768, pl. 38, figs. 1–2).  
 Figures 3–6. *Persististrombus coronatus* (DeFrance, 1827). 3–5: Specimen 93(1790) present in NMB. 6: Label with NMB specimen.  
 Figures 7–9. A typical representative of *Persististrombus coronatus* from the Lower Pliocene of Tresanti (Florence, Tuscany) in Italy (NHM Inv. A2576); dorsal view, ventral view, apical view.



- [1] *Strombus coronatus* var. *compressonana* Sacco, Erüinal-Erentöz, 1958:38, pl. 4, figs. 2–3.
- [2] *Strombus coronatus* Defrance, Glibert, 1963:219.
- [3] *Strombus coronatus* Defrance, Compagnoni, 1964:259, fig. 6.
- [4] *Strombus coronatus* Defrance, Moroni & Paonita, 1964:12.
- [5] *Strombus coronatus* Defrance, Hecht et al., 1964:451.
- [6] *Strombus (Strombus) coronatus* Defrance, Symeonides, 1965:256, pl. 32, fig. 1.
- [7] *Strombus coronatus* Defrance, Palla, 1967:959, pl. 72, fig. 2.
- [8] *Strombus coronatus* Defrance, Mastroilli, 1969:pl. 5, fig. 2.
- [9] *Strombus coronatus* Defrance, Beneventi & Piccoli, 1969:17, pl. 2, fig. 1.
- [10] *Strombus (Strombus) coronatus* Defrance, Malatesta, 1974:219, pl. 17, figs. 1–7.
- [11] *Strombus (Strombus) coronatus* Defrance, Pavia, 1975:112, pl. 5, figs. 1–4.
- [12] *Strombus coronatus* Defrance, Fekih, 1975:111, pl. 33, fig. 1.
- [13] *Strombus coronatus* Defrance, Meco, 1977:56, pl. 14, fig. 2, pl. 15, fig. 2, pl. 16, figs. 1–2, etc.
- [14] *Strombus coronatus* Defrance, Martinell, 1979:123, pl. 3, figs. 5–6.
- [15] *Strombus coronatus* (Defrance), Akbulut, 1980:5.
- [16] *Strombus (Strombus) coronatus* Defrance, Bré-bion, 1983:165 (?), see further below).
- [17] *Strombus coronatus* var. *percoronata* Sacco, Ferrero-Mortara et al., 1984:138, pl. 21, figs. 2a–2c.
- [17] *Strombus coronatus* var. *perspinosonana* Sacco, Ferrero-Mortara et al., 1984:139, pl. 21, figs. 6a–6b.
- [17] *Strombus coronatus* var. *compressonana* Sacco, Ferrero-Mortara et al., 1984:139, pl. 21, figs. 7a–7b.
- [18] *Strombus coronatus* (Defrance), Moscatelli, 1987:18.
- [19] *Strombus coronatus* Defrance, Cavallo & Repetto, 1992:58, fig. 101.
- [20] *Strombus coronatus* (De France), Falconeri, 1996:67–68, figs 1–9, 69 figs 1–9.
- [21] *Strombus coronatus*, Gregor et al., 1998:13 middle fig., specimen on right, 13 bottom fig.
- [22] *Strombus coronatus*, Ivanov et al., 2001:112 bottom figure, specimen on left.
- [23] *Strombus coronatus* (Defrance), İslamoğlu, 2002:53, 54.
- [24] *Strombus (Strombus) coronatus* Defrance, Landau et al., 2004:63, pl. 14, fig. 6.
- non Persististrombus coronatus* (Defrance, 1827)  
[but used as presumed valid name as required by  
ISCN Article 23.9.1.2.]
- [25] *Strombus (Str.) coronatus* Defrance, Sieber, 1958:141 (= *ex gr. Persististrombus exbonellii* Sacco, 1893).
- [26] *Strombus coronatus* Defrance, Strausz, 1966:222, figs. 102–103 (= *ex gr. Persististrombus lapugyensis-exbonellii* Sacco, 1893).
- [27] *Strombus coronatus* Defrance, Baldi, 1973:2705, pl. 34, figs. 7–8. (unnamed *Persististrombus*).
- [28] *Strombus coronatus* Defrance, Steininger & Baldi, 1975:345, pl. 3, fig. 6. (unnamed *Persististrombus*).
- [29] *Strombus (Strombus) coronatus* Defrance, Tanar, 1985:22, pl. 1, fig. 4 (= *Melongena cornuta* Agassiz, 1843).
- [30] *Strombus (Strombus) coronatus* Defrance, Nikolov, 1993:69, pl. 3, figs. 7–8 (= “*Euprotomus*” *schroeckingeri* Hörnes in Hoernes & Auinger, 1884).
- [31] *Strombus (Strombus) coronatus* Defrance, Schultz, 1998:60, pl. 23, fig. 6 (= *ex gr. Persististrombus lapugyensis* Sacco, 1893).
- [32] *Strombus coronatus* (Defrance), Árpád, 2003:11 (= *ex gr. Persististrombus bonellii* Brongniart, 1823).
- [33] *Strombus coronatus* (Defrance), İslamoğlu & Taner, 2003:22 (= *ex gr. Persististrombus bonellii* Brongniart, 1823).

Note that the suggested affiliations are only preliminary; details will be provided in Harzhauser and Kronenberg in prep.

Defrance (1827:124) based his description of *Strombus coronatus* on figures in Walch (1768, pl. 38 figs 1–2; attributing the work to Knorr) and added “On trouve des coquilles de cette espèce aux environs de Sienna.” (One finds shells of this species near Siena). We conclude that Defrance’s description is based on both the illustration by Walch and by specimens from near Siena (Italy) Defrance had seen prior to his description. These specimens are best considered syntypes of *Strombus coronatus* (ICZN recommendation 73F). Dance (1986:209) gives information on the Defrance collection, stating it is present in the Musée d’Histoire Naturelle, Caen (France), and some shells in Geneva (Switzerland).

According to Cleevely (1983), the Defrance collection in Caen was destroyed in 1944. It is however possible that parts of the Defrance collection, such as parts of the Coelentrata (see Cleevely, 1983), survived this bombing and the whereabouts of possible remains are presently unaccounted for. Nevertheless, Dr. Jean-Philippe Rioult, Université de Caen confirmed to Mr. Franck Frydman (email 13 November 2007) that the Defrance collection indeed was destroyed (“... mais cette collection a bien été détruite en totalité lors du bombardement incendiaire des locaux du Muséum d’Histoire Naturelle de Caen le 7 juillet 1944.”) and added “A moins d’un miracle (...) il ne faut pas compter retrouver d’échantillons de cette collection.”

Dr. Yves Finet, Muséum d’Histoire Naturelle, Genève (MHNG), informed us that there are no

specimens of *S. coronatus* present in that museum (email 25 Oct. 2007).

Rutsch (1936) claimed that the specimen present in the collection of the Naturhistorisches Museum Basel (NMB), coll. nr. 93/1790, is the specimen illustrated by Walch. However, comparison of images of the Basel specimen, kindly made available by Mr. Arne Ziem, NMB, here reproduced (Figures 3–5), clearly demonstrates that these are different specimens. Also the accompanying label (Figure 6) makes a provenance from the Walch collection quite improbable.

Therefore, the only currently available syntype is the specimen illustrated by Walch (1769), and all other syntypes are considered lost.

Meco (1977) distinguished *S. coronatus* from *S. latus* Gmelin, 1791 (as *S. bubonius* Lamarck, 1822) based on morphometrics, without fixing a type specimen for *S. coronatus*. Prior to Meco's (1977) publication, *S. coronatus* had been often confused with other species of the Miocene to Recent which we allocate to *Persististrombus*. Even after Meco's (1977) paper (see listing above) considerable confusion about the identity of *S. coronatus* remains.

To unequivocally stabilize the identity of *S. coronatus* we hereby designate the specimen illustrated in Walch (1768, pl. 38, figs 1–2), here re-illustrated (Figures 1–2), as lectotype of *Strombus coronatus* Defrance, 1827.

**Description:** Protoconch of all available specimens poorly preserved, with about 3 smooth, moderately convex whorls. Shell of Pliocene specimens very thick and heavy; Tortonian ones are generally slightly less robust. Spire low, concave, with an average apical angle of  $70.8^\circ$  ( $n = 47$ ,  $s = 11.0$ ; Table 1) [apical angle = angle of spire whorls; body whorl angle = angle between the flanks of the terminal part of the last whorl; body whorl height = height of last whorl from anterior tip to the suture between last whorl and last spire whorl in apertural view]. Size of adults usually up to 110 mm, but giant representatives may attain sizes up to 155 mm; dwarf forms are also common. About eight prominent triangular shoulder spines on body whorl and evident on the spire whorls as sutural excrescences which produce a stellate (“coronate”) pattern in apical view. Two more spiral rows of knobs on the body whorl; middle one often reduced or absent while anterior one predominates. Outer lip solid and strongly thickened. Columellar callus thick, covering the base completely in fully grown adults. Often wing extends apically above the suture between the penultimate and body whorls. Stromboid notch deeply incised and regularly U-shaped. A typical specimen of *S. coronatus* is illustrated here (Figures 7–9).

**Remarks:** Herein we treat only Late Miocene to Early Pliocene specimens as *Persististrombus coronatus* (De-

france, 1827). Several morphologically similar specimens known from Early to Middle Miocene deposits of the Paratethys Sea usually have been treated as *Strombus coronatus* Defrance. However, these shells differ in their stromboid notch-morphology (e.g., shallower and less well defined margins) and/or in their higher early spire. Sacco (1893) recognized these differences and introduced several new species names for such specimens. These “*coronatus*-like” morphs represent independent, iterative developments within a *Persististrombus* lineage which comprise a herein-proposed preliminary concept: the *Persististrombus lapugyensis-exbonellii* group. A slender counterpart of iterative but unrelated developments is represented by the extant *Persististrombus granulatus* (Swainson, 1822) and the Middle Miocene *Persististrombus exbonellii* (Sacco, 1893). Occurrences of *Persististrombus* in the Pontilevian fauna (Middle Miocene) of the Loire Basin described by Glibert (1949) as *Strombus coronatus* might also belong to this group. A detailed analysis of the Middle Miocene strombids will be presented elsewhere (Harzhauser & Kronenberg in prep.).

**Distribution:** The earliest record of this species is mentioned by Brébion (1983) from the Middle or Late Miocene of Angola. Unfortunately, Brébion (1983) did not provide a description or an illustration. Therefore, this interesting occurrence has to be treated with caution. If the identification is correct, then the West African Miocene occurrence of *Persististrombus coronatus* suggests that this species is a West African element, which later invaded the Mediterranean Region. There, it does not appear before the Tortonian, where it is known from Italy and Turkey (Sacco, 1893; Stchepinsky, 1939, 1946). It is apparently absent from the Mediterranean during the Messinian but flourished in this bioprovince in the Zanclean and the early Piacenzian. During this warm period the species is recorded from Portugal, Spain, France, Italy, Greece, Turkey, Syria, Libya, Tunisia, Morocco and the Canary Islands (Pereira da Costa, 1866; Almera & Bofill, 1886; Serres, 1829; d’Ancona, 1871; Sacco, 1893; Gignoux, 1913; Erünal-Erentöz, 1958; Symeonides, 1965; Roman, F. 1940; Fekih, 1975; Lecointre, 1952; Landau et al., 2004; Meco, 1977). *Persististrombus coronatus* disappears from the Mediterranean Sea completely with the onset of the Late Pliocene cooling (Landau et al., 2004) and seems to be extinct thereafter.

## CONCLUSIONS

Despite its homonymy with a cerithiid described by Röding (1798), *Strombus coronatus* Defrance, 1827 can be conserved as a name for a Miocene to Pliocene strombid species. A review of the literature fulfills the requirements of the ICZN. Moreover, recent studies of Kronenberg & Lee (2007) have shown that this taxon is

Table 1

Measurements of 47 specimens of *Persististromus coronatus* (DeFrance, 1827) from the collections of the Natural History Museum Vienna (NHM) and Naturalis - Nationaal Natuurhistorisch Museum, Leiden (RGM).

nr.	locality	dating	height (mm)	width (mm)	aperture height (mm)	body whorl height (mm)	apical angle	body whorl angle
1	Muezzinler - Turkey	Late Miocene	42	21	27	29	65	32
2	Muezzinler - Turkey	Late Miocene	29	14.5	19	22	56	39
3	Muezzinler - Turkey	Late Miocene	44	23	27	28	50	43
4	Muezzinler - Turkey	Late Miocene	43	22	28	31	71	42
5	Muezzinler - Turkey	Late Miocene	40	20	25	29	65	35
6	Muezzinler - Turkey	Late Miocene	41	22.5	29	30	63	38
7	Muezzinler - Turkey	Late Miocene	85	75	83	71	63	31
8	Muezzinler - Turkey	Late Miocene	75	50	57	60	62	40
9	Muezzinler - Turkey	Late Miocene	64	66	46	48	65	39
10	Muezzinler - Turkey	Late Miocene	65	33	48	49	59	35
11	Bolognese - Italy	Early Pliocene	64	50	60	54	62	31
12	Bordighera - Italy	Early Pliocene	58	50	49	48	60	33
13	Bucciana - Italy	Early Pliocene	85	78	78	74	75	37
14	Toscana - Italy	Early Pliocene	86	75	87	79	72	41
15	Toscana - Italy	Early Pliocene	69	60	56	57	73	40
16	Asti - Italy	Early Pliocene	93.5	70.5	84.5	83	66	38
17	Asti - Italy	Early Pliocene	108.4	94.8	111.5	98.5	85	40
18	Asti - Italy	Early Pliocene	103	85	103.4	97.5	78	40
19	Castell Arquato - Italy	Early Pliocene	69.9	54.5	70	66.9	88	36
20	Castell Arquato - Italy	Early Pliocene	101.5	87.7	95.9	89	66	47
21	Castell Arquato - Italy	Early Pliocene	111.8	95.6	108.8	101.3	85	37
22	Castell Arquato - Italy	Early Pliocene	104	88	94	89.9	72	40
23	Ceriale Rio Torsero - Italy	Early Pliocene	49	34	36	30	60	30
24	Ceriale Rio Torsero - Italy	Early Pliocene	65	47	54	47	62	34
25	Ceriale Rio Torsero - Italy	Early Pliocene	65	44	53	48	65	35
26	Ceriale Rio Torsero - Italy	Early Pliocene	70	43	55	53	57	34
27	Ceriale Rio Torsero - Italy	Early Pliocene	51	35	47	33	75	36
28	Ceriale Rio Torsero - Italy	Early Pliocene	65	61	46	45	63	32
29	Ceriale Rio Torsero - Italy	Early Pliocene	65	54	49	47	61	35
30	Ceriale Rio Torsero - Italy	Early Pliocene	73	56	56	46	68	37
31	Ceriale Rio Torsero - Italy	Early Pliocene	115	94	85	72	84	37
32	Ceriale Rio Torsero - Italy	Early Pliocene	104	102	81	83	85	36
33	Siena - Italy	Early Pliocene	65.3	59.7	61	56.6	62	41
34	Siena - Italy	Early Pliocene	62.8	49	55.7	55.1	85	35
36	Siena - Italy	Early Pliocene	98	98	84	82	75	38
37	Siena - Italy	Early Pliocene	78	75	77	58	80	33
38	Tresanti - Italy	Early Pliocene	100.8	83.3	94.2	89.5	74	37
39	Tresanti - Italy	Early Pliocene	108.5	84	105.7	93	67	40
40	Tresanti - Italy	Early Pliocene	111.7	87	110	98	87	40
41	Tresanti - Italy	Early Pliocene	98.4	90	103.4	89	70	39
42	Tresanti - Italy	Early Pliocene	95.4	84	92.5	84	64	40
43	Sicily	Early Pliocene	100.9	95.8	94.4	88.5	67	38
44	Sicily	Early Pliocene	90	84.4	87.2	78	65	40
45	Fuerteventura - Canary Islands	Early Pliocene	137	126	135	115	78	36
46	Fuerteventura - Canary Islands	Early Pliocene	111	112	112	105	85	40
47	Fuerteventura - Canary Islands	Early Pliocene	134	122	130	125	78	38

assignable to the strombid genus *Persististrombus*, which affiliation unites a conspicuous amphi-Atlantic Neogene species flock. The fossil record suggests that *Persististrombus coronatus* might have its roots in the Miocene of West Africa. During the Tortonian it managed to invade the Mediterranean Sea. The Messinian crisis forced the species to retreat from the Mediterranean, and it might have found a refuge in the Eastern Atlantic. During the early Pliocene warming it became very abundant throughout the Mediterranean, being recorded from nearly all coasts. Its final extinction was related to the Pliocene cooling. This strict species concept shows that the Early and Middle Miocene populations of Central Europe, erroneously synonymized with *P. coronatus* in the literature, represent “*coronatus*-like” but unrelated morphs of the *Persististrombus lapugyensis-exbonellii* group.

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