

A new record for the Italian fauna: *Plagyrona placida* (Shuttleworth, 1852) from Sardinia and Southern Italy (Gastropoda Pulmonata Valloniidae)

Simone Cianfanelli^{1*}, Gianbattista Nardi² & Marco Bodon³

¹Museo di Storia Naturale, Sezione Zoologica de "La Specola", Università di Firenze, Via Romana 17, 50125 Firenze, Italy; e-mail: simone.cianfanelli@unifi.it

²Via Boschette 8/A, 25064 Gussago, Brescia, Italy; e-mail: gbnardi@libero.it

³Dipartimento di Scienze Ambientali dell'Università di Siena, Via P.A. Mattioli 4, 53100 Siena, Italy; e-mail: mabodon@tin.it

*Corresponding author

ABSTRACT

Plagyrona placida (Shuttleworth, 1852) is a terrestrial minute species with a wide but fragmented distribution, known from some of the Macaronesian Islands of the Canaries and the Madeira archipelago, from Corsica Island, from some European countries (Portugal, Albania and Greece) and from Northern Africa (Algeria). This species has been recently discovered in Italy (Sardinia, Campania and Calabria) for the first time; data of sampling and the characteristics of the Italian populations are discussed in this note. *P. placida* lives in the Mediterranean forest or bush environments, but its specific habitat is not known because it has been found, at least in Italy, in alluvial debris collected along streams and in litter. Even if this species has not been recorded until now, the undisturbed habitat and its rarity suggest that it may be native to Italy, and not accidentally introduced by man through trees used for reforestation or through imported vegetables, as already happened for others small species.

KEY WORDS

Valloniidae; *Plagyrona placida*; Italy; Sardinia; Campania; Calabria.

Received 12.05.2012; accepted 12.12.2012; printed 30.12.2012

Proceedings of the 1st International Congress "Insularity and Biodiversity", May 11th-13th, 2012 - Palermo (Italy)

INTRODUCTION

The family Valloniidae Morse, 1864, includes helicoid minute molluscs, usually living in the soil or in the litter, with cosmopolitan distribution (Schileyko, 1998).

In Europe it is represented by the genera *Acanthinula* Beck, 1847, *Gittenbergia* Giusti et Manganelli, 1986, *Plagyrona* Gittenberger, 1977, *Spermodea* Westerlund, 1902, *Vallonia* Risso, 1826 and *Zoogenetes* Morse, 1864, with about 15 known species (Schileyko, 1998; Bank, 2011a; Holyoak & Holyoak, 2012). While the genus *Vallonia* includes several species, the genera *Acanthinula*, *Sper-*

modea and *Plagyrona* include few species and the remaining genera include only monospecific taxa (Gerber, 1996; Falkner et al., 2001; Bank et al., 2002; Bank, 2011a; Holyoak & Holyoak, 2012).

In Italy, until now, six species belonging to the family Valloniidae are known: *Acanthinula aculeata* (Müller, 1774), *Gittenbergia sororcula* (Benoit, 1859), *Vallonia costata* (Müller, 1774), *V. enniensis* (Gredler, 1856), *V. pulchella* (Müller, 1774) and *V. suevica* Geyer, 1908, the last one only recently reported (Manganelli et al., 1995; Bank, 2011b; another taxon, *V. excentrica* Sterki, 1893, has been considered as conspecific with *V. pulchella* by some authors). A seventh species, *Plagyrona*

placida (Shuttleworth, 1852), is now reported in this paper from Sardinia, Campania and Calabria.

P. placida has a fairly wide but fragmented distribution, having been reported for the Canary Islands (El Hierro, La Gomera, La Palma, Tenerife) (Wollaston, 1878; Ibáñez et al., 2001; Bank et al., 2002; Brito & Fraga, 2010), the islands of Madeira and Porto Santo (Wollaston, 1878; Waldén, 1983; Bank et al., 2002; Cameron et al., 2007; Seddon, 2008), Portugal (Servain, 1880; Silva e Castro, 1887; Locard, 1899; Gittenberger, 1977; Oliveira, 2008, 2009, 2010; Torres & Oliveira, 2010; Bank, 2011a; Holyoak & Holyoak, 2012), Corsica (Ripken & Bouchet, 1998; Falkner et al., 2002), Albania (Reischhütz et al., 2008; Ferhër & Eröss, 2009; Bank, 2011c) and Greece (Gittenberger, 1989; Bank, 2011d); moreover, it was also surveyed in north-eastern Africa, in Algeria (Bourguignat, 1863, 1864; Gittenberger, 1977).

Being of small size, rather rare and localized, therefore difficult to find, *P. placida* might have escaped non specific searches performed in other countries, so that its known distribution may have been underestimated. In Madeira and Porto Santo the species has been found also as a fossil (Cook et al., 1993; Cameron et al., 2006) so, in these places, it is undoubtedly to be considered a native species; on the other hand, in other countries, its autochthony is not proven with certainty, even if there are no elements in favour of a passive diffusion.

Historical notes

"*Helix placida*" was described by Shuttleworth (1852) on the basis of some specimens found on the island of Tenerife, in the Canary archipelago. A second description of this entity was made by Bourguignat (1863) who, collecting this minute snail in Algeria, named it "*Helix debeauxiana*" (taxon now acknowledged as a junior synonym of *Plagyrona placida*; Waldén, 1983). Lowe (1855) established a "variety" of "*Helix pusilla*", taxon described by him some years before from Madeira (Lowe, 1831), which he called "*Helix pusilla* var. *β. sericina*". But, whereas "*Helix pusilla*" Lowe, 1831 is a younger synonym of *Paralaoma servilis* (Shuttleworth, 1852) (Falkner et al., 2002), the new taxon "*Helix pusilla* var. *β. sericina*" can be attributed to *Plagyrona placida* (Bank et al., 2002).

Then reports of "*Helix debeauxiana*" followed from Portugal (Servain, 1880) and descriptions of

"*Helix luseana*" (Paiva, 1866) from the island of Madeira and "*Helix bussacona*" (Silva e Castro, 1887) from Portugal, too, all nowadays considered as synonyms of the species (Gittenberger, 1977; Bank et al., 2002).

Gittenberger (1977) described the new genus *Plagyrona*, on the basis of the peculiar spiral micro-sculpture on protoconch and teleoconch of the shell, to separate "*Helix debeauxiana*" by the others Valloniidae. In that work he briefly described also the radula.

In the last decades *P. placida* was surveyed for the fauna of France, having been found in a site of Corsica, near Coti-Chiavari, in the SW of the island (Ripken & Bouchet, 1998), in an Albanian site, placed E of Rrogozhine (Reischütz et al., 2008) and in Greece, in the Ionian islands of Kerkyra, Ithaca and Cephalonia (Gittenberger, 1989).

Finally, Holyoak & Holyoak (2012) have recently separated the populations of Portugal into two different taxa, with the description of a new species *Plagyrona angusta* Holyoak & Holyoak, 2012. This species has been established on a few morphometric characters of the shell, as a narrower diameter and a smaller umbilicus, and, even though it is not always well distinguishable from *P. placida*, the sympatry of the two taxa may support its distinct specific status. Unfortunately, even if the authors found living specimens of both taxa, they have not reported any anatomical data and therefore the anatomy of *Plagyrona* is still unknown, so the allocation of this genus to the family Valloniidae still has some margin of uncertainty.

While for the European Mediterranean areas no detailed information about the habitat of collection of *P. placida* is available, it is known for Portugal, Algeria and for the Macaronesian Islands. In Portugal the specimens have been sieved from leaf-litter on rocky slopes of limestone covered by bushes and herbs (Seddon & Tattersfield, 1992) or in humid rocky limestone habitats underneath deciduous woodlands, on trunks and branches covered with epiphytic mosses or on low limestone rocks covered of mosses (Holyoak & Holyoak, 2012). In Algeria the species has been found under leaves, among hypnoid mosses covering oak trees, preferring upper sides of large horizontal branches (Bourguignat, 1863; Letorneux, 1870), while in the islands of Madeira and in the Canary Islands the species has been found in laurel forests on mosses and lichens on damp trunks (Shuttleworth, 1852;

Paiva, 1866; Wollaston, 1878), in rocky sites above the ground on damp tree trunks or in leaf-litter or in litters, mosses and branches of laurels (Seddon & Holyoak, 1993; Seddon, 2008) or in humid laurel forests or *Erica arborea* L. scrubs, on mosses or trunks (Holyoak & Holyoak, 2012).

MATERIALS AND METHODS

Shells of *P. placida* were collected in alluvial debris or in litter: the sediments were sieved using decreasing mesh sieves and the specimens were separated visually or using a binocular microscope.

The photographs of the shells have been taken with the aid of a binocular microscope and related software. Details of the protoconch and teleoconch were obtained from samples mounted on aluminium supports covered by conductive glue, sputter-coated with graphite and gold, and examined using a scanning electron microscope (SEM). All dimensions (shells height, shells diameter, aperture height and aperture diameter) were measured using a micrometer in the light microscope.

The collection data are listed as follows: locality, altitude, municipality and abbreviation of the province in parentheses, UTM coordinates (ED 50), collectors and dates, number of specimens in parentheses. Names of the localities were taken from the official map of Italy by I.G.M.I.; UTM coordinates were taken from the same maps or detected by GPS.

The examined material is presently preserved in the following collections: Museo di Storia Naturale dell'Università di Firenze, sezione di Zoologia de "La Specola", Via Romana 17, Florence, Italy (MZUF); M. Bodon, Via delle Eliche 100/8, Genoa, Italy, (MBC); S. Cianfanelli, Via Monferrato 3, Florence, Italy (SCC); E. Talenti, Piazza Parri 4, Incisa, Florence, Italy (ETC); G. Nardi, Via Boschette 8/A, Gussago, Brescia, Italy (GNC).

RESULTS AND DISCUSSION

Plagyrona placida (Shuttleworth, 1852)

Helix placida Shuttleworth, 1852: 140

Helix placida, Pfeiffer, 1853: 82-83

Helix pusilla var. *β. sericina* Lowe, 1855: 176

Helix Debeauxiana Bourguignat, 1863: 183-184, Pl. 19, figs. 13-16

Helix Debeauxiana, Bourguignat, 1864: 308, 329

Helix luseana Paiva, 1866: 342-343, Pl. 11, fig. 9

Helix luseana, Paiva, 1867: 80, Pl. 2, fig. 3

Helix Debeauxiana, Letourneux, 1870: 277, 279

Patula placida, Pfeiffer, 1870: 40-41, 62, Pl. 120, figs. 9-12

Patula placida, Mousson, 1872: 25, Pl. 2, figs. 9-12

Helix placida, Pfeiffer, 1876: 139

Patula placida, Wollaston, 1878: 63, 87-88, 282, 331, 481, 570

Helix Debeauxiana, Servain, 1880: 61-62

Helix Debeauxiana, Silva e Castro, 1887: 246 (records to confirm according to Holyoak & Holyoak, 2012)

Helix bussacona Silva e Castro, 1887: 246

Helix Debeauxiana, Tryon, 1887: 28-29, 275. Pl. 6, figs. 31-33

Helix luseana, Tryon, 1887: 31, 275. Pl. 6, figs. 59-60

Helix placida, Tryon, 1887: 51, 275. Pl. 9, fig. 94

Helix (Punctum) debeauxiana, Westerlund, 1889: 8

Helix (Punctum) bussacona, Westerlund, 1889: 9

Pyramidula (Pyramidula) bussacona, Pilsbry, 1894: 44

Pyramidula (Pyramidula) debeauxiana, Pilsbry, 1894: 44

Patula (Punctum) debeauxi, Kobelt, 1898: 47, Pl. 225, fig. 1434

Helix bussacona, Kobelt, 1898: 47

Helix Debeauxiana, Locard, 1899: 72

Helix Bussacona, Locard, 1899: 73

Plagyrona debeauxiana, Gittenberger, 1977: 297-303, Figs. 3, 4; Pl. 1, figs. 1, 2; Pl. 2, figs. 1-6

Plagyrona placida, Waldén, 1983: 266, 268

?Planogyra sororcula, Palazzi, 1988: 17 (not *Helix sororcula* Benoit, 1859)

Plagyrona placida, Gittenberger, 1989: 14, Figs. 4, 5

Plagyrona placida, Cook et al., 1990: 50, 72, 74, 76

Plagyrona placida, Fidalgo & Callopez, 1990: 80

Plagyrona placida, Ripken & Bouchet, 1998: 15

Plagyrona placida, Seddon & Tattersfield, 1992: 259 (record from Algarve to confirm according to Holyoak & Holyoak, 2012)

Plagyrona placida, Cook et al., 1993: 83, 93, 96, 99-103

Plagyrona placida, Seddon & Holyoak, 1993: 326

Plagyrona placida, Goodfriend et al., 1994: 319

Plagyrona placida, Schileyko, 1998: 98-99, Fig. 111

Plagyrona placida, Cameron & Cook, 2001: 262

Plagyrona placida, Falkner et al., 2001: 34

Plagyrona placida, Ibáñez et al., 2001: 147

- Plagyrona placida*, Bank et al., 2002: 102, 140, 151, 157, 174, 187, 195
Plagyrona placida, Falkner et al., 2002: 37, 107
Plagyrona placida, Albuquerque de Matos, 2004: 38
Plagyrona placida, Cameron et al., 2006: 31-33, 35, 41
Plagyrona placida, Cameron et al., 2007: 15, 19
Plagyrona placida, Oliveira, 2008: 41 (records to confirm according to Holyoak & Holyoak, 2012)
Plagyrona placida, Reischütz et al., 2008: 38
Plagyrona placida, Seddon, 2008: 37; Pl. 5D; Map 37, 125
Plagyrona placida, Fehér & Eröss, 2009: 27
Plagyrona placida, Kappes et al., 2009: 585
Plagyrona placida, Oliveira, 2009: 55-56 (records to confirm according to Holyoak & Holyoak, 2012)
Plagyrona placida, Brito & Fraga, 2010: 188
Plagyrona placida, Fontaine et al., 2010: 24
Plagyrona placida, Oliveira, 2010: 42-43 (records to confirm according to Holyoak & Holyoak, 2012)
Plagyrona placida, Torres & Oliveira, 2010: 32 (records to confirm according to Holyoak & Holyoak, 2012)
Plagyrona placida, Bank, 2011a
Plagyrona placida, Bank, 2011c: 25
Plagyrona placida, Bank, 2011d: 14
Plagyrona placida, Gargominy et al., 2011: 326
Plagyrona placida, Welter-Schultes, 2011
Plagyrona placida, Holyoak & Holyoak, 2012: 153-165, Figs. 1 A-C, 3 E, F
Plagyrona placida, Welter-Schultes, 2012: 205

DESCRIPTION. Shell (Figs. 1-11) very small (1.2-1.6 mm in height; 1.6-2.3 mm in diameter; Table 1), depressed, with $3\frac{1}{4}$ - $3\frac{1}{2}$ convex and slowly expanded whorls, separated by a deep suture; spire not elevated; last whorl little wide and slightly descending near the aperture. Protoconch not protruding, with the surface covered by many thin spiral striae and spiral grooves, crossed with more spaced and less marked growth lines; teleoconch covered by dense periostracal ribs, clearly visible and equal to each other, and by thin spiral lines, sometimes scarcely visible. Aperture roundish, with oblique outer peristome, not thickened and not reflected, interrupted in the parietal portion. Umbilicus large, corresponding to $3/10$ of the maximum shell diameter. Periostracum light brown in colour, with weakly whitish bands, more evident in not recent shells.

EXAMINED MATERIAL (Fig. 12). Sardinia: Rio Abba Frida (left tributary of the Rio Melis, tributary of the Rio San Giorgio), 3.5 km E-SE from Perdasdefogu along the connecting road to the SP 125, 470 m a.s.l. (Perdasdefogu, OG); UTM: 32S NJ4191, S. Cianfanelli & E. Talenti leg. 23.05.2011 (44 shells from alluvial debris, MZUF GC/41424; 2 shells from alluvial debris, SCC; 2 shells from alluvial debris, ETC; 14 shells from litter, MZUF GC/41786); G. Nardi & A. Braccia leg. 12.04.2012 (2 shells from alluvial debris, GNC).

Campania: near Nerano, 200 m a.s.l. (Massa Lubrense, NA); UTM: 33T VE4493, M. Bodon, E. Bodon & S. Cianfanelli leg., 30.12.2012 (3 shells, SCC).

Calabria: Lao river, 100 m upstream of the bridge in locality Campicello, 290 m a.s.l. (Laino Castello and Papasidero, CS); UTM: 33S WE7918, M. Bodon & E. Bodon leg. 23.07.2005 (1 shell, MZUF GC/41804; 3 shells, MBC).

The others species of molluscs, collected in the sites described above, are listed in Table 2.

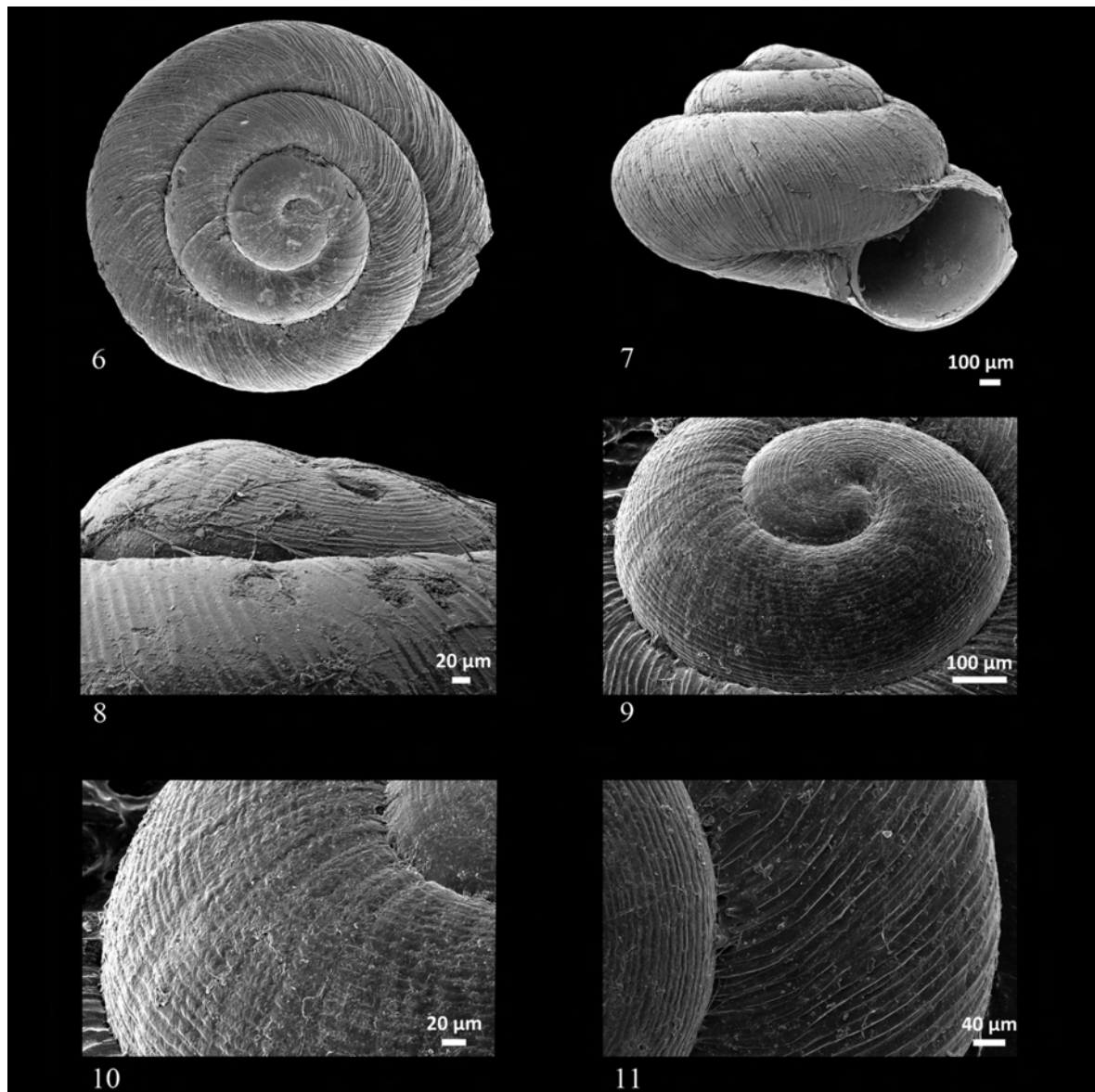
COMPARATIVE NOTES. All Italian specimens are here attributed to *P. placida*, even if the Sardinian population shows a more conical shell (mean shell height/shell diameter = 0.71), resembling to that of *P. angusta* (Figs. 1-3; Table 1). Anyway, for the maximum shell diameter (2.30) and for the large umbilicus, also this population is here identified as *P. placida*.

Among other Valloniidae (Figs. 13-18), the genus *Vallonia* differs from *Plagyrona placida* for the more depressed shell and the enlarged and strongly thickened peristome. The most similar species for the sculpture of the teleoconch, *Vallonia costata*, is distinguished by the presence of thicker ribs (periostracal ribs) alternated with thinner ribs (radial striae) (Figs. 13, 14; Giusti & Manganelli, 1986, Fig. 7, Table 3; Gerber, 1996, Fig. 64a), while the shell of *Plagyrona* is covered by periostracal ribs all with the same thickness (Figs. 6-11; Gittenberger, 1989, Figs. 4, 5). Moreover, in *V. costata*, ramified radial striae are present on the teleoconch, while they are absent in *Plagyrona*.

Gittenbergia sororcula is very similar to *V. costata*, but it shows a thin peristome, it does not have the ramified radial striae on the teleoconch, although a spiral and malleated micro-sculpture is present on the protoconch (Figs. 15, 16; Giusti & Manganelli, 1986, Fig. 6, Table 3); finally, it also



Figures 1-5. Shells of *Plagyrona placida*. Figs. 1-3: specimens collected in the valley of the Rio Abba Frida (Perdasdefogu, OG), Sardinia, S. Cianfanelli & E. Talenti leg. 23.05.2011, MZUF GC/41424, GC/41786. Figs. 4, 5: alluvial debris of the Lao river, collected in locality Campicello (Laino Castello and Papisidero, CS), Calabria, M. Bodon & E. Bodon leg., 23.07.2005, MBC.



Figures 6-11. Shells of *Plagyrona placida* photographed by scanning electron microscope (SEM). Fig. 6: apical view. Fig. 7: frontal view. Fig. 8: magnification of protoconch in lateral view. Figs. 9, 10: magnification of protoconch in oblique view. Fig. 11: magnification of teleoconch in apical view. Figs. 6-8: specimen collected in the valley of the Rio Abba Frida), Sardinia, S. Cianfanelli & E. Talenti leg. 23.05.2011, MZUF GC/41424. Figs. 9-11: specimen collected in locality Campicello, alluvial debris of the Lao river, Calabria, M. Bodon & E. Bodon leg. 23.07.2005, MZUF GC/41804.

SITES	H	D	H/D	h	d	N
Abba Frida (Perdasdefogu, OG), Sardinia	1.42 ± 0.13 (1.20 - 1.60)	1.99 ± 0.21 (1.65 - 2.30)	0.71 ± 0.04 (0.67 - 0.79)	0.78 ± 0.07 (0.65 - 0.85)	0.81 ± 0.06 (0.70 - 0.90)	9
Campicello (Laino Castello/Papasidero, CS), Calabria	1.25 (1.20 - 1.30)	1.90 (1.85 - 1.95)	0.66 (0.65 - 0.67)	0.73 (0.70 - 0.75)	0.73 (0.70 - 0.75)	2

Table 1. Shell size (mm) in Italian specimens of *Plagyrona placida*: mean $\pm$ standard deviation and range (in parenthesis). H = shell height; D = shell diameter; h = aperture height; d = aperture diameter; N = number of measured shells.

differs from *Plagyrona* for the more depressed shell and unequal ribs.

Acanthinula aculeata presents a higher shell than *Plagyrona*, an expanded and slightly thickened peristome and periostracal ribs with visible flexible spines, placed in the middle part of each whorl, always alternated with thin radial striae and spiral lines (Figs. 17, 18; Gittenberger, 1977, Figs. 3, 4; Giusti & Manganeli, 1986, Table 3).

There are other species belonging to other families, among those present in the Italian fauna, with similar small size and depressed shells, resembling to *Plagyrona*. The species of the genus *Pyramidula* Fitzinger, 1833, like *P. pusilla* (Vallot, 1801) and *P. rupestris* (Draparnaud, 1801), family Pyramidulidae, are darker in colour (reddish-brown or purple), with sculpture of shell surface less pronounced and no spiral striae (Gittenberger & Bank, 1996, Figs. 5-15). *Punctum pygmaeum* (Draparnaud, 1801), family Punctidae, differs in the smaller size and more depressed spire (Cianfanelli, 2009, Fig. 90 B). *Paralaoma servilis* (Shuttleworth, 1852), family Punctidae, perhaps the taxon showing the most similar

shell in colour, sculpture and size, differs from *P. placida* because of the more depressed shape and the less deep sutures, but especially because of the unequal radial ribs, as the main periostracal ribs are more spaced from each other (Figs. 19, 20; Giusti, 1973, Table 5).

Four of these entities have been found in Sardinia and three in Calabria, in the same sites where *P. placida* was collected (Table 2).

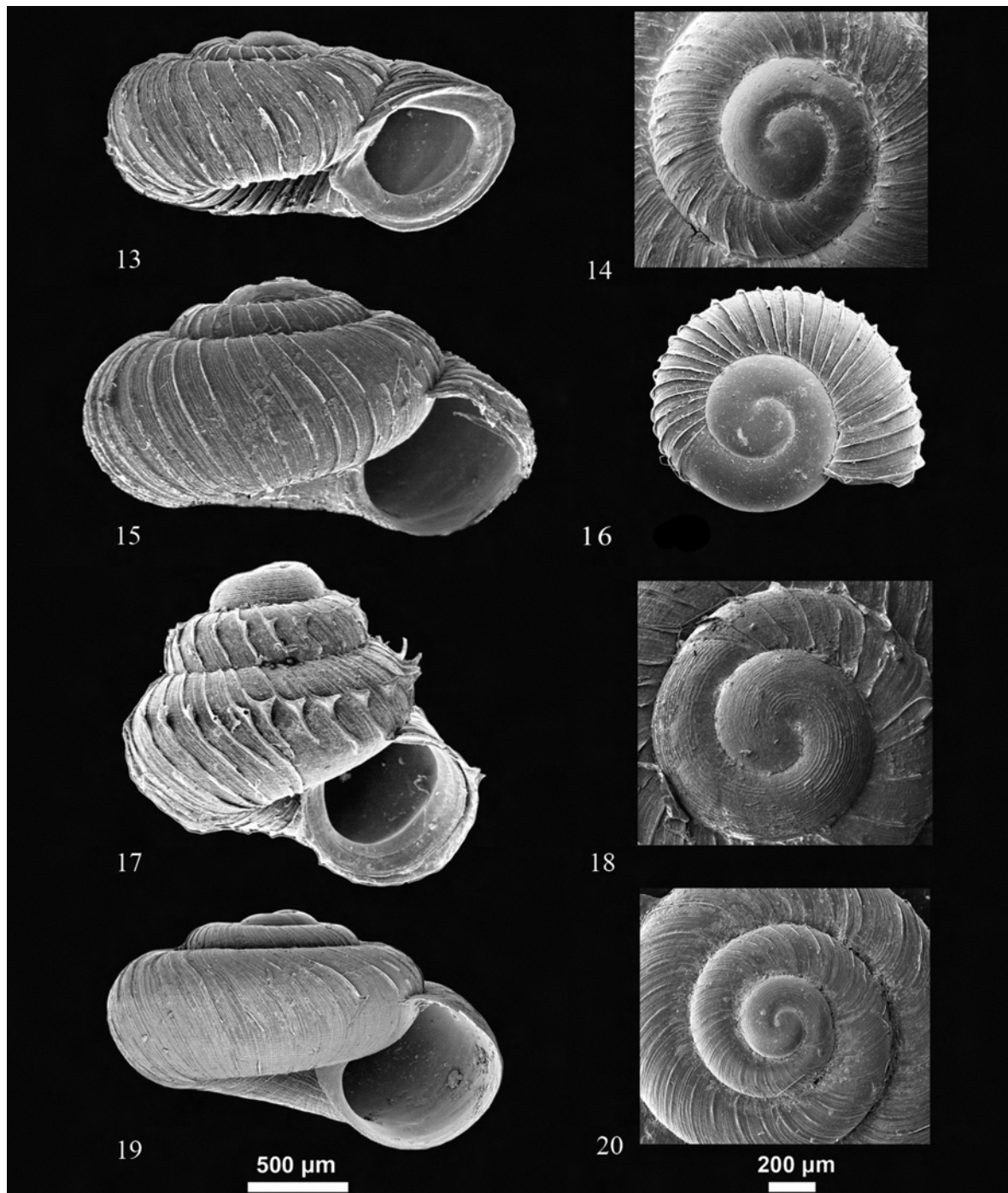
CONCLUSIONS

The three Italian sites, where *Plagyrona placida* has been recently discovered, are the result of research on the distribution of the malacological fauna, not targeted, but extended to many Italian areas.

The records were made in sedimentary substrate (leaf-litter and alluvial debris), where shells only (without living animals) have been collected. Although fresh material, therefore certainly coming from habitats next to the collection sites, it is not possible to establish with certainty the microhabitat



Figure 12. Distribution of *Plagyrona placida* in Europe and Northern Africa: recent populations known in the scientific literature (black dots); fossil populations known in the scientific literature (white stars); recent populations found in Italy (red dots). A few data from scientific literature need to be confirmed (see Holyoak & Holyoak, 2012).



Figures 13-20. Other species similar to *Plagyrona placida*, in frontal view (left) and magnification of protoconch and first whorls (right). Figs. 13, 14: *Vallonia costata*, Betania, M. Stabut (Tolmezzo, UD), Friuli-Venezia Giulia, 400 m a.s.l., UTM: 33T UM4741, S. Cianfanelli leg. 5.4.1988, MZUF GC/10553, SEM support MZ/176/1; Figs. 15, 16: *Gittenbergia sororcula*. Fig. 15: at the crossroads between Rif. Fasanelli, Rif. Colleruggio and Rif. De Gasperi, Pollino Mountains (Rotonda, PZ), Basilicata, 1650 m a.s.l., UTM: 33S WE9518, S. Cianfanelli, E. Talenti & R. Martignoni leg. 28.10.1993, MZUF GC/6131, SEM support MZ/176/3. Fig. 16: Val di Luce (Abetone, PT), Tuscany, 1590 m a.s.l., UTM: 32T PP3087, S. Cianfanelli & E. Lori leg. 24.9.2008, MZUF GC/26585, SEM support MZ/245/4. Figs. 17, 18: *Acanthinula aculeata*, Passo Porrai, Monte Cucco (Costacciaro, PG), Umbria, 910 m a.s.l., UTM: 33T UJ1805, S. Cianfanelli & M. Calcagno leg. 2.2.1992, MZUF GC/2635, SEM support MZ/176/4. Figs. 19, 20: *Paralaoma servilis*, Ombrone river, S. Pantaleo (Pistoia), Tuscany, 65 m a.s.l., UTM: 32T PP5264, S. Cianfanelli & E. Lori leg. 22.2.2007, MZUF GC/24152, SEM support MZ/245/2-3.

Family	Species	Abba Frida, Sardinia. Alluvional debris	Abba Frida, Sardinia. Litter	Nerano, Campania. Litter	Campicello, Calabria. Alluvional debris
Cochlostomatidae	<i>Cochlostoma</i> spp.			x	x
Cochlostomatidae	<i>Cochlostoma sardoum</i> (Westerlund, 1890)	x	x		
Aciculidae	<i>Acicula lineolata banki</i> Boeters, Gittenberger et Subai, 1989				x
Aciculidae	<i>Platyla similis</i> (Reinhardt, 1880)				x
Pomatiidae	<i>Pomatias elegans</i> (Müller, 1774)			x	x
Carychiidae	<i>Carychium biondii</i> Paulucci, 1882	x			
Carychiidae	<i>Carychium tridentatum</i> (Risso, 1826)				x
Pyramidulidae	<i>Pyramidula rupestris</i> (Draparnaud, 1801)	x	x		
Vertiginidae	<i>Vertigo antivertigo</i> (Draparnaud, 1801)	x			x
Vertiginidae	<i>Vertigo pygmaea</i> (Draparnaud, 1801)	x			x
Vertiginidae	<i>Vertigo angustior</i> Jeffreys, 1830				x
Vertiginidae	<i>Columella aspera</i> Waldén, 1966	x			
Vertiginidae	<i>Columella edentula</i> (Draparnaud, 1805)				x
Vertiginidae	<i>Truncatellina callicratis</i> (Scacchi, 1883)			x	
Vertiginidae	<i>Truncatellina cylindrica</i> (Férussac, 1807)	x			x
Orculidae	<i>Sphyradium doliolum</i> (Bruguière, 1792)				x
Orculidae	<i>Pagodulina pagodula</i> (Des Moulins, 1830)				x
Chondrinidae	<i>Granopupa granum</i> (Draparnaud, 1801)	x		x	
Chondrinidae	<i>Rupestrella philippii</i> (Cantraine, 1840)	x		x	x
Lauriidae	<i>Lauria cylindracea</i> (Da Costa, 1778)	x		x	x
Lauriidae	<i>Lauria sempronii</i> (Charpentier, 1837)	x	x		
Argnidae	<i>Argna biplicata biplicata</i> (Michaud, 1831)				x
Argnidae	<i>Agardhiella truncatella</i> (Pfeiffer, 1841)				x
Valloniidae	<i>Vallonia pulchella</i> (Müller, 1774)				x
Valloniidae	<i>Acanthinula aculeata</i> (Müller, 1774)	x	x		x
Valloniidae	<i>Plagyrona placida</i> (Shuttleworth, 1852)	x	x	x	x
Enidae	<i>Merdigera obscura</i> (Müller, 1774)	x			
Punctidae	<i>Punctum pygmaeum</i> (Draparnaud, 1801)	x	x		x
Punctidae	<i>Paralaoma servilis</i> (Shuttleworth, 1852)	x			x
Helicodiscidae	<i>Lucilla scintilla</i> (Lowe, 1852)	x			
Helicodiscidae	<i>Lucilla singleyana</i> (Pilsbry, 1890)				x
Discidae	<i>Discus rotundatus rotundatus</i> (Müller, 1774)	x	x		x
Zonitidae	<i>Vitrea contracta</i> (Westerlund, 1871)	x	x	x	x
Zonitidae	<i>Vitrea subrimata</i> (Reinhardt, 1871)	x	x		x
Zonitidae	<i>Retinella olivetorum icterica</i> (Tiberi, 1872)				x
Zonitidae	<i>Oxychilus draparnaudi</i> (Beck, 1837)			x	x
Zonitidae	<i>Oxychilus oppressus</i> (Shuttleworth, 1878)	x	x		
Zonitidae	<i>Mediterranea hydatina</i> (Rossmässler, 1838)			x	

Family	Species	Abba Frida, Sardinia. Alluvional debris	Abba Frida, Sardinia. Litter	Nerano, Campania. Litter	Campicello, Calabria. Alluvional debris
Zonitidae	<i>Daudebardia brevipes</i> (Draparnaud, 1805)	x			x
Zonitidae	<i>Daudebardia rufa</i> (Draparnaud, 1805)	x	x		x
Euconulidae	<i>Euconulus fulvus</i> (Müller, 1774)	x			
Ferussaciidae	<i>Cecilioides acicula</i> (Müller, 1774)			x	x
Ferussaciidae	<i>Cecilioides petitiana</i> (Benoit, 1862)				x
Ferussaciidae	<i>Cecilioides</i> sp.			x	
Subulinidae	<i>Rumina decollata</i> (Linnaeus, 1758)	x		x	x
Oleacinidae	<i>Poiretia dilatata dilatata</i> (Philippi, 1836)			x	
Testacellidae	<i>Testacella scutulum</i> Sowerby, 1820			x	x
Clausiliidae	<i>Medora dalmatina pollinensis</i> Nordsieck, 2012				x
Clausiliidae	<i>Cochlodina kuesteri</i> (Rossmässler, 1836)	x	x		
Clausiliidae	<i>Siciliaria paestana paestana</i> (Philippi, 1836)			x	x
Clausiliidae	<i>Papillifera papilaris papilaris</i> (Müller, 1774)			x	
Cochlicellidae	<i>Cochlicella acuta</i> (Müller, 1774)	x			
Cochlicellidae	<i>Cochlicella barbara</i> (Linnaeus, 1758)				x
Hygromiidae	<i>Xerotricha conspurcata</i> (Draparnaud, 1801)	x			
Hygromiidae	<i>Candidula cavannae</i> (Paulucci, 1881)			x	
Hygromiidae	<i>Hygromia cinctella</i> (Draparnaud, 1801)			x	x
Hygromiidae	<i>Ichnusotricha berninii</i> Giusti et Manganeli, 1987	x	x		
Hygromiidae	<i>Cernuella cisalpina</i> (Rossmässler, 1837)	x			x
Hygromiidae	<i>Cernuella virgata</i> (Da Costa, 1778)				x
Hygromiidae	<i>Xerosecta dohrni</i> (Paulucci, 1882)	x			
Hygromiidae	<i>Trochoidea pyramidata</i> (Draparnaud, 1805)				x
Hygromiidae	<i>Monacha parumcincta</i> (Menke, 1828)			x	x
Helicodontidae	<i>Helicodonta obvoluta</i> (Müller, 1774)				x
Helicidae	<i>Chilostoma planospira setulosum</i> (Briganti, 1825)				x
Helicidae	<i>Marmorana serpentina</i> (Férussac, 1821)	x	x		
Helicidae	<i>Marmorana fuscolabiata</i> (Rossmässler, 1842)			x	x
Helicidae	<i>Cantareus apertus</i> (Born, 1778)	x			
Helicidae	<i>Cornu aspersum aspersum</i> (Müller, 1774)			x	x

Table 2. Species of molluscs collected with *Plagyrona placida*, in the three Italian sites.

where *P. placida* lives in the Italian sites; however, it might be represented by rocky habitats or tree trunks and branches covered by mosses, in Mediterranean maquis, in oak forests (*Quercus ilex* L.) or in mesophilic deciduous forests.

The environments seem to be intact, especially in Campania (a Mediterranean maquis of *ilexes*

with calcareous cliff) and in Calabria, the Lao River Valley (a protected area established as a Nature Reserve, Ministerial Decree 423 dated 21.07.1987), which includes one of the most intact waterways which have the greater ecological importance for all Southern Italy. Moreover, the associated malacofauna (Table 2) is characterized by

the presence of typical litter entities, not very common or requiring a well preserved habitat, such as *Columella aspera* Walden, 1966 (reported in Italy, until now, only from Elba Island; Manganelli et al., 1995), *Pagodulina pagodula* (Des Moulins, 1830), *Lauria sempronii* (Charpentier, 1837), *Agardhiella truncatella* (Pfeiffer, 1841) (it has never been reported for Southern Italy), *Daudebardia brevipes* (Draparnaud, 1805) and *D. rufa* (Draparnaud, 1805), or endemic species such as *Cochlostoma sardoum* (Westerlund, 1890), *Carychium biondii* Paulucci, 1882, *Oxychilus oppressus* (Shuttleworth, 1878), *Cochlodina kuesteri* (Rossmässler, 1836), *Siciliaria paestana* (Philippi, 1836), *Candidula cavannae* (Paulucci, 1881), *Ichnusotricha berninii* Giusti et Manganelli, 1987, *Xerosecta dohrni* (Paulucci, 1882), *Chilostoma planospira* (Lamarck, 1822) and *Marmorana fuscolabiata* (Rossmässler, 1842).

All this suggests that *P. placida* could be native; but the presence of non-native species, such as *Paralaoma servilis*, *Lucilla scintilla* (Lowe, 1852) and *L. singleyana* (Pilsbry, 1890), even if only few specimens were collected and only in alluvial debris (never in litter), still leaves some doubt about the fact that *P. placida* may actually be native in the Italian sites where it was found. Furthermore, it should be noted that, while *P. placida* is a rare species, so that the animal is still unknown and living specimens have never been collected in Italy, small non-native species of litter and soil such as *P. servilis*, *L. scintilla* and *L. singleyana*, once introduced, become abundant species, often dominant compared to the native species, they can reach very high densities and they can often spread quickly and widely in their environments, so they are now present in almost all European countries and, in Italy, in most regions (Bodon et al., 2004; Cianfanelli, 2009; Bank, 2011a; Cianfanelli & Bodon, in press).

P. placida is a new taxon that must be added to the checklist of terrestrial Mollusca of the Italian fauna (Bodon et al., 1995; Manganelli et al., 1995); since 1995 such list has undergone several increments (Eikenboom, 1996; Giovannelli, 1996; Manganelli & Favilli, 1996; Manganelli et al., 1997; Giusti & Manganelli, 1998; Riedel, 1998; Cianfanelli et al., 2000; Colla et al., 2000; Manganelli et al., 2000; Beckmann, 2002; Carr, 2002; Colla & Stoch, 2002; Falkner et al., 2002; Gerber, 2002; Beckmann & Falkner, 2003; De Mattia, 2003; Zalot, 2003; Beckmann, 2004; Bodon et al., 2004;

Cianfanelli et al., 2004; De Mattia, 2005; Ferreri et al., 2005; De Mattia & Prodan, 2006; Garominy & Ripken, 2006; Gittenberger & Eikenboom, 2006; Lo Brano & Sparacio, 2006; Nordsieck, 2006; De Mattia, 2007; Nordsieck 2007a, 2007b; Reitano et al., 2007; Beckmann & Falkner, 2008; Bodon & Cianfanelli, 2008; Falkner, 2008; Falkner & Niederhöfer, 2008; Gavetti et al., 2008; Falkner & von Proschwitz, 2009; Nardi, 2009; Nitz et al., 2009; Reitano et al., 2009; Bodon et al., 2010; Fehér et al., 2010; Halgass & Vannozzi, 2010; Kokshoorn & Gittenberger, 2010; Liberto et al., 2010; Manganelli et al., 2010; Nitz et al., 2010; Pfenninger et al., 2010; Bank, 2011b; Colomba et al., 2011; De Mattia et al., 2011; Nardi, 2011; Nardi & Bodon, 2011; Nordsieck, 2011a, 2011b, 2011c; Nordsieck, 2012; Reise et al., 2011; Colomba et al., 2012; Liberto et al., 2012; Niero et al., 2012; Evangelista et al., in press). Moreover, the current list needs to be revised and confirmed following the more modern methods of investigation.

ACKNOWLEDGEMENTS

We thank Antonio Braccia, Emanuele Bodon, Micaela Calcagno, Elisabetta Lori and Enrico Talenti for their help during the research; Maurizio Ulivi for technical assistance; Giuseppe Manganelli for literature.

REFERENCES

- Albuquerque de Matos R.M., 2004. Non-marine testaceous Gastropoda of continental Portugal and Berlengas Islands. I. Catalogue and bibliography. Arquivos do Museu Bocage, 4: 1-158.
- Bank R.A., 2011a. Fauna Europaea: Mollusca Gastropoda. Fauna Europaea version 2.4. Last update: January 27th, 2011. <http://www.faunaeur.org>.
- Bank R.A., 2011b. Fauna Europaea: Mollusca Gastropoda. Fauna Europaea version 2.4. Checklist of the land and freshwater Gastropoda of Italy. Fauna Europaea Project: 1-49. Last update: July 24th, 2011. http://www.nmbe.unibe.ch/sites/default/files/uploads/pubinv/fauna_europaea_-_gastropoda_of_italy.pdf.
- Bank R.A., 2011c. Fauna Europaea: Mollusca Gastropoda. Fauna Europaea version 2.4. Checklist of the land and freshwater Gastropoda of Albania and former Yugoslavia. Fauna Europaea Project: 1-59. Last update: July 24th, 2011. <http://www.nmbe.uni->

- be.ch/sites/default/files/uploads/pubinv/fauna_europaea_-_gastropoda_of_albania_former_yugoslavia.pdf.
- Bank R.A., 2011d. Fauna Europaea: Mollusca: Gastropoda. Fauna Europaea version 2.4, Checklist of the land and freshwater Gastropoda of Greece. Fauna Europaea Project. Last update: July 24th, 2011. http://www.nmbe.ch/sites/default/files/uploads/pubinv/fauna_europaea_-_gastropoda_of_greece.pdf
- Bank R.A., Groh K. & Ripken T. E. J., 2002. Catalogue and bibliography of the non-marine Mollusca of Macaronesia. In: Falkner et al. (Eds.), *Collectanea Malacologica*. Conchbooks, Hackenheim: 89-235.
- Beckmann K.-H., 2002. Elemente einer Revision der endemischen Rupestrellen Siziliens. In Falkner et al. (Eds.), *Collectanea Malacologica*, Conchbooks, Hackenheim: 49-79.
- Beckmann K.-H., 2004. Zur Verbreitung der endemischen nordwestsizilianischen Clausiliidae der Unterartgattung *Charpentieria* (*Siciliaria*) mit Beschreibung von zwei neuen Unterarten (Gastropoda: Stylomatophora: Clausiliidae). *Archiv für Molluskenkunde*, 133: 185-191.
- Beckmann K.-H. & Falkner G., 2003. Neunachweise von Binnenmollusken auf italienischen Inseln. *Heldia*, 5: 37-40.
- Beckmann K.-H. & Falkner G., 2008. Beiträge zur Nomenklatur der europäischen Binnenmollusken, XXI. Zur Kenntnis der sizilianischen Blindschnecken *Cecilioides raphidia* (Bourguignat 1856) und *Cecilioides actoniana* (Benoit 1862) (Gastropoda: Ferussaciidae). *Heldia*, 5: 137-138, Pl. 19.
- Bodon M. & Cianfanelli S., 2008. Una nuova specie di *Platyla* per il sud Italia (Gastropoda, Prosobranchia: Aciculidae). *Bollettino Malacologico*, 44: 27-37.
- Bodon M., Lori E. & Cianfanelli S., 2004. Un'altra specie aliena per la malacofauna italiana: *Hawaiiia minuscula* (Binney, 1840) (Pulmonata: Zonitidae). *Bollettino Malacologico*, 40: 11-14.
- Bodon M., Manganelli G., Favilli L. & Giusti F., 1995. Prosobranchia Archaeogastropoda Neritimorpha (generi 013-014); Prosobranchia Caenogastropoda Architaenioglossa (generi 060-065); Prosobranchia Caenogastropoda Neotaenioglossa p.p. (generi 070-071, 077, 095-126); Heterobranchia Heterostrophia p.p. (genere 294). In: Minelli A., Ruffo S. & La Posta S. (Eds), *Checklist delle specie della fauna italiana*, 14 (Gastropoda Prosobranchia, Heterobranchia). Calderini, Bologna, 60 pp.
- Bodon M., Nardi G., Braccia A. & Cianfanelli S., 2010. Un nuovo oleacinide in Sardegna: *Sardopoiretia emanueli* n. gen. n. sp. (Gastropoda: Pulmonata). *Atti Società italiana di Scienze naturali e Museo civico di Storia naturale di Milano*, 151: 229-252.
- Bourguignat J.R., 1863. *Malacologie de l'Algérie ou histoire naturelle des animaux mollusques terrestres et fluviatiles recueillis jusqu'à ce jour dans nos possessions du nord de l'Afrique*. Bouchard-Huzard, Paris, 1: i-xii + 294 pp., 32 Pls.
- Bourguignat J.R., 1864. *Malacologie de l'Algérie ou histoire naturelle des animaux mollusques terrestres et fluviatiles recueillis jusqu'à ce jour dans nos possessions du nord de l'Afrique*. Bouchard-Huzard, Paris, 2: 380 pp., 26 Pls.
- Brito Núñez Brito L. & Fraga Núñez Fraga J., 2010. *Divisione Mollusca*. In: Arechavaleta M., Rodríguez S., Zurita N. & García A. (coord.), *Lista de especies silvestres de Canarias. Hongos, plantas y animales terrestres 2009*. Gobierno de Canarias: 182-189.
- Cameron R.A. D. & Cook L.M., 2001. Madeiran snails: faunal differentiation on a small island. *Journal of Molluscan Studies*, 67: 257-267.
- Cameron R.A. D., Cook L.M., Goodfriend G.A. & Seddon M.B., 2006. Fossil land snail faunas of Porto Santo, Madeiran archipelago: change and stasis in Pleistocene to recent times. *Malacologia*, 49: 25-59.
- Cameron R.A. D., Da Cunha R.M.T. & Frias Martins A. M., 2007. Chance and necessity: land-snails faunas of São Miguel, Azores, compared with those of Madeira. *Journal of Molluscan Studies*, 73: 11-21.
- Carr R., 2002. Geographical variation of taxa in the genus *Rumina* (Gastropoda: Subulinidae) from the Mediterranean region. *Journal of Conchology*, 37: 569-577.
- Cianfanelli S. 2009. *I Molluschi della Provincia di Pistoia: le specie da tutelare e quelle da combattere*. Quaderni del Padule di Fucecchio n. 6. Centro di Ricerca, Documentazione e Promozione del Padule di Fucecchio. 112 pp.
- Cianfanelli S. & Bodon M., in press. Stato delle conoscenze sui Molluschi terrestri e acquidulcicoli alloctoni nel Lazio. In: Monaco A., *Progetto Atlante Specie Alloctone del Lazio*, Palombi Ed.
- Cianfanelli S., Manganelli G. & Giusti F., 2004. A new species of *Schileykiella* from Marettimo (Aegadian Islands, Italy) and discussion of relationships of cilielline hygromiids (Gastropoda, Pulmonata, Hygromiidae). *Journal of Conchology*, 38: 209-230.
- Cianfanelli S., Talenti E., Bodon M. & Manganelli G., 2000. Two *Platyla* species from Sardinia (Gastropoda: Prosobranchia: Aciculidae). *Journal of Conchology*, 37: 61-74.
- Colla A., De Mattia W., Dolce S. & Stoch F., 2000. Prime indagini biospeleologiche nella Grotta Meravigliosa di Lazzaro Jerko (4737 VG) (Carso triestino, Italia). *Progressione*, 43: 62-67.
- Colla A. & Stoch F., 2002. Prime ricerche biospeleologiche nelle grotte dei Monti Musi (Parco Naturale delle Prealpi Giulie). *Atti del Museo civico di Storia naturale di Trieste*, 49: 93-112.
- Colomba M.S., Gregorini A., Liberto F., Reitano A., Giglio S. & Sparacio I., 2011. Monographic revision of

- the endemic *Helix mazzullii* De Cristofori & Jan, 1832 complex from Sicily and re-introduction of the genus *Ercetella* Monterosato, 1894 (Pulmonata, Stylommatophora, Helicidae). *Zootaxa*, 3134: 1-42.
- Colomba M.S., Reitano A., Liberto F., Giglio S., Gregorini A. & Sparacio I., 2012. Additional data on the genus *Muticaria* Lindholm, 1925 with description of a new species (Gastropoda Pulmonata Clausiliidae). *Biodiversity Journal*, 3: 251-258.
- Cook L.M., Cameron R.A.D. & Lace L.A., 1990. Land snails of eastern Madeira: speciation, persistence and colonization. *Proceedings of the Royal Society of London*, 239: 35-79.
- Cook L.M., Goodfriend G.A. & Cameron R.A.D., 1993. Changes in the land snail fauna of eastern Madeira during the Quaternary. *Philosophical Transactions of the Royal Society, Biological Sciences*, 339: 83-103.
- De Mattia W., 2003. I molluschi ipogei del Carso Triestino (Friuli-Venezia Giulia, Italia) (Gastropoda: Prosobranchia, Basommatofora, Stylommatophora; Bivalvia: Pterioidea). Check-list delle specie, tassonomia, sistematica, ecologia e biogeografia. *Atti del Museo civico di Storia naturale di Trieste*, 50: 89-218.
- De Mattia W., 2005. *Pseudochondrula seductilis* (Rossmässler, 1837) in Italia (Mollusca: Stylommatophora: Enidae). *Bollettino Malacologico*, 40: 109-113.
- De Mattia W., 2007. *Xeropicta derbentina* (Krynicky, 1836) (Gastropoda, Hygromiidae) in Italy and along the Croatian coast, with notes on its systematics and nomenclature. *Basteria*, 71: 1-12.
- De Mattia W. & Prodan M., 2006. Nuovi dati sulla distribuzione di *Cochlostoma (Turritus) tergestinum tortivum* (Westerlund, 1885) e *Cochlostoma (Cochlostoma) scalarinum scalarinum* (Villa & Villa, 1841) in Italia (Gastropoda: Prosobranchia, Cochlostomatidae). *Atti del Museo Civico di Storia Naturale di Trieste*, 52: 205-213.
- De Mattia W., Zallot E. & Prodan M., 2011. *Cochlostoma gracile* (L. Pfeiffer, 1849) in Italy (Architaenioglossa, Cochlostomatidae). *Basteria*, 75: 1-9.
- Eikenboom J.C.A., 1996. Een verslag van 10 jaar landslakken verzamelen in Italië. *De Kreukel*, 32: 61-106, 9 pls.
- Evangelista M., Marco B., Cianfanelli S. & Birindelli S., in press. *Zonitoides arboreus* (Say, 1816): un altro gasteropode terrestre introdotto in Italia (Pulmonata: Gastrodontidae). *Bollettino Malacologico*, 49 (1).
- Falkner G., 2008. *Limax (Limax) brandstetteri* n. sp. - a new high mountain slug from the Abruzzi Mountains (Gastropoda: Limacidae). *Stuttgarter Beiträge zur Naturkunde A, Neue Serie*, 1: 133-142.
- Falkner G., Bank R.A. & Proschwitz T. von, 2001. Check-list of the non-marine molluscan species-group taxa of the states of northern, Atlantic and central Europe. *Heldia*, 4: 1-76.
- Falkner G. & Niederhöfer H. -J., 2008. *Limax (Brachylimax* n. subg.) *giovannellae* n. sp., ein sexualbiologisch definiertes Subgenus und neue Art aus den Julischen Alpen (Gastropoda: Limacidae). *Club Conchylia Informationen*, 39: 7-19.
- Falkner G. & Proschwitz T. von, 2009. Beiträge zur Nomenklatur der europäischen Binnenmollusken, XXV. Nomenclatural remarks on the genus-group names in the synonymy of *Limax* s. str. in Schileyko's treatise on recent terrestrial pulmonate molluscs, part 11 (Gastropoda: Limacidae). *Heldia*, 5: 171-177.
- Falkner G., Ripken T.E.J. & Falkner M., 2002. Mollusques continentaux de France. Liste de référence annotée et bibliographie. *Patrimoines Naturels*, 52: 1-350.
- Fehér Z. & Eröss Z.P., 2009. Checklist of the Albanian mollusc fauna. *Schriften zur Malazozoologie*, 25: 22-38.
- Fehér Z., Deli T. & Sólomos P., 2010. Revision of *Granaria frumentum* (Draparnaud 1801) (Mollusca, Gastropoda, Chondrinidae) subspecies occurring in the eastern part of the species' range. *Journal of Conchology*, 40: 201-217.
- Ferreri D., Bodon M. & Manganelli G., 2005. Molluschi terrestri della provincia di Lecce. *Thalassia Salentina*, 28: 31-130.
- Fidalgo J. & Callopez P., 1990. Notes on the land snails of the Bussasco forest (Central Portugal). *Publicacoes Ocasionais da Sociedade Portuguesa de Malacologia*, 15: 79-82.
- Fontaine B., Bichain J.M., Cucherat X., Gargominy O. & Prié V., 2010. French names of continental molluscs of France: process for establishing a list of reference. *La Terre et la Vie – Revue d'Ecologie*, 65: 293-317.
- Gargominy O., Prié V., Bichain J.-M., Cucherat X. & Fontaine B., 2011. Liste de référence annotée des mollusques continentaux de France. *MalaCo*, 7: 307-382.
- Gargominy O. & Ripken T., 2006. Données nouvelles sur les mollusques (Mollusca, Gastropoda) du Parc national du Mercantour (France). *MalaCo*, 3: 109-139.
- Gavetti E., Birindelli S., Bodon M. & Manganelli G., 2008. Molluschi terrestri e d'acqua dolce della Valle di Susa. *Monografie XLIV. Regione Piemonte, Museo Regionale di Scienze naturali, Torino*, 272 pp.
- Gerber J., 1996. Revision der Gattung Vallonia Risso 1826 (Mollusca: Gastropoda: Valloniidae). *Schriften zur Malakozoologie*, 8: 1-227.
- Gerber J., 2002. Two more northern outposts of the Southern Alpine land snail *Chondrina megacheilos* (Cristofori & Jan 1832) (Gastropoda: Pupilloidea: Chondrinidae). In Falkner et al. (eds.), *Collectanea Malacologica, Conchbooks, Hackenheim*: 33-40, Pl. 7.

- Giovannelli M.M., 1996. Malacofauna continentale. In Guerreschi A.: Il sito preistorico del Riparo di Biarzo (Valle del Natisone, Friuli), Comune di Udine, Pubblicazione n. 39: 25-30.
- Gittenberger E., 1977. Beiträge zur Kenntnis der Pupillacea VII. Über zwei wenig bekannte Valloniidae. Zoologische Mededelingen, 50: 295-301.
- Gittenberger E., 1989. Additional data concerning the systematics and the remarkable ranges of three species of landsnails, known from Sintra. Publicacoes Ocasionalis da Sociedade Portuguesa de Malacologia, 13: 13-16.
- Gittenberger E. & Bank R.A., 1996. A new start in *Pyramidula* (Gastropoda Pulmonata: Pyramidulidae). *Basteria*, 60: 71-78.
- Gittenberger E. & Eikenboom J.C.A., 2006. The genus *Lindbergia* (Gastropoda, Pulmonata, Zonitidae) in Greece and the Promontorio del Gargano in Italy. *Basteria*, 70: 161-163.
- Giusti F., 1973. Notulae malacologicae XVIII. I molluschi terrestri e salmastri delle Isole Eolie. Lavori della Società Italiana di Biogeografia, N.S., 3: 113-306, 16 pls.
- Giusti F. & Manganelli G., 1986. Notulae malacologicae, XXXIII. "*Helix*" *sororcula* Benoit 1859 and its relationship to the genera *Vallonia* Risso and *Planogyra* Morse (Pulmonata: Pupilloidea). *Archiv für Molluskenkunde*, 116: 157-181.
- Giusti F. & Manganelli G., 1998. *Ichnusomunda sacchii* a new hygromiid snail from Sardinia Island (Western Mediterranean): an intriguing case of homoplasy in the anatomical organization (Pulmonata, Hygromiidae). *The Veliger*, 41: 319-332.
- Goodfriend G.A., Cameron R.A.D., & Cook L.M., 1994. Fossil evidence of recent human impact on the land snail fauna of Madeira. *Journal of Biogeography*, 21: 309-320.
- Hallgass A. & Vannozi A., 2010. Molluschi continentali alloctoni: dati ed ipotesi sull'introduzione in Italia dal Neolitico ad oggi. Atti del I Convegno del Forum Natura Mediterraneo www.naturamediterraneo.com, Selva di Paliano (FR), 20/21 marzo 2010, 17 pp.
- Holyoak D.T. & Holyoak G.A., 2012. An undescribed second species of *Plagyrona* from Portugal (Gastropoda, Pulmonata, Valloniidae). *Journal of Chonchology*, 41: 153-165.
- Ibáñez M., Alonso R. & Luis C., 2001. Divisione Mollusca: 143-148. In: Izquierdo I., Martín J.L., Zurita N. & Arechavaleta M. (Eds.), Lista de especies silvestres de Canarias (hongos, plantas y animales terrestres) 2001. Consejería de Política Territorial y Medio Ambiente Gobierno de Canarias, 437 pp.
- Kappes H., Delgado J.D., Alonso M.R. & Ibáñez M., 2009. Native and introduced gastropods in laurel forests on Tenerife, Canary Islands. *Acta Oecologica*, 35: 581-589.
- Kobelt W., 1898. Iconographie der Land- & Süsswasser-Mollusken mit vorzüglicher Berücksichtigung der europäischen noch nicht abgebildeten Arten von E. A. Rossmässler. Neue Folge. Achter Band, 8 (3-4): 41-72, Pls. 221-230.
- Kokshoorn B. & Gittenberger E., 2010. Chondrinidae taxonomy revisited: new synonymies, new taxa, and a checklist of species and subspecies (Mollusca: Gastropoda: Pulmonata). *Zootaxa*, 2539: 1-62.
- Letourneux M.A., 1870. Excursions malacologiques en Kabylie et dans le Tell Oriental. *Annales de Malacologie*, 1: 258-322, Pl. 6.
- Liberto F., Giglio S., Colomba M.S. & Sparacio I., 2012. New and little known land snails from Sicily (Mollusca Gastropoda). *Biodiversity Journal*, 3: 201-228.
- Liberto F., Giglio S., Reitano A., Colomba M. S. & Sparacio I., 2010. Molluschi terrestri e dulciacquicoli di Sicilia della collezione F. Minà Palumbo di Castelbuono. Danaus Ed., Palermo, 135 pp.
- Lo Brano V.D. & Sparacio I., 2006. Molluschi terrestri e dulciacquicoli del S.I.C. Rupi di Catalfano e Capo Zafferano (Sicilia) (Gastropoda Neotaenioglossa Pomatiasidae, Basommatophora, Stylommatophora). *Il Naturalista siciliano*, 30: 555-589.
- Locard A., 1899. Conchyliologie Portugaise. Coquilles terrestres des eaux douces et saumâtres. *Archives du Muséum d'Histoire Naturelle de Lyon*, 7: 1-303.
- Lowe R.T., 1831. Primitiae faunae et florae Maderae et Portus Sancti; sive species quaedam novae vel hactenus minus rite cognitae animalium et plantarum in his insulis degentium breviter descriptae. *Transactions of the Cambridge Philosophical Society*, 4 (1): 1-70, Pl. 1-6.
- Lowe R.T., 1855. Catalogus molluscorum pneumatorum insularum Maderensium: or a list of all the land and fresh-water shells, recent and fossil, of the Madeiran islands: arranged in groups according to their natural affinities; with diagnoses of the groups, and of the new or hitherto imperfectly defined species. *Proceedings of the Zoological Society of London*, 22: 161-218.
- Manganelli G., Bodon M., Favilli L., Castagnolo L. & Giusti F., 1997. Checklist delle specie della fauna d'Italia, molluschi terrestri e d'acqua dolce. Errata ed addenda, 1. *Bollettino Malacologico*, 33: 151-156.
- Manganelli G., Bodon M., Favilli L. & Giusti F., 1995. Gastropoda Pulmonata. In: Minelli A., Ruffo S. & La Posta S. (Eds.), Checklist delle specie della fauna italiana. Calderini, Bologna. 16: 60 pp.
- Manganelli G., Bodon M. & Giusti F., 2000. Checklist delle specie della fauna d'Italia, molluschi terrestri e d'acqua dolce. Errata e addenda, 2. *Bollettino Malacologico*, 36: 125-130.
- Manganelli G., Bodon M. & Giusti F., 2010. The status of *Arion alpinus* Pollonera 1887, and re-description

- of *Arion obesoductus* Reischütz 1973 (Gastropoda, Arionidae). Journal of Conchology, 40: 269-276.
- Manganelli G. & Favilli L., 1996. *Xerosecta giustii* a new hygromiid from Tuscany (Italy) close to extinction (Gastropoda, Pulmonata: Helicoidea). Journal of Conchology, 35: 335-355.
- Mousson A., 1872. Revision de la faune malacologique des îles Canaries. - Neue Denkschriften der Allgemeinen Schweizerischen Gesellschaft für die Gesamten Naturwissenschaften - Nouveaux Mémoires de la Société Helvétique des Sciences Naturelles, 25: 1-176, Tav. 1-6.
- Nardi G., 2009. Una nuova sottospecie di *Chondrina megacheilos* (De Cristofori & Jan, 1832) per le Prealpi Bresciane (Gastropoda, Pulmonata, Chondrinidae). Bollettino Malacologico, 45: 83-93.
- Nardi G., 2011. Clausiliidae (Gastropoda, Pulmonata) from Lombardy (northern Italy), with the description of a new subspecies. Basteria, 75: 95-103.
- Nardi G. & Bodon M., 2011. Una nuova specie di *Testacella* Draparnaud Lamarck, 1801, per l'Italia Settentrionale (Gastropoda: Pulmonata: Testacellidae). Bollettino Malacologico, 47: 150-164.
- Niero I., Nardi G. & Braccia A., 2012. Una nuova specie di *Renea* Nevill, 1880 per le Prealpi Venete (Gastropoda: Prosobranchia: Aciculidae). Bollettino Malacologico, 48: 73-102.
- Nitz B., Falkner G. & Haszprunar G., 2010. Inferring multiple Corsican *Limax* (Pulmonata: Limacidae) radiations: a combined approach using morphology and molecules. In: Glaubrecht M. (Ed.), Evolution in Action, Springer-Verlag Berlin Heidelberg: 405-435.
- Nitz B., Heim R., Schnepf U.E., Hyman I. & Haszprunar G., 2009. Towards a new standard in slug species descriptions: the case of *Limax sarnensis* Heim & Nitz n. sp. (Pulmonata: Limacidae) from the Western Central Alps. Journal of Molluscan Studies, 75 (3): 279-294.
- Nordsieck H., 2006. Systematics of the genera *Macrogastra* Hartmann 1841 and *Julica* Nordsieck 1963, with the description of new taxa (Gastropoda: Stylommatophora: Clausiliidae). Archiv für Molluskenkunde, 135: 49-71.
- Nordsieck H., 2007a. Worldwide Door Snails (Clausiliidae), recent and fossil. ConchBooks, Hackenheim, 214 pp.
- Nordsieck H., 2007b. Neue Unterarten von *Chochlodina costata* (C. Pfeiffer, 1828) (Gastropoda, Stylommatophora, Clausiliidae, Alopinae). Club Conchylia Informationen, 38: 5-9.
- Nordsieck H., 2011a. Beschreibung einer neuen *Cochlostoma*-Art aus Italien, mit revisorischen Bemerkungen zu den *Cochlostoma*-Arten der Apenninen-Halbinsel (Gastropoda, Caenogastropoda, Architaenioglossa, Cochlostomatidae). Conchylia, 41: 13-21.
- Nordsieck H., 2011b. Murellen von Mittel- und Süditalien (Gastropoda, Stylommatophora, Helicidae) bestimmen, eine schwierige Aufgabe. Conchylia, 41: 22-32.
- Nordsieck H., 2011c. Revision of the genus *Leucostigma* A. J. Wagner 1919 (Gastropoda: Stylommatophora: Clausiliidae). Archiv für Molluskenkunde, 140: 123-147, 4 pls.
- Nordsieck H., 2012. Ergänzung der Revision der Gattung *Medora* H. & A. Adams: Die *Medora*-Arten Italiens (Gastropoda, Stylommatophora, Clausiliidae, Alopinae), mit Beschreibung einer neuen Unterart von *Medora dalmatina* Rossmässler. Conchylia, 42: 75-81.
- Oliveira Á. de, 2008. Materiais para o estudo da Malacofauna não-marinha de Portugal. 1. Seis gastrópodes (Pulmonata, Stylommatophora) não citados na obra de Augusto Nobre. 2. *Monacha cartusiana* (Müller O.F., 1774) e *Helicigona lapicida* (Linnaeus, 1758) (Pulmonata, Helicoidea). Noticiário de la Sociedad Española de Malacología, 49: 40-45 (& correction, ibid., 51: 48, 2009).
- Oliveira Á. de, 2009. Materiais para o estudo da malacofauna não-marinha de Portugal. 5. *Cochlicopa lubricella* (Rossmässler, 1834) (Pulmonata, Cochlicopidae). Noticiário de la Sociedad Española de Malacología, 51: 55-58.
- Oliveira Á. de, 2010. Fauna Malacológica da cidade de Coimbra (Beira Litoral). Moluscos "urbanos" de Portugal. 1. Iberus, 28 (2): 39-50.
- Paiva C. de, 1866. Description de dix espèces nouvelles de Mollusques terrestres de l'archipel de Madère. Journal de Conchyliologie, 14 (4): 339-343, Pl. 11.
- Paiva C. de, 1867. Monographie molluscorum terrestrium fluviatilium, lacustrium insularum maderensium. Memórias da Academia Real das Ciências de Lisboa, Classe de Ciências Matemáticas, Físicas e Naturais, 6: I-XIX, 1-168, 1-2, Pls. 1-2.
- Palazzi S., 1988. On some landsnails collected in Sintra. Publicações Ocasiais da Sociedade Portuguesa de Malacologia, 10: 17-18.
- Pfeiffer L., 1853. Monographia heliceorum viventium. Sistens descriptiones systematicas et criticas omnium huius familiae generum et specierum hodie cognitatum. Brockhaus F. A., Lipsiae. 3, i-viii, 1-711.
- Pfeiffer L., 1870-1876. Novitates Conchologicae. Series prima. Mollusca extramarina. Descriptions et figures de coquilles extramarines nouvelles et peu connues. Fischer T., Cassel, 4: 1-171, Pls. 109-137.
- Pfeiffer L., 1876. Monographia heliceorum viventium. Sistens descriptiones systematicas et criticas omnium huius familiae generum et specierum hodie cognitatum. Brockhaus F. A., Lipsiae. 7, i-x, 1-674.
- Pfenninger M., Vela E., Jesse R., Arantzazu Elejalde M., Liberto F., Magnin F. & Martínez-Ortí A., 2010. Temporal speciation pattern in the western Mediterranean genus *Tudorella* P. Fischer, 1885 (Gastro-

- poda, Pomatiidae) supports the Tyrrhenian vicariance hypothesis. *Molecular Phylogenetics and Evolution*, 54: 427-436.
- Pilsbry H.A., 1894. Guide to the study of Helices. In: Tryon G. W., *Manual of conchology, structural and systematical, with the illustrations of the species. Second series, Pulmonata*, 9 (Helicidae 7.) Conchological Section, Academic of Natural Sciences of Philadelphia, iii-xlvi, 1-366, Pls. 1-71.
- Reischütz A., Reischütz N. & Reischütz P.L., 2008. Ein Beirag zur Kenntnis der Molluskenfauna Albanien. *Nachrichtenblatt der Ersten Voralberger Malakologischen Gesellschaft*, 15: 37-39.
- Reise H., Hutchinson J.M.C., Schunack S. & Schlitt B., 2011. *Deroceras panormitanum* and congeners from Malta and Sicily, with a redescription of the widespread pest slug as *Deroceras invadens* n. sp. *Folia Malacologica*, 19: 201-223.
- Reitano A., Liberto F. & Sparacio I., 2007. Nuovi dati sui Molluschi terrestri e dulciacquicoli di Sicilia. 1° contributo (Gastropoda Prosobranchia Neotaenioglossa; Gastropoda Pulmonata Basommatophora, Stylommatophora). *Il Naturalista siciliano*, 31: 311-330.
- Reitano A., Liberto F., Sparacio I. & Giglio S., 2009. I molluschi terrestri della R.N.I. "Grotta Palombara" (Melilli, Sicilia sud-orientale) (Gastropoda Architaenioglossa, Neotaenioglossa, Stylommatophora). *Il Naturalista siciliano*, 33: 177-205.
- Riedel A., 1998. Eine neue *Retinella*-Art aus Piemont, Italien (Gastropoda: Stylommatophora: Zonitidae). *Malakologische Abhandlungen*, 19: 5-11.
- Ripken T.E. & Bouchet P., 1998. Les Mollusques terrestres endémiques de la faune de Corse. *Rapport d'étude. Muséum National d'Histoire Naturelle*, Paris, 22 pp.
- Schileyko A.A., 1998. Treatise on recent terrestrial pulmonate molluscs. Part 1: Achatinellidae, Amastridae, Orculidae, Strobilopsidae, Spelaeodiscidae, Valloniidae, Cochlicopidae, Pupillidae, Chondrinidae, Pyramidulidae. *Ruthenica*, Supplement 2: 1-127.
- Seddon M.B., 2008. The Landsnails of Madeira. An illustrated compendium of the landsnails and slugs of the Madeiran archipelago. *Biotir Reports*, 2: i-vi + 196 pp.
- Seddon M.B. & Holyoak D.T., 1993. Land Gastropoda of NW. Africa: new distributional data and nomenclature. *Journal of Conchology*, 34: 321-331.
- Seddon M.B. & Tattersfield P., 1992. New distributional data for some land snails from France and the Iberian Peninsula. *Journal of Conchology*, 34: 259-260.
- Servain G., 1880. Étude sur les mollusques recueillis en Espagne et en Portugal. Bardini D., Saint-Germain, 172 pp.
- Shuttleworth R.J., 1852. Diagnosen einiger neuen Mollusken aus den Canarischen Inseln. *Mittheilungen der Naturforschenden Gesellschaft in Bern*, 241/242: 137-146.
- Silva e Castro J. da, 1887. Contributions a la faune malacologique du Portugal, 2-4. *Jornal de Sciencias Mathematicas Physicas e Naturaes*, 1: 232-249.
- Torres J.S. & Oliveira Á. de, 2010. Materiais para o estudo da malacofauna não-marinha de Portugal. 7. *Lucilla singlelyana* (Pilsbry, 1890) (Pulmonata, Helicodiscidae). *Noticiario de la Sociedad Española de Malacologia*, 54: 32-33.
- Tryon G.W., 1887. *Manual of Conchology; structural and systematic. Second Series, Pulmonata*, 3, (Helicidae, Vol. 1), Conchological Section, Academic of Natural Sciences of Philadelphia, 1-313, Pls. 1-63.
- Waldén H.W., 1983. Systematic and biogeographical studies of the terrestrial Gastropoda of Madeira. With an annotated Check-list. *Annales Zoologici Fennici*, 20: 255-275.
- Welter-Schultes F.W., 2011. Animal Database. Last modified 10-03-2011. <http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=1939>.
- Welter-Schultes F.W., 2012. European non-marine molluscs, a guide for species identification. Planet Poster Editions, Göttingen: A1-A3, 1-679, Q1-Q78.
- Westerlund C.A., 1889. Fauna der in der paläarktischen Region (Europa, Kaukasien, Sibirien, Turan, Persien, Kurdistan, Armenien, Mesopotamien, Kleinasien, Syrien, Arabien, Egypten, Tripolis, Tunesien, Algerien und Marocco) lebenden Biennenconchylien - 2: Genus *Helix*. Friedländer, Berlin, 473 pp. + 31 pp.
- Wollaston T.V., 1878. *Testacea Atlantica or the land and freshwater shells of the Azores, Madeiras, Salvages, Canaries, Cape Verdes and Saint Helena*. Reeve, London, xi + 588 pp.
- Zallot E., 2003. Alcune note sul genere *Cochlostoma* Jan, 1830 (Gastropoda, Prosobranchia) in Friuli (Italia nord-orientale). *Gortania - Atti del Museo Friulano di Storia Naturale*, 24: 93-113.