

New faunistic data on *Trochoidea (Trochoidea) caroni* (Deshayes, 1832) (Gastropoda Pulmonata Hygromiidae)

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ABSTRACT

Trochoidea (Trochoidea) caroni (Deshayes, 1832), with *T. (T.) elegans* (Gmelin, 1791) and *T. (T.) trochlea* (Pfeiffer, 1846), belong to a group of species (“*elegans* group”), which, although considered valid by most authors, show a not completely defined systematic position. In this work, we report four new records (Terracina and Spigno Saturnia for Latium, Sorrento for Campania and Castagneto Carducci for Tuscany) and confirm two historical records (Ischia Island for Campania and Manfredonia for Apulia) of *T. caroni* from Italy, and all published and new faunistic data about the presence of this species in the Sicilian Islands, Capri Island and Maltese Islands. Moreover, we report some historical data from the Western Mediterranean Sea: two bibliographical records from the Balearic Islands, not verified, and three records from North Africa (Tunis in Tunisia, Annaba in Algeria and an unmarked locality in Morocco). We also report the up to now historical faunistic data of *T. trochlea*, a not well known species with an undefined status, and of some populations of *T. elegans* with raised whorl. It is not yet possible to draw a certain conclusion on the particular biogeography of these taxa, but the new data presented in this work, enhance the current knowledge on the distribution of *T. caroni* which would be larger than previously known.

KEY WORDS

Trochoidea; land gastropods; Italy; Mediterranean; faunistics.

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INTRODUCTION

Trochoidea (Trochoidea) caroni (Deshayes, 1832) (Gastropoda Pulmonata Hygromiidae) is morphologically characterised by a trochiform, pyramidal, dextrorse shell with 8–10 well raised whorls having a sharp marginal keel, finely ribbed external surface and small umbilicus. The height-to-diameter ratio (h/d) of the spire ranges from 1.00 to 1.30, in some cases as low as 0.88: see Sacchi’s “*elata*” form (Sacchi, 1955a).

Anatomically, *T. (T.) caroni* is characterised (Giusti et al., 1995) by penial papilla elliptical or reniform in transverse section with long C-shaped groove on one side; four pleats defining two lozenges, each surrounding the opening of an appendicula into the vagina; atrial appendix containing crest-like structure; long penial flagellum. *T. (T.) caroni* lives in garigue and grassy meadow environments, under stones and detritus, sometimes also on calcareous rocks or at their base. It is currently reported in Italy as a living species in Central Western Sicily and on

Capri (Alzona, 1971; Cossignani & Cossignani, 1995; Manganelli et al., 1995). The aim of the present paper is to provide new data on the presence of *T. caroni* in certain regions of Italy and to collect all data in the literature and available from museum collections on its present and past distribution.

T. caroni has close anatomical affinity (“*elegans* group”) with *T. (T.) elegans* (Gmelin, 1791), *T. (T.) spratti* (Pfeiffer, 1846), a species endemic to the island of Malta, and *T. (T.) cumiae* (Calcara, 1847), endemic to the island of Lampedusa (Giusti et al., 1995). In particular, the systematic and biogeographical positions of *T. caroni*, *T. elegans* and *T. trochlea* (Pfeiffer, 1846), the latter a little-known North-African species, are still unclear.

T. trochlea was described as a new species by Pfeiffer (1846) but the original types are not known. According to the original description (Pfeiffer, 1846), this species is morphologically characterised by a conical shell with eight keeled, crenulated whorls, having diameter about the same as height, or slightly greater ($h/d = 1.04$ in Pfeiffer (1846), 1.05 in Bourguignat (1864) with a variety *B minor* reaching 1.14). In the continuation of Rossmässler’s “Iconographie”, Kobelt (1877) also reports similar measurements for *Helix trochlea* Pfeiffer [“Diam. et alt. 7-8 Mm”, $h/d = 1.14$]. Bourguignat (1864) adds other distinctive characters with respect to *T. elegans*, such as more accentuated striations, small umbilicus, crenulated keel and more imbricated whorls that overlap each other. Its distribution is thought to include Algeria and Northern Tunisia (Pfeiffer, 1853; Morelet, 1853; Bourguignat, 1864, 1868; Kobelt, 1877; De Saint-Simon, 1882; Letourneux & Bourguignat, 1887; Monterosato, 1893; Sacchi, 1955a).

Morphologically, *T. elegans* is characterised by a conical shell with 6-7 whorls of variable height and diameter greater than height. It is distinguished from *T. caroni* by a different height-to-diameter ratio (h/d) of the spire, in the range 0.82–0.62 (Sacchi, 1954) or less (“*scitula*” form); external surface with fine regular growth ridges; umbilicus small. Its distribution is European-Western Mediterranean (Southern France, Spain, Greece, Tunisia, Algeria and perhaps Morocco; (Pallary, 1904)) with isolated populations in Belgium, Northern France, Sardinia and Corsica; introduced into Great Britain from the early 1800s (Férussac, 1821), into South Carolina (USA) from before 1875 (Mazyck, 1876)

and perhaps the Balearic Islands (Gargominy, 2011). In Italy it is present in Liguria, Tuscany, Umbria (Misuri, 1907), Latium and doubtful in Sicily. It is a xerophilous species with wide ecological valence colonising coastal, ruderal and cultivated calcareous environments. The biometric character hitherto used therefore does not discriminate the three species with absolute certainty and various anatomical similarities also exist. Since there are currently no other diagnostic criteria, it was decided to list the data available in the literature and from museum collections, exactly as reported by the original authors or collectors, also for *T. trochlea* and *T. elegans*.

MATERIALS AND METHODS

In order to obtain an exhaustive picture of the distribution of *T. caroni* in Italy, field surveys were conducted and their results were compared with historical data obtained from other sources. This research was carried out in addition to the data-gathering in the literature and by studying malacological collections in different Italian and foreign museums and private collections. The field studies were conducted between September 2002 and September 2006 on Capri and in Sicily and in the period 2006-2009 in Latium. The species identification was based on Giusti et al. (1995); the taxonomical and nomenclatural arrangement follows Manganelli et al. (1995) and Bank (2011).

RESULTS

Trochoidea (Trochoidea) caroni (Deshayes, 1832)

ORIGINAL DESCRIPTION. Deshayes, 1832, species n. 142, pag. 262, locus typicus “Sicile”: “*Hélice de Caron. Helix Caroni. Nob. H. testa conica, elongato-pyramidata, trochiformi, longitudinaliter striata, striis confertis, sublamellosis; anfractibus numerosis, basi carinatis; carina squamosa; apertura depressa, quadrangulari, simplici; labro tenui. Diamètre de la base 9 millim., longueur 11 millim.* [$h/d = 1.22$]”.

Férussac (1821) reports the species for the first time as: “*Helix elata* Faure Biguet [J. P. Faure-Biguet] espèce n. 304, p. 46, “Hab. L’île de Caprée”, without



Figure 1. Syntype n° Moll 23356 from Palermo collected by “M. Caron” (collection Mollusques, Muséum National d’Histoire Naturelle, Paris), apertural view. Figure 2. Idem, umbilical view. Figure 3. Idem, apical view. Figure 4. Idem, original labels. Photos by P. Maestrati, Muséum National d’Histoire Naturelle, Paris.

any description. Thus the name is now considered a nomen nudum.

Deshayes (1832) [according to Sherborn (1924: p. 1110) the correct year of publication is 1832] published the first valid description of the species, assigning the name “*Helix Caroni*”. The original type series is still kept in the National Museum of Natural History in Paris: a syntype from Palermo collected by “M. Caron”, to whom the species is dedicated (syntype: “1 lot de 1 spécimen, Typothèque Leg. Caron, n° Moll 23356”) and other 8 syntypes from “Sicilia” (syntypes: “1 lot de 8 spécimens, Typothèque, n° Moll 23357”) (Maio, pers. obs.; Figs. 1–4).

Rossmässler (1837: pp. 23, 24, fig. 344), who gives Faure-Biguet’s description of *Helix elata*, considers the species a synonym of *Helix caroni*.

EXAMINED MATERIAL. LATIUM. The first report of *T. caroni* in Latium is by Statuti (1882) who mentions finding a single shell on the beach between Porto di Badino and Torre Olevola, a few km from Terracina in Latina Province. The author sustains that the specimen reached the beach with flotsam from nearby rivers of the Pontine Plain. The studies conducted in this area produced 12 shells (three juveniles) from the Municipality of Spigno

Saturnia (Latina) in spring and summer 2006 (Figs. 5–7). The specimens have an h/d ratio greater than 1.40. Their good state of conservation suggests that they come from a population still present in the area. However, this could not be confirmed as no live specimens were found (Petraccioli et al., 2011).

A live population of *T. caroni* was identified in 1986 (Hallgass, 2007; com. pers.; Figs. 8–10, 25) at San Silvano in the Ausoni Mountains, near Terracina (Latina), at an altitude of 200 m. Specimens have an h/d ratio between 1.10 and 1.30. The species is indicated generically in Latium by Welter-Schultes (2012).

CAMPANIA. The first historical report of *T. caroni* in Campania dates back to Férussac (1821) who reports data of Faure-Biguet for Capri. The species is referred to as “*Helix elata* Faure Biguet”. Rossmässler (1837) also reports it from Capri as Faure-Biguet’s *Helix elata*. Achille Costa (1840, sub *Corocolla* (sic!) *elata*) claims to have found it under stones on the road to S. Giacomo (Capri, Naples) and lists it among rare species. Philippi (1836, 1844, sub *Helix elata* Faure Biguet) confirms the presence of the species on Capri. Monterosato (1893) reports *Xerophila caroni* Desh. (= *turrita* Ph.) from “isola di Capri (Philippi)”.

In his writings, Bellini (1899, 1900, 1901, 1910, 1915, 1920, 1922, 1924, 1926) reports it with various names: *Helix (Xerophila) turrita* Phil., *Helix (Tropidocochlis) turrita* Phil., *Tropidocochlis elatus* Faure Biguet, *Tropidocochlis turritus* Phil., *H. (Tropidocochlis) elata* Faure Biguet, *Tropidocochlis Caroni* Deshayes, *H. (Xerophila) elata* Fer. var. *caprensis* and claims it to be a rare species on Capri, though locally abundant in litter at Castiglione, Arco Naturale, Via Krupp and Pizzolungo. Bellini (1901) describes a hypsometric zone of Capri between Valletta (120 m) and Mt. S. Michele (245 m), which he calls “zona di *H. elata* e *H. surrentina*”. He distinguishes an eastern subzone where *H. elata* predominates. Bellini (1899; 1900) also describes a variety *caprensis* (Bellini, 1899: pp. 4–5), “rara nella parte occidentale dell’isola, nelle zolle incolte al di sotto del Castello Barbarossa” [rare in the western part of the island, in uncultivated turf and below Castello Barbarossa]. Original specimens collected by Bellini are kept in the malacological collection of the Zoological Museum of Naples University Federico II and in the museum of the Centro Caprese “Ignazio Cerio” on Capri (Maio, pers. obs.). Sacchi (1953) reports its presence on Capri, on Mt. Tuoro and Mt. Solaro, in sparse garigues with rosemary, as: “endemita del gruppo *Helicella (Trochoidea) elegans* Gm., a spira elevata e a forma tur-

ricolata, che corrisponde alle forme descritte dal Bellini (1915) come *H. caroni* Desh. e *H. elata* Faure”. Subsequently (Sacchi, 1955a, 1955b, 1956a), he states that “*Helicella (Trochoidea) caroni* Desh. and *H. elata* Faure” are indistinguishable on Capri.

Three specimens found in Via Tragara in August 1979 are kept in the S. Duraccio collection (ex coll. Pirozzi no. 69). During our study on Capri, we found *T. caroni* in 10 stations ranging in altitude from about 25 m to 200 m, but only in two of these stations did we find live specimens (Table 1, Figs. 11–13, 27). They were found at the base of the trunks or near superficial roots of mainly leguminous plants typical of Mediterranean maquis, growing on calcareous rock in the littoral zone (Petraccioli et al., 2005a, 2005b, 2006). The h/d ratio was about 1.05.

There is an interesting report of fossils of this species from Capri. Segre (1959) reports it as *Helix caronii* (sic!) Desh. (F. Settepassi det.) found in calcarenite of Villa Jovis (Monte di Lauro, Capri), a well-cemented, medium to coarse grained calcareous sandstone from the Lower Pleistocene (Baratolo et al., 1992; Petraccioli et al., 2007).

Sacchi (1953) states that it is possible to find “una piccola forma, (...) mostrante affinità con *Helicella elegans* e forme simili” at the base of coastal cliffs between Amalfi and Positano (Salerno).

Specimens	Sampling stations	Date	Habitats	Alt. m	UTM
Living	Trackfrom via Mesola to Fortino Mesola (Anacapri)	17.04.2004	Dry stone walls, mediterranean maquis	37-150	3289
Living	Fortino Mesola (Anacapri)	17.04.2004	Mediterranean maquis	37	3289
Shells	“Belvedere o Piazzetta delle Noci” (Capri)	15.04.2004	Pinewood, dry stone walls. In humus	194	3789
Shells	Scala Fenicia, quarto tratto, Capri	06.04.2003	On calcareous rock	67-100	3489
Shells	Via Krupp (Capri)	18.07.2003, 01.11.2003	On calcareous rock	25-125	3588
Shells	Via Arco Naturale (Capri)	18.07.2003	In litter	75	3788
Shells	Via Pizzolungo (Capri)	16.04.2004	In litter	50-100	3688
Shells	Via Cesina (Capri)	16.11.2003	Dry stone walls. In debris	150-200	3689
Shells	Giardini Augusto (Capri)	24.01.2004	Gardens. In debris	75-96	3688
Shells	Monte Tamborio (Capri)	07.11.2003	On calcareous rock. In debris	200	3689

Table 1. Faunistic data of *Trochoidea (Trochoidea) caroni* from Capri Island.

Finally, two shells of juvenile specimens of *T. caroni* were found in humus at Sorrento (Naples) (March 1984, G. Fasulo legit) (Figs. 14–16). The site unfortunately no longer exists, due to roadworks that destroyed the original habitat. Their h/d ratio was about 0.95.

Delle Chiaje (1841) reports *Helix elegans* Drap. from Ischia Island. The plate was previously published by the author in the atlas “Memorie sulla Storia e Notomia degli Animali senza vertebre del Regno di Napoli” dating between 1822 and 1830 (Delle Chiaje, 1830) (Fig. 23). The figure clearly indicates that the species in question is actually *T. caroni*, which at the time had not yet been described. The synonymy is also confirmed by Benoit (1862, 1875) and Statuti (1882).

APULIA. A specimen of *T. caroni* found at Manfredonia (Foggia Province), collected by W. Kobelt in 1878, is kept in the L. Pfeiffer collection at the Senckenberg Forschungsinstitut und Naturmuseum in Frankfurt am Main, Germany (R. Janssen, pers. com.; see Table 3). Its h/d ratio is $7.0/6.6 = 1.06$.

TUSCANY. A specimen found of *T. caroni* at Castagneto Carducci (Livorno Province) in 1983 is kept in the S. Duraccio collection (ex coll. Pirozzi no. 69F, G. D’Anna legit). Its h/d ratio is $8.5/7.0 = 1.21$.

SICILY. The first historical report of *T. caroni* from Sicily dates back to Férussac (1821), who cites W.E. Leach’s report of “*Helix elata* Faure Biguet”. Subsequently, Deshayes (1832) described *Helix Caroni* on a specimen from Sicily (Figs. 1–4).

Philippi (1836: pp. 137–138, pl. 8, fig. 17) describes it in his first volume as a new species with the name of *Carocolla turrita* on specimens from Palermo (Fig. 24). He also reports *Carocolla elata* Faure-Biguet (pl. 8, fig. 16) from Palermo, Sciacca (Agrigento Province) and from Pachino (Siracusa Province). In his second volume (Philippi, 1844), he reports *Helix turrita* Ph. as a synonym of *H. caroni* Desh. from Palermo. Rossmässler (1837) also cites the same works.

Pirajno (1840, sub *Helix elata*), reports it “presso Scillato [Palermo] alla Portella di mare”.

Describing the Trapani area, Power (1842, as *Caracolla elata*) reports *T. caroni* “sul monte S. Giuliano sotto erbe e pietre” and near the walls of the Castello di Erice (Sparacio, 2012). Aradas & Maggiore (1840) reported *T. caroni* as *H. elata* Fér.

(Elice alta) in their “Catalogo delle Conchiglie viventi e fossili”, as being “frequente in Palermo e Sciacca, rarissima nei nostri dintorni. Trovasi pure alle Madonie presso Scillato alla portella di Mare”, and as *H. turrita* Phil. (Elice torriciuolata) as being “comune in Palermo, e alle falde di Monte Pellegrino, abita in terreni aridi”.

Calcara (1845) reported *T. caroni* sub *Helix elata* in the Palermo area, on the banks of the River Oreto and as *Helix caroni* from “Malaspina, alle Croci, falde di Monte Pellegrino, sponde dell’Oreto, a Sferracavallo e Carini”.

Benoit (1862, p. 206, pl. 5, fig. 18) describes a local form of *Helix* cfr. *caroni* with a less accentuated conical form and rounded apex, as *Helix Sequentiana*. He found it in the Eastern Madonie Mountains and near Cefalù (Palermo). He also describes a variety *dilatata* of *H. elata* Faure-Biguet that he found near Palermo and on Mt. S. Giuliano (or Mt. Erice) near Trapani. He describes *H. caroni* Deshayes on Mt. Pellegrino, on the banks of the River Oreto, “alle Croci”, at Carini, near Palermo, as well as at Calatafimi, near the Temple of Segesta, Trapani (Benoit, 1875, 1881). Some specimens of the Minà Palumbo collection bear Fiume Oreto and Palermo as collection sites (Liberto et al., 2010).

De Saint-Simon (1882) reports *Helix caroni* generically from Sicily. Westerlund (1889) reports it from Palermo as *Helix caroni*, from the Madonie Mountains as *Helix sequentiana*, and generically from Sicily as *Helix turrita*.

Monterosato (1893) reports *Xerophila caroni* Desh. (= *H. Caroni*, Ben. – Ill. Sist. 1857, t. V. f. 14) from Favignana and the Egadi islands (Benoit). He also states that the species of this group are: “a) *X. Caroni*, Desh. (= *turrita*, Ph.) - Prov. di Palermo, Nicosia, Siracusa; b) *H. exacta*, Monts. mss. = *H. Caroni*, Ben. - Ill. Sist. T. V, f. 15 (Calatafimi); c) *H. elata*, Faure-Biguet et var. *dilatata*, Ben. - Prov. di Trapani; d) = *H. Sequenziana*, Ben. *H. ?pyramis*, Ph. - Calatafimi, Sciacca ed altre località Siciliane”. Monterosato (1894) later cites *H. (Xerocochlea) Caroni* Desh. “comune e caratteristica delle parti basse del Monte Pellegrino e dei suoi dintorni sino a S. Polo, in tutta la parte che lo circonda”.

De Gregorio (1895, sub *Helix elata* Faure Biguet) reports *T. caroni* from “Fiume Anapo in Siracusa e (...) Carini”; in the same paper (1895, as *Helix elata* Var. *dilatata* Ben.) also from Monte San Giuliano.

Specimens	Localities (Municipality)	Province	Date	Collection	Collector
Shell	Monte Pellegrino	Palermo	1949	"V. Wiese" Haus der Natur, Cismar (Germany)	Brandt
17 es.	via Sampolo (Palermo)	Palermo	1910-60	"C. Alzona" MCSNM	Monterosato
3 es.	San Vito (Palermo)	Palermo	1910-60	"C. Alzona" MCSNM	Monterosato
4 es.	Monreale	Palermo	1910-60	"C. Alzona" MCSNM	Monterosato
6 es.	Salaparuta	Trapani	1910-60	"C. Alzona" MCSNM	
2 es.	Erice	Trapani	Ott. 1951	"C. Alzona" MCSNM	C. Sacchi
2 es.	Agrigento	Agrigento	1910-60	"C. Alzona" MCSNM	
11 es.	Porto Empedocle	Agrigento	Ott. 1951	"C. Alzona" MCSNM	C. Sacchi
5 es.	Siracusa	Siracusa	1910-60	"C. Alzona" MCSNM	
Shells	Sferracavallo (Palermo)	Palermo	15.09.1978	Coll. I. Sparacio	I. Sparacio
Living	Bosco della Ficuzza (Corleone) 600 m s.l.m.	Palermo	21.11.1979	Coll. I. Sparacio	I. Sparacio
Living	Capaci (Capaci)	Palermo	17.02.1980	Coll. I. Sparacio	I. Sparacio
Living	Foci Fiume Pollina (Pollina)	Palermo	24.05.1981	Coll. I. Sparacio	I. Sparacio
Living	Bolognetta	Palermo	19.06.1987	Coll. I. Sparacio	I. Sparacio
Living	Isola delle Femmine	Palermo	15.08.1990	Coll. I. Sparacio	I. Sparacio
Living	Golfo di Cofano, Castelluzzo (San Vito Lo Capo)	Trapani	14.10.1984	Coll. I. Sparacio	I. Sparacio
Living	Golfo di Cofano, fascia costiera (S. Vito Lo Capo)	Trapani	06.10.1987	Coll. M. Cuomo	M. Cuomo
Living	Monte Cofano, Castelluzzo (San Vito Lo Capo)	Trapani	04.1991	Coll. I. Sparacio	I. Sparacio
Living	Calatafimi (Calatafimi Segesta)	Trapani	05.12.1984	Coll. I. Sparacio	I. Sparacio
Shells	Favignana, Cala Rossa	Trapani	25.08.1990	Coll. I. Sparacio	I. Sparacio
Living	località Lido Cornino (Custonaci)	Trapani			Cossignani & Cossignani, 1995
Living	Monte Erice (Erice)	Trapani			Giusti et al., 1995
Living	Favignana (Is. Egadi)	Trapani		G. Manganelli	Giusti et al., 1995
Living	San Vito Lo Capo	Trapani	20.08.2006	Coll. I. Sparacio	I. Sparacio
Living	Favignana (Is. Egadi)	Trapani			Reitano, 2006b
Living	Zone aride costiere per Cala Rossa (Terrasini)	Palermo	2006		Reitano, 2006a
Living	Monti delle Madonie	Palermo	2006		Reitano, 2006b
Living	Dintorni di Grotta Conza, Sferracavallo	Palermo	2012		Reitano et al., 2012
Shells	North side of the city	Agrigento	10.09.2008	Coll. W. Renda	W. Renda
Living	Erice	Trapani	26.08.2008	Coll. W. Renda	W. Renda
Living	Isola delle Femmine	Palermo	16.10.2008	Coll. W. Renda	W. Renda
Living	Capaci		24.09.2010		I. Sparacio

Table 2. Faunistic data of *Trochoidea (Trochoidea) caroni* from Sicily.

Many specimens (more than 20) of *T. caroni* from Sicily are kept in the malacological collection of the Zoological Museum of Naples. These specimens, reported with various names such as: *Helix caroni*, *H. (Turricula) turrita*, *H. (T.) caroni*, *Helix (T.) exacta*, date to the second half of the nineteenth century and were acquired under the direction of Achille Costa; most come from localities in Palermo Province or from near the city (exact toponyms are not indicated); some were donated by the eminent Sicilian malacologist Tommaso De Maria Allery di Monterosato (Maio, pers. obs.).

Bellini (1915) reports the species as *Tropidocochlis Caroni* Deshayes “nei dintorni di Palermo, Nicosia [Enna] e Siracusa”.

In October 1953, Sacchi (1955b, 1956a, 1956b) reported it as *Helicella (Trochoidea) caroni-elata* from Sicily, island of Mozia (Isola dello Stagnone, Marsala, Trapani) and Capo Gallo (Palermo), and in November 1953 as *Helicella (Trochoidea) caroni* on silicicolous substrates at Mistretta (Messina Province) and on Isola delle Femmine (Palermo), stating that the latter form differed from the former “per la conchiglia molto alta e turricolata”. Sacchi (1955b, 1956b) also reports finding fossil specimens of *H. elata* on Levanzo, Favignana and Marettimo (Egadi Islands, Trapani) in pink sandstone.

Some specimens from Porto Empedocle (Agrigento) are kept in the LÖbbecke Museum in Düsseldorf (Maio, pers. obs.). They were collected by J. Boscheinen in 1974 and determined as *Trochoidea elata* (Férussac, 1819) by T. Meijer in 1975. Specimens of this species are reported from different sites in Trapani Province, Palermo and Agrigento between 1949 and 2010 (Tab. 2). Fiorentino et al. (2004) reports it from the Egadi Islands.

Finally, the present authors found various colonies of *T. caroni* at Cala Rossa (Terrasini, Palermo) (Figs. 17–19, 26, 28) in November 2004, at Gicalone (Palermo) in October 1995 and at S. Vito Lo Capo and Macari (Trapani Province) in June 2006. The h/d ratio ranged from 1.14 to more than 1.20.

MALTA. The species was first documented as a fossil from the Quaternary of Malta by Trechmann (1938, sub *Xeroclivia* sp.). Four specimens from Marfa Point in the North of the island, determined by Trechmann, are kept in the Department of Paleontology of the British Natural History Museum of London (Sacchi, 1955b). Giusti et al. (1995) found many juvenile fossil specimens and shell fragments similar

to Sicilian populations of *T. caroni* in deposits at Cirkewwa dating to the Lower and Upper Quaternary (Hunt, 1997; Kolouch, 2003). Their h/d ratio ranged from 1.24 to more than 1.29 (Giusti et al., 1995).

Recent specimens of *T. caroni* were reported from the Maltese Islands in the nineteenth century: Gulia (1874) and Feilden (1879) reported specimens that Giusti et al. (1995) assume to have been stranded transported by the sea. A specimen from Malta, found in the first half of the nineteenth century, is kept in the Philipp P. Carpenter collection of the Field Museum of Natural History in Chicago (Maio, pers. obs.). Originally labelled *Iberus trochlea* Pfr., it was later determined by K. H. Beckmann as *T. caroni*. Four specimens (two recent without date and two Quaternary) from Malta, determined as *Trochoidea* cfr. *caroni*, are kept in the Paul Sammut collection in Rabat, donated to Heritage Malta, the cultural agency of the Government of Malta (Various authors, 2007).

NORTH AFRICA. Monterosato (1893) reports *Xerophila caroni* Desh. (= *turrita* Ph.) from “Tunisi (auct. [Monterosato?])” and *H. elata*, Faure-Biguet et var. *dilatata*, Ben. from “Bona (Kob.)”.

Bellini (1915) reports the species as *Tropidocochlis Caroni* Deshayes from Tunis.

Four specimens from Annaba (= Bona, Algeria) attributed to *T. caroni* are kept in the LÖbbecke Museum in Düsseldorf (Germany). They were collected by Carl Emil Lischke in 1868 and determined by him as *Trochoidea elata* (Férussac, 1819) (Figs. 20–22). Their h/d ratio ranges from 0.97 to 1.12. Two specimens of the species from Morocco, dating to the first half of the twentieth century, are kept in the Walter F. Webb collection of the Field Museum of Natural History in Chicago (USA). Originally labelled “*Helicella sequentiana* (Benoit)”, they were determined as *T. caroni* by K. H. Beckmann.

All these specimens were examined directly by one of the authors (Maio, pers. obs.) and despite the shell variations also present in North African populations of this group (see Bourguignat, 1864: vol. 1, T. 32, f. 4–22), seem to belong to *T. caroni*.

BALEARIC ISLANDS (SPAIN). Bullen (1910) reports fossils of “*Trochula elata* (Faure-Biguet)” in two different Holocene deposits on the island of Majorca (Balearic Islands), namely at Porto Pi and Alcudia. Sacchi (1954, 1955a) mentions an old report of *Helicella (Trochoidea) elata* from Majorca, considered doubtful by Jaekel (1952).



Figs. 5–22. Shells of *T. caroni*. Figs. 5–7. Spigno Saturnia, height 8.8 mm, diameter 6.1 mm: apertural view (Fig. 5), umbilical view (Fig. 6), apical view (Fig. 7). Figs. 8–10. Terracina, height 9.6 mm, diameter 7.1 mm: apertural view (Fig. 8), umbilical view (Fig. 9), apical view (Fig. 10). Figs. 11–13. Capri, height 6.7 mm, diameter 6.6 mm: apertural view (Fig. 11), umbilical view (Fig. 12), apical view (Fig. 13). Figs. 14–16. Sorrento, juvenile shell, height 3.3 mm, diameter 3.5 mm: apertural view (Fig. 14), apical view (Fig. 15), umbilical view (Fig. 16). Figs. 17–19. Terrasini, height 11.1 mm, diameter 9.6 mm: apertural view (Fig. 17), umbilical view (Fig. 18), apical view (Fig. 19). Figs. 20–22. Annaba (Algeria) Löbbecke Museum, Düsseldorf, Germany, height 9.6 mm, diameter 8.6 mm: apertural view (Fig. 20), umbilical view (Fig. 21), apical view (Fig. 22). diameter 8.6 mm: apertural view (Fig. 20), umbilical view (Fig. 21), apical view (Fig. 22).

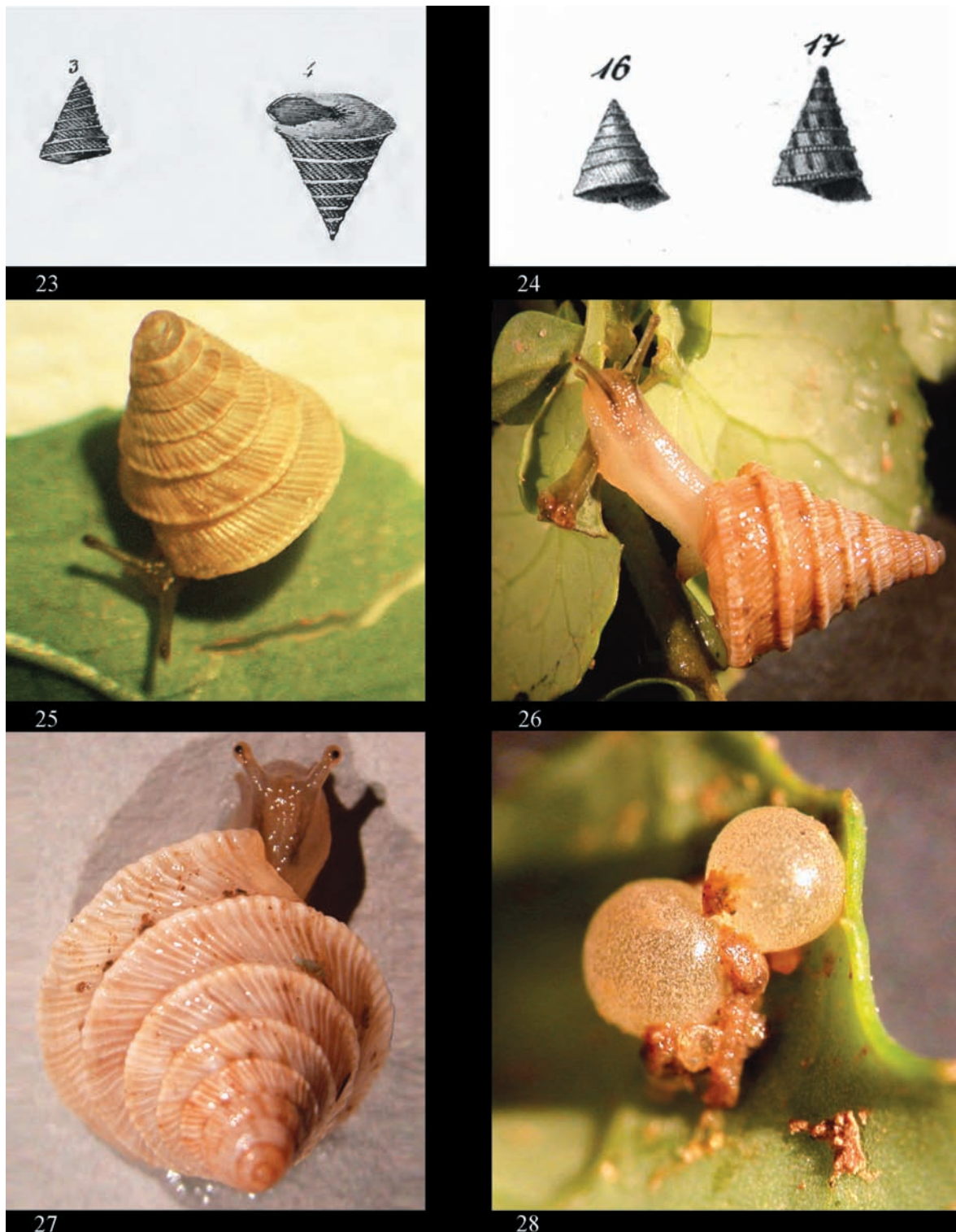


Fig. 23. *Carocolla elata* Faure-Biguet and *C. turrita* Philippi, 1836 illustrated in Philippi (1836), pl. 8, fig. 16 and 17, respectively. Fig. 24. *Helix elegans* from Ischia illustrated in Delle Chiaje (1841), pl. 72, figs. 3, 4. Fig. 25. Live specimen of *Trochoidea caroni* from Terracina, height 7.8 mm, diameter 7.0 mm. Fig. 26. Live specimen of *T. caroni* from Terrasini, height 12.5 mm, diameter 10.4 mm. Fig. 27. Live specimen of *T. caroni* from Capri, height 6.8 mm, diameter 6.6 mm. Fig. 28. *T. caroni* from Terrasini, detail of two eggs (diameter 1.5 e 1.7 mm).

Trochoidea (Trochoidea) trochlea (Pfeiffer, 1846)

ORIGINAL DESCRIPTION. Pfeiffer, 1846, species no. 302, p. 69, locus typicus: "Patria ?": "*Helix trochlea* Pfr. - *T. perforata, conico-turrita, trochlearis, costulato-striata, albida, interdum fusco-maculata vel basi fusco-fasciata; anfr. 8 acute crenulato-carinati, late exserti, utriusque planulati, ultimus basi subtilius et confertius striatus, convexiusculus, antice non descendens; apertura securiformis; perist. acutum, margine basali arcuato, intus leviter labiato, columellari subdilato, ad perforationem sub-reflexo. Diam. 7 2/3, alt. 8 mm [h/d=1.04] - Patria? (Coll. Cuming.)".*

EXAMINED MATERIAL. The first faunistic reports of *T. trochlea* date back to Morelet (1853, sub *Helix trochlea* Pfr.) from the promontory of Ippona, Capo di Guardia near Bona [present town of Annaba, author's note], Algeria, and to Bourguignat (1864) who reports four varieties of *Helicella trochlea* Pfeiffer (var. *minor, depressa, fusco-maculata* and *hypozone*) from Bugia [present town of Béjaïa, author's note], Algiers and at Capo di Guardia, near Annaba (Algeria). Bourguignat (1868) also reports it from Tunisia at Kamart (Tunis), in the ruins of Carthage and on the eastern slope of Djebel Ahmar (Tunisia). Specimens with this determination from Annaba are kept in the Löbbecke Museum in Düsseldorf (1868, legit Lischke) and have h/d ratios in the range 0.68-1.04 (mean: 0.86) (Maio, pers. obs.; Figs. 29-31). Kobelt (1877) writes: "This very attractive species represents [=substitutes?] the group of the "*Hel. Caroni*" in Algeria, where it is found in the Provinces of Algiers and Constantine in various points" (Fig. 32). De Saint-Simon (1882) reports specimens of *Helix trochlea* collected at Capo di Guardia, near Bona, of which he examined the radula. Letourneux & Bourguignat (1887) also report it from Tunisia, as well as from Bona, Bugia and Algiers (Algeria). Monterosato (1893) reports *H. trochlea* Pfeiff. from "Algeria a Bona e nel deserto del Sahara (Mouss.)" and *H. speciosa*, Monts. as "nuova forma vicina alla trochlea ma pur distinta" from Salaparuta (Trapani Province) in Sicily (Prof. A. Palumbo).

Wenz (1923) reports this species as a "Pliocen. S. - Diluv." fossil at "Cap de Garde bei Bone" and Joleaud (1936) also reports it as a fossil from Capo di Guardia in the "panchina quaternario antica del

posto". Sacchi (1955a) reports finding specimens of *Helicella (Trochoidea) trochlea* Drap. in Eastern Algeria at Capo Carbon, near Bugia and at Capo di Guardia.

In the L. Pfeiffer collection of the Senckenberg Forschungsinstitut und Naturmuseum in Frankfurt am Main (Germany), there is a specimen reported as "*Helix trochlea* Pf., coll. O. Reinhardt ex Parreyss" from "Sicilia" (h/d=0.81) and nine specimens reported as "*Trochula trochlea* Pf., coll. C. Bout ex H. Rolle" from "Sierra Nevada, Hispania" (h/d=0.72). In the same collection there are other specimens with labels indicating provenance from sites in Algeria and Tunisia (R. Janssen, pers. com.; see Table 3).

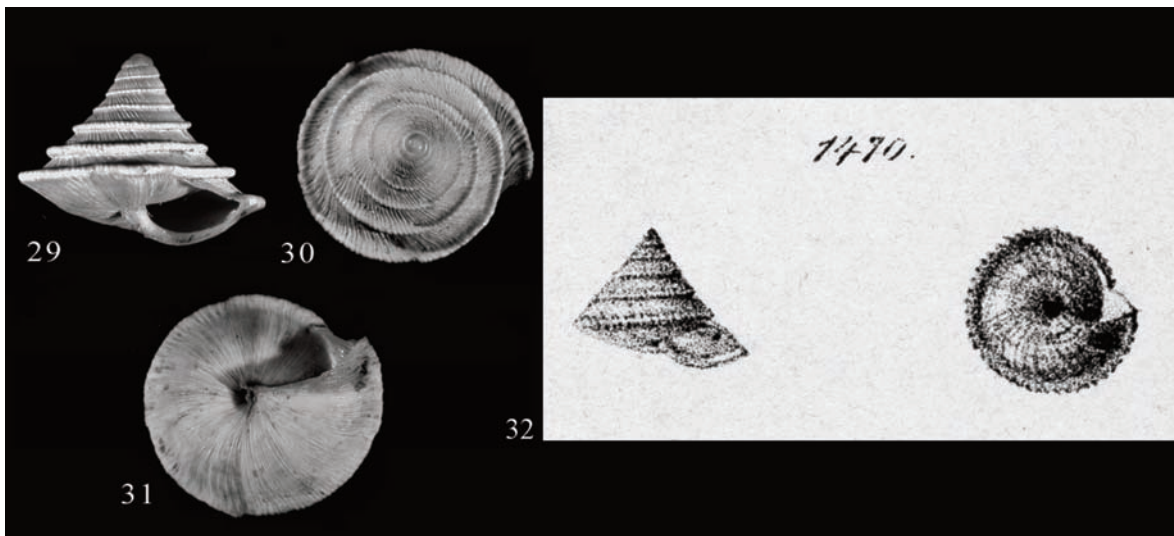
Trochoidea (Trochoidea) elegans (Gmelin, 1791)

ORIGINAL DESCRIPTION. Gmelin, 1791, species no. 229, p. 3642, locus typicus "Barbaria et australi Europa": "*Helix elegans. H. testa pyramidalis alba umbilicata: anfractibus sex acutis planiusculis marginatis. Habitat terrestris in Barbaria et australi Europa.* [Barbaria or Berberia: the Mediterranean coastal area of Barbary and the Barbary States: Tunisia, Algeria and Morocco, author's note]".

EXAMINED MATERIAL. During the present study, some populations with particularly elevated spire were found in the literature. Morphologically very similar to *T. caroni*, they were of uncertain taxonomic attribution. The reports are included to complete the information on this particular group of land snails.

Sacchi (1955a) reports finding specimens of *Helicella elegans* with elevated spire and morphological characteristics very similar to *H. elata* on Ibiza. In the same paper he reports "molto turricolate" forms of *H. elegans* from Tunis and specimens of *Helicella (Trochoidea) elegans* stated to belong to "forme assai alte di spira" from Southern France. Sacchi (1954, 1955a) does not exclude the hypothesis of the presence of turricolate forms in the Balearic Islands, though he considers them the result of geographical isolation of populations of *H. elegans* (reported, moreover, by Bofill I Poch & D'Aguillar-Amat (1924) as *Helix (Trochula) elegans*).

Two historical reports of *T. elegans* by Rossmässler (1837, Tafel XXVI, Fig. 345, sub *H. elegans* Gm.) and by Aradas & Maggiore (1840: specie LXVI, Elice elegante *H. elegans* Gm) from Sicily



Figures 29-31. Shell of *Trochoidea trochlea* from Annaba (Algeria), Löbbecke Museum, Düsseldorf, Germany, height 8.1 mm, diameter 10.2 mm: apertural view (Fig. 29), umbilical view (Fig. 30), apical view (Fig. 31). Figure 32. Figure n. 1470 of *Helix trochlea* from plate 146 in Kobelt (1877).

are also noteworthy. In particular, the latter authors write: “Rara: gli esemplari che possediamo ci son pervenuti da Palermo ad eccezione di un solo ritrovato nella plaia di Catania. Diam. lin. [Linea siciliana (o linia) = 1.79234583 mm] 5 ½ [= 9.86 mm], altezza lin. 2 ½ [= 4.48 mm] (h/d: 0.46). Coll. (A.G.) [= Abate Emiliano Guttadauro?]”. Philippi (1836) also reports it with the name *Carocolla elegans* Lamk. from Palermo and Pantelleria Island. The same citation is repeated by Monterosato (1893) with the comment “Non è stato più ritrovata, né credo si trovi”.

DISCUSSION

On the basis of the data collected, the current distribution of *T. caroni*, limited to Capri and Sicily (Manganelli et al., 1995), proves to be much wider (Fig. 33). In peninsular Italy, new sites of collection are in fact reported: one at Terracina with live specimens, one at Spigno Saturnia with many fresh empty shells, one in Sorrento with two empty shells of juveniles, one at Castagneto Carducci with a shell of an adult specimen, one at Manfredonia with a shell in a museum collection, dating to 1878, and a bibliographic specimen from Ischia, dating to 1822–1830. It is also important to mention the reports by Statuti (1882: Porto Badino and Torre

Olevola near Terracina) and the fossil reports from Capri by Segre (1959) attributed by him to the Lower Pleistocene, when Capri was joined to the Sorrentina peninsula (Barattolo et al., 1992; Capasso Barbato & Gliozzi, 1995). This report therefore demonstrates the ancient presence of the species on the island of Capri.

Of similar interest is the finding of fossil specimens on Malta, which may demonstrate colonisation from Sicily during the Quaternary (Giusti et al., 1995; Hunt, 1997; Kolouch, 2003). *T. caroni* may have been present on the island until last century at least, as historical reports from the mid and late nineteenth century suggest (Gulia, 1874; Feilden, 1879).

Reports from North Africa are also interesting but require further confirmation, since local forms of *T. trochlea* or other taxa cannot be excluded.

Reports from the Balearic Islands cannot be verified since the original specimens cited in the papers could not be traced.

In the light of this new data, it is possible to say that the distribution of *T. caroni* is certainly wider than hitherto known, although it is not yet possible to draw conclusions on the origin and spread of this population. Likewise for *T. trochlea* and *T. elegans* with elevated spires, it is impossible to determine the correct systematic, phylogenetic and biogeographic position of the taxa and their effective rela-

tionships with *T. caroni*. The morpho-biometric criterion used to date does not enable clear discrimination between the various populations. *T. trochlea* should have an h/d between 1.14 and 0.70 or lower, *T. caroni* between 1.30 or higher and 0.88 and *T. elegans* between 0.82 and 0.62 or lower. Thus the h/d ratios of the three forms overlap and the same is true of their distributions.

Studies of anatomical characters do not solve the problem. Interestingly, in their times, von Ihering (1892) and Hesse (1934) already observed that the anatomy of specimens of *T. caroni* from Capri was indistinguishable from that of Sicilian specimens. Moreover, Caziot (1908) and Sacchi (1956a) considered that the anatomy of *H. elegans* from Tunisia was identical to that of Sicilian *H. caroni-elata*. Giusti et al. (1995) observed an evident similarity of genital systems between *T. caroni* from Sicily and *T. elegans* from Tuscany and Algeria, sustaining that anatomically, all species of the “*elegans* group” (*T. elegans*, *T. caroni*, *T. spratti* and *T. cumiae*) were indistinguishable.

Sacchi (1955a; 1956b) considers *Helix caroni-elata* and *H. trochlea* valid species, distinct from *H. elegans* by virtue of “their particular geographic distribution” and the “remarkable morphological characterisation” of their shells, even if he views all

these species as a single species complex (“ciclo di forme”). Giusti et al. (1995), too, suggest that these species probably all belong to a hypothetical “superspecies” or “species group”, the validity of which has yet to be confirmed.

According to Liggia (2013), *T. trochlea* Pfeiffer 1846 is synonymous with *T. elegans* (Gmelin 1791), but the site does not provide sources or other references for this conclusion.

Conservation status

In the Red List of the International Union for the Conservation of Nature (IUCN), version 2013.1. (Falkner et al., 2011), the status of *T. caroni* is classified as “LC” (Least Concern) or “lowest risk, not endangered or low risk”. In the Red List of the 27 countries of the European Union it is classified as “LC” and is considered a “European endemic species” (Cuttelod et al., 2011). *T. elegans* is also classified as “LC” by the IUCN (Gargominy, 2011) and in the European Red List it is considered a “European endemic species” (Cuttelod et al., 2011). In view of the extreme localisation of currently known populations of these species, we think they are near threatened and worthy of protection at regional and national level.



Figure 33. Sites of finding of *Trochoidea caroni* in the Western Mediterranean.

Species	Localities	Collection	Collector, date, name reported
<i>T. elegans</i>	Spagna: Sierra Nevada	Slg. C. Bout ex H. Rolle	As <i>T. trochlea</i>
<i>T. trochlea</i>	Algeria	Slg. W. Kobelt	
<i>T. trochlea</i>	Algeria: Maskara	Slg. W. Kobelt	
<i>T. trochlea</i>	Algeria: Oran	Slg. Rossmässler	ex Terver 1944
<i>T. trochlea</i>	"Sicilia"	Slg. O. Reinhardt	ex Parreys
<i>T. trochlea</i>	Algeria: Cape de Garde, Constantine	Slg. Jetschin	ex G. Schneider 1881
<i>T. trochlea</i>	Algeria: Bona	Slg. Jetschin	ex O. Stoll 1899 ex R. Mousson
<i>T. trochlea</i>	Algeria: Bône [Cap de Garde]	Slg. Jetschin	ex Kobelt 1887
<i>T. trochlea</i>	Algeria: Bône	Slg. Jetschin	ex M. Braun 1887
<i>T. trochlea</i>	Tunisia: "Umgebung von Tunis"	Slg. O. Reinhardt	ex ? 5.1891
<i>T. trochlea</i>	Algeria: Bône, Cap de Garde	Slg. W. Kobelt	
<i>T. trochlea</i>	Tunisia: "SW Biserta bei la Pêcherie am See von Biserta"	Slg. H. Kaltenbach 15.3.1956	
<i>T. trochlea</i>	Tunisia: "Paßhöhe s. Biserta von Tunisaus"	Slg. H. Kaltenbach 14.3.1956	
<i>T. caroni</i>	Is. Capri	Slg. C. R. Boettger 1906	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. K. L. Pfeiffer 1928	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. J. Blum 3.1891	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. W. Kobelt 1878	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri: Mte. Solaro	Slg. K. L. Pfeiffer 1928	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri		ex Fitz-Gerald 1878 as <i>T. elata</i>
<i>T. elata</i>	Napoli	Slg. C. Bosch ex H. Rolle	As <i>T. elata</i>
<i>T. caroni</i>	S-Italia: Manfredonia	Slg. W. Kobelt 1878	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. S. H. Jaeckel	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. H. Kaltenbach ex O. Schmidt	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. Jetschin	ex Rousseau 1901 as <i>T. elata</i>
<i>T. caroni</i>	Is. Capri: M.te Solaro	Slg. Schlickum 19.8.1956	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. W. Kobelt	ex Heynemann as <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. Jetschin	ex Kobelt 1880 as <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. Ehrmann	4.1894 as <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. L. Henrich	As <i>T. elata</i>
<i>T. caroni</i>	Is. Capri	Slg. H. Kaltenbach ex O. Schmidt	ex A. Köhler 1906 as <i>T. elata</i>
<i>T. caroni</i>	Sicilia	Slg. Rossmässler	ex Philippi as <i>T. elata</i>
<i>T. caroni</i>	Sicilia	Slg. O. Reinhardt	ex Parreys as <i>T. elata</i>
<i>T. caroni</i>	Sicilia	Slg. O. v. Moellendorff	As <i>T. elata</i>
<i>T. caroni</i>	Sicilia	Slg. Rossmässler	ex Hueb du Pavillon as <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Trapani	Slg. S. H. Jaeckel	As <i>T. elata</i>
<i>T. caroni</i>	Sicilia: San Vito	Slg. K. L. Pfeiffer 1930	As <i>T. elata</i>

Table 3. Faunistic data of *Trochoidea* sp. della "Collezione L. Pfeifer" of the Senckenberg Forschungsinstitut und Naturmuseum (R. Janssen, pers. com.) of Frankfurt am Main, Germany.

Species	Localities	Collection	Collector, date, name reported
<i>T. caroni</i>	Sicilia	Slg. Jetschin	ex Linnaea 1885 as <i>T. elata</i>
<i>T. caroni</i>	Sicilia		ex Parreyss as <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Trapani	Slg. K.L.Pfeiffer ex K. Henschel 1890	As <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Palermo	Slg. C. Bosch ex H. Rolle	As <i>T. elata dilatata</i>
<i>T. caroni</i>	Sicilia: M.te San Giuliano	Slg. K. L. Pfeiffer 1930	As <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Trapani-Marsala	Slg. K. L. Pfeiffer 1930	As <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Trapani	Slg. Jetschin	ex Caruana Gatto as <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Trapani	Slg. Jetschin	ex Kobelt 1880 as <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Sferracavallo near Palermo	Slg. W. Kobelt 1878	As <i>T. elata</i>
<i>T. caroni</i>	Sicilia	Slg. W. Kobelt	ex Benoit as <i>T. elata</i>
<i>T. caroni</i>	Sicilia	Slg. Rossmässler	ex Ziegler as <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Calatafimi	Slg. W. Kobelt	ex Monterosato as <i>T. elata</i>
<i>T. caroni</i>	Sicilia: Trapani	Slg. W. Kobelt 1878	As <i>T. elata</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. Rossmässler	ex Philippi as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. W. Kobelt	ex Westerlund as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. O. Reinhardt	ex Parreyss as <i>T. elata caroni</i>
<i>T. elata</i>	[Sicilia]	Slg. Knotte	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. O. Boettger	ex C. Koch as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. K. Harhagen	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. O. v. Moellendorff	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. A. Gyssea	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. W. Kobelt	ex Benoit as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Mte. Pellegrino near Palermo		ex ? 4.1889 as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. S. H. Jaeckel	ex Scholtz as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. G. Nägele ex Monterosato 1897	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. G. Nägele	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo		ex ? As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo		ex Linnaea 1883 as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Sferracavallo near Palermo	Slg. S. H. Jaeckel 4.1935	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. Jetschin	ex Wohlberedt 1903 as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. Th. Krüper	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. H. Kaltenbach	ex A. Köhler as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia	Slg. Jetschin	ex Zellweger as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: near Palermo	Slg. Jetschin	ex Kobelt 1880 as <i>T. elata caroni</i>

Table 3. Faunistic data of *Trochoidea* sp. della "Collezione L. Pfeiffer" of the Senckenberg Forschungsinstitut und Naturmuseum (R. Janssen, pers. com.) of Frankfurt am Main, Germany.

Species	Localities	Collection	Collector, date, name reported
<i>T. elata</i>	Sicilia: Palermo	Slg. W. Kobelt	ex Monterosato as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo, San Polo	Slg. Jetschin	ex A. Bofill 1900 as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Sferracavallo near Palermo	Slg. H. Kaltenbach ex A. Köhler 1913	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. C. Bosch ex H. Rolle	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Palermo	Slg. W. Kobelt	As <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia		ex ? as <i>T. elata caroni</i>
<i>T. elata</i>	Sicilia: Sferro Cavallo	Slg. C. Bosch ex H. Rolle	As <i>T. elata caroni</i>

Table 3. Faunistic data of *Trochoidea* sp. della “Collezione L. Pfeiffer” of the Senckenberg Forschungsinstitut und Naturmuseum (R. Janssen, pers. com.) of Frankfurt am Main, Germany.

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