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## LECTOTYPES FOR *TRICOLIA PULLUS*, *GIBBULA DIVARICATA* AND *THEODOXUS FLUVIATILIS* (MOLLUSCA, GASTROPODA) REVISITED

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**Lectotypes for *Tricolia pullus*, *Gibbula divaricata* and *Theodoxus fluviatilis* (Mollusca, Gastropoda) Revisited. Anistratenko V. V.** — During the recent faunal and taxonomic revisions of the Ukrainian marine and freshwater Gastropoda, the lectotypes for some of the species studied have been designated. As the relevant information was published in Russian, its accessibility for the international scientific community is limited. The present communication includes the detailed description of the lectotypes for *Tricolia pullus*, *Gibbula divaricata* and *Theodoxus fluviatilis* and additional taxonomic remarks on the species. All lectotype designations are based on black-white photographs of syntypes stored in the Linnaeus collection at the Linnean Society of London (Great Britain). Most important taxonomic characters such as size, outline, spire angle, apertural size, shape, etc. could be deduced from the figures.

**Key words:** Mollusca, Gastropoda, lectotype, *Tricolia pullus*, *Gibbula divaricata*, *Theodoxus fluviatilis*.

**Еще раз о лектотипах *Tricolia pullus*, *Gibbula divaricata* и *Theodoxus fluviatilis* (Mollusca, Gastropoda). Анистратенко В. В.** — В результате недавней фауно-таксономической ревизии морских и пресноводных Gastropoda Украины, в частности, обозначены лектотипы нескольких изученных видов. Поскольку эти материалы были опубликованы на русском языке, их доступность ограничена для зарубежных коллег. Настоящее сообщение содержит детальное переписание лектотипов *Tricolia pullus*, *Gibbula divaricata* и *Theodoxus fluviatilis*, а также дополнительные таксономические замечания по названным видам. Все лектотипы обозначены по фотографическим изображениям раковин синтипов, хранящихся в коллекции К. Линнея Лондонского линнеевского общества (Великобритания). По этим фотографиям можно судить о размерах и форме раковины, вершинном угле, очертаниях устья и других важных таксономических признаках раковин.

**Ключевые слова:** Mollusca, Gastropoda, лектотип, *Tricolia pullus*, *Gibbula divaricata*, *Theodoxus fluviatilis*.

### Introduction

During the faunal and taxonomic revisions of the Ukrainian marine and freshwater Gastropoda (Anistratenko et al., 1999; Anistratenko, Anistratenko, 2001), we designated lectotypes for some of the species studied, e. g. for *Tricolia pullus*, *Gibbula divaricata* and *Theodoxus fluviatilis*. As this information was published in Russian, its accessibility for the international scientific community is limited. In the present paper these lectotypes are revised. Detailed taxonomic remarks on the species are provided as well.

All lectotype designations are based on black-white photographs of syntypes stored in the Linnaeus collection at the Linnean Society of London. The photographs were kindly provided by Ms. Kathie M. Way (Collections Manager Division of Invertebrates I, Linnean Society of London) in 1996. Since we have not studied the actual specimens of syntypes, detailed descriptions of color and color patterns cannot be provided. Nevertheless, the most important taxonomic characters such as size, outline, spire angle, apertural size, shape, etc. could be deduced from the figures.

### Family PHASIANELLIDAE Swainson, 1940

There have been several different interpretations of the familial relationships of *Tricolia*, the genus having been referred to in Turbinidae (Woodward, 1851; Thiele,

1929; Hickman, McLean, 1990), in Trochidae (Swainson, 1840; Kobelt, 1879), or even a monogeneric family Tricoliidae (Woodring, 1928; Robertson, 1985; Wilke, 1996) in Trochoidea. We interpret *Tricolia* as a genus of Tricoliinae, following Hickman and McLean (1990), but refer that subfamily to Phasianellidae, following many other authors (Wenz, 1938–1944; Knight et al., 1960; Fretter, Graham, 1977; Poppe, Goto, 1991).

### Genus *Tricolia* Risso, 1826

(= *Phasianella* Lamarck, 1809 part)

Type species (subsequent designation Gray, 1847): *Turbo pullus* Linnaeus, 1758; Recent, East Atlantic, Mediterranean.

There are varying opinions on the systematics and number of living *Tricolia* species. Owing to high variability of shell shape, color and pattern some workers consider that many species remain to be described (Nordsieck, 1973). Other workers recognize only a few polymorphic species, e. g., S. Gofas (1982) who provided an excellent review of the Mediterranean and Eastern Atlantic *Tricolia* species.

*Tricolia* shell color patterns, which some authors consider as important taxonomic characters, are usually described with great subjectivity. The situation remains ambiguous even when fine drawings (e. g., Gofas, 1982) or photographs (e. g., Robertson, 1985) have been used to show the range of variation. Due to extreme variation of colors and patterns we suppose that these features are useless for distinction of species within *Tricolia*.

### *Tricolia pullus* (Linnaeus, 1758) (fig. 1)

Syn.: – *pullus* Linnaeus, 1758: 761, n. 531 (*Turbo*); – *pullus* Linnaeus – Montagu, 1808: 319 (part); – *pulla* Payraudeau, 1826: 140, n. 218 (*Phasianella*) (part); – *punctata* Risso, 1826: 122 (*Tricolia*); – *pulchella* Recluz – Bucquoy, Dautzenberg, Dollfus, 1884: 339, pl. 39, fig. 18 (*Phasianella pullus* (L.) var.); – *pontica* Milaschewitsch, 1909: 311 (*Phasianella*); – *pontica* – Milaschewitsch, 1916: 25, pl. 1, fig. 10–12 (part); – *pontica* Milaschewitsch – Grossu, 1956: 55, fig. 22 (*Tricolia*) (part); – *pulla* (L.) – Golikov, Starobogatov, 1972: 81, pl. 1, fig. 10 (*Tricolia*) (part); see Gofas (1982) for further detailed synonymy.

**Distribution.** Eastern Atlantic, and Mediterranean basin, including all shores of the Black Sea (Payraudeau, 1826; Hanley, 1855; Bucquoy et al., 1882–1886; Milaschewitsch, 1916; Kaneva-Abadjieva, 1959; Golikov, Starobogatov, 1972; Gofas, 1982; Anistratenko, Starobogatov, 1991; Wilke, 1996). *Tricolia pullus* is also known from the Sea of Azov, though so far only empty shells have been seen (our collection).

**Remarks.** In the literature there are two versions of the species name spelling: “*pulla*” or “*pullus*”. In the opinion of Ya. I. Starobogatov, the species name can be considered both as a noun and an adjective. The Latin noun “*pullus*” denotes “a young fowl” whereas the adjective means “dirty”. In the first case the coordination of the grammatical gender with the generic name “*Tricolia*” would not be necessary and the species epithet is kept in the form selected by Linnaeus – “*pullus*”. In the second case, coordination is necessary and the species name would become “*pulla*”. We consider the species name to be derived from a noun and therefore retain the spelling introduced by Linnaeus – *Tricolia pullus*.

Despite various interpretations of intraspecific variation, we support the opinion that in Mediterranean and Eastern Atlantic there are rather numerous more or less similar but distinct species of *Tricolia* (Payraudeau, 1826; Hanley, 1855; Bucquoy et al., 1882–1886; Milaschewitsch, 1916; Kaneva-Abadjieva, 1959; Golikov, Starobogatov, 1972; Gofas, 1982; Poppe, Goto, 1991 and others): at least four in the Mediterranean basin alone.

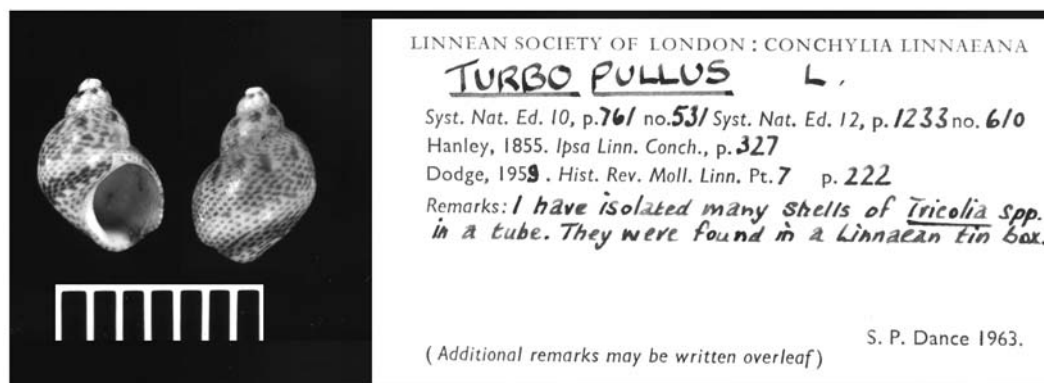


Fig. 1. Lectotype of *Tricolia pullus*, with the label of the Linnean Society of London.

Рис. 1. Лектотип *Tricolia pullus*, с этикеткой Лондонского линнеевского общества.

As *Tricolia pullus* has been regarded as a composite species (Anistratenko, Starobogatov, 1991), until now we considered the shell of “*Turbo pullus* L.” figured by H. Donovan (1799, pl. 2, fig. 6) as true *T. pullus* sensu Linnaeus. The image of this shell, according to the evidence of Hanley (1855), who revised part of the Linnaeus collection, exactly corresponds to specimens in the collection. Possible syntypes of *Turbo pullus* have been reported by H. Dodge (1959), who stated that these are the only shells in the collection that conform to the original description (Linnaeus, 1758). In the interests of nomenclatural stability, V. Anistratenko and O. Anistratenko (2001) selected and designated a lectotype for *Turbo pullus* (fig. 1). Because numerous syntypes exist we are not sure if this is the specimen illustrated by E. Donovan. This designation is very important because the original description can be applied to almost any of the Mediterranean or East Atlantic *Tricolia* species: “*Turbo pullus*, n. 531: testa imperformata ovata laevi, apertura antice diducta. Habitat in Mediterraneo” (Linnaeus, 1758: 761).

#### Family TROCHIDAE Rafinesque, 1815

According to the classification suggested by J. Knight et al. (1960), the subfamily Gibbulinae Stoliczka, 1868 comprises over 10 genera, among them *Gibbula* Risso, 1826 with about 20 subgenera, including *Steromphala* Gray, 1847. Similarly, Hickman, McLean (1990) classified *Gibbula* (with all assigned subgenera) in tribe Gibbulini, within subfamily Trochinae. We treat *Gibbula* and *Steromphala* as taxa of subfamily Gibbulinae in family Trochidae (Anistratenko, Starobogatov, 1991).

#### Genus *Gibbula* Risso, 1826

##### Subgenus *Steromphala* Gray, 1847

Type species (original designation Gray, 1847): *Trochus cinerarius* Linnaeus, 1758; Recent, East Atlantic, Mediterranean.

In our previous publications (Anistratenko, Starobogatov, 1991; Anistratenko, 1998; Anistratenko, Anistratenko, 2001) *Steromphala* is interpreted as an independent genus of Trochidae. This opinion was based mainly on the fact that shell characters of type species of *Gibbula* (*Trochus magus* Linnaeus, 1758) are quite different from those of *Trochus cinerarius* Linnaeus, 1758, the type species of *Steromphala*. The differences mentioned were considered as sufficient for separating the taxa at generic level. At the same time we had insisted that conchological differences between *Trochus magus* and *Trochus albidus* Gmelin in Linnaeus, 1791 (the latter type species of *Adriaria*

Monterosato in Pallary, 1917) are not sufficient to consider these taxa as a separate genera (Nordsieck, 1968) or even subgenera (Knight et al., 1960).

Recently we compared radulae of *Gibbula albida* and "*Steromphala*" *divaricata* from the Black Sea (Crimean shore near Sevastopol'). Our observations revealed that the main characters studied are very similar and even the nature and degree of polymorphism is the similar. Accordingly we now consider that *Steromphala* is no more than a subgenus of *Gibbula*.

***Gibbula (Steromphala) divaricata* (Linnaeus, 1758) (fig. 2)**

Syn.: – *divaricatus* Linnaeus, 1758: 758, n. 513 (*Trochus*); – *lessonii* Payraudeau, 1826: 139, pl. 7, fig. 3, 4 (*Monodonta*); – *divaricata* (L.) – Milaschewitsch, 1916: 21, pl. 1, fig. 7–9 (*Gibbula*).

**Distribution.** Eastern Atlantic and Mediterranean basin including all shores of the Black Sea (Payraudeau, 1826; Hanley, 1855; Bucquoy et al., 1882–1886; Milaschewitsch, 1916; Kaneva-Abadjieva, 1959; Golikov, Starobogatov, 1972; Anistratenko, Starobogatov, 1991; Wilke, 1996).

**Remarks.** Taking into account the fact that there are several similar species of *Gibbula* in the Mediterranean basin and Eastern Atlantic (Bucquoy et al., 1882–1886; Milaschewitsch, 1916; Kaneva-Abadjieva, 1959; Golikov, Starobogatov, 1972; Anistratenko, Starobogatov, 1991; Poppe, Goto, 1991; Wilke, 1996) and considering the interests of stability of the nomenclature, V. Anistratenko, O. Anistratenko (2001) selected and designated the lectotype for *Trochus divaricatus*. The photograph (fig. 2) shows eight syntypes of *Trochus divaricatus* from the Linnaeus collection. Some of these specimens are undoubtedly immature individuals, whilst others have a more or less clear disjunction of the last two whorls. The latter phenomenon has already been reported and figured in literature e. g. by B. Payraudeau (1826, pl. 7, fig. 3, 4), E. Bucquoy et al. (1884, pl. 46, fig. 15–22) and others. The selected specimen is a mature individual without clear disjunction (fig. 2, arrowed). The other seven shells are paralectotypes (Art. 74, ICZN, 1999).

We note that disjunction of some latter whorls in is quite frequent in Black Sea populations of *Gibbula divaricata*, whereas in populations of *Gibbula crimeana*, which inhabits the Black Sea almost always together with the former species, no reliable case of shell disjunction has been reported (Anistratenko, Starobogatov, 1991).

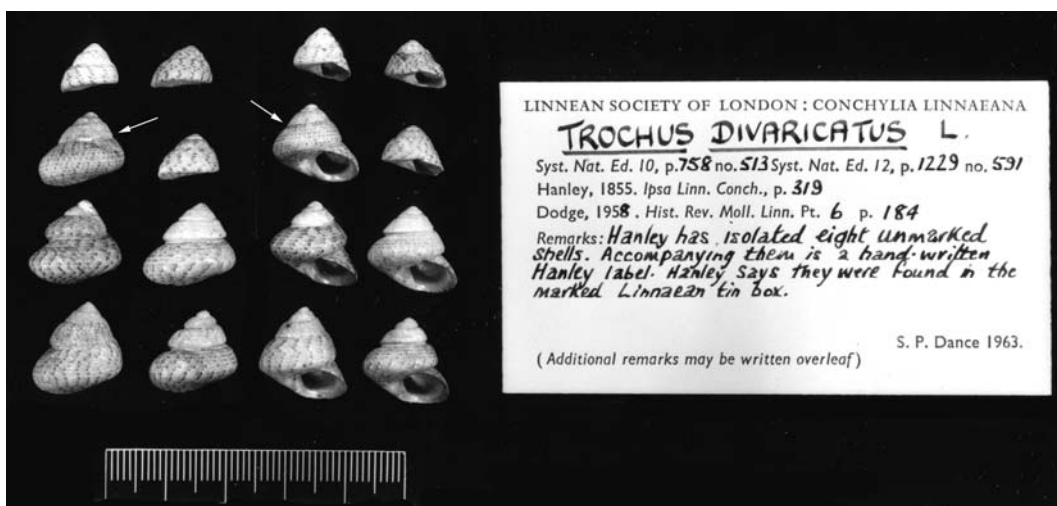


Fig. 2. Lectotype (indicated by arrows) and paralectotypes of *Gibbula divaricata*, with label.

Рис. 2. Лектотип (указан стрелкой) и паралектотипы *Gibbula divaricata*, с этикеткой.

Designation of a lectotype allows confident identification of *Gibbula divaricata*. This is important because the original description of the species could be applied to almost any of the Mediterranean or East Atlantic *Gibbula* species: “*Trochus divaricatus*, n. 513: testa subumbilicata ovata: anfractu infimo remotiore, umbilico subconsolidato. Habitat in Mediterraneo. testa viridis, fasciata punctis sanguinensis Anfractus... erusus aperturam magis removus i reliqua spira” (Linnaeus, 1758: 761).

#### Family NERITIDAE Rafinesque, 1815

Recently, the subfamily Theodoxinae was established in Neritinae (Bandel, 2001). In our opinion, it is quite justifiable to separate the taxa that retain a fully marine planktotrophic larva from those that have entered the fresh water with the larval stage abolished due to nurse egg feeding (Theodoxinae Bandel, 2001); the later subfamily unites species related to *Theodoxus*.

#### Genus *Theodoxus* Montfort, 1810

Syn.: *Elea* Fitzinger, 1833 (obj.); *Neritoglobus* Kobelt, 1871 (obj.); *Theodoxia* Bourguignat, 1877 (obj.)

Type species: *Nerita fluviatilis* Linnaeus, 1758; Recent, Europe, Western Asia (ICZN, Opinion 335, 1955).

Over 10 subgenera are recognized in this genus (Wenz, 1938–1944; Knight et al., 1960). Despite some excellent recent surveys (Jekelius, 1944; Bandel, 2000, 2001), taxonomy of fossil and recent *Theodoxus* remains extraordinarily complicated, disputable and requires further investigation.

#### *Theodoxus fluviatilis* (Linnaeus, 1758) (fig. 3, 4)

Syn.: – *fluviatilis* Linnaeus, 1758: 777 (*Nerita*); – *fluviatilis* (L.), Westerlund, 1886: 149 (*Neritina*); – *brauneri* Lindholm, 1908: 217 (*Neritina*); – *lacrymans* Lindholm, 1908: 217 (*Neritina brauneri* forma); – *alboguttata* Lindholm, 1908: 217 (*Neritina brauneri* forma); – *pulherrima* Lindholm, 1908: 217 (*Neritina brauneri* forma); – *fluviatilis* (L.) – Zhadin, 1952: 206 (*Theodoxus*).

**Distribution.** Europe and Western Asia (Lindholm, 1908; Zhadin, 1952; Golikov, Starobogatov, 1972; Anistratenko et al., 1999; Bandel, 2001). Although locality from what *Nerita fluviatilis* was described exactly is unknown, Bandel (2001) supposed that it probably had originally been defined from individuals that were collected in the Main River in Southern Germany.

**Remarks.** We avoid a formal re-description of this species because we have seen only the photograph of the syntypes (fig. 3, 4), and because it is well-known species with wide polymorphism. *Theodoxus fluviatilis* demonstrates an extremely broad spectrum of colors and patterns as demonstrated by many authors (Jekelius, 1944; Neumann, 1959 a, b; Sheppard, 1959; Bandel, 2001).

Numerous *Theodoxus* species have been described from fresh-water and moderately brackish water bodies in Europe and Western Asia (Recluz, 1841; Lindholm, 1908; Zhadin, 1952; Golikov, Starobogatov, 1972; Poppe, Goto, 1991; Dhora, Welter-Shultes, 1996). At least five species of *Theodoxus* are recognized from the northern part of the drainage system of the Black Sea and the Sea of Azov (Anistratenko et al., 1999). For nomenclatural stability Anistratenko et al. (1999) designated the lectotype for *Nerita fluviatilis* (fig. 3 arrowed, 4). The other five shells are paralectotypes (Article 74 of the International Code of Zoological Nomenclature, 1999).

Designation of the lectotype allows confident identification of *Theodoxus fluviatilis*. This is important, as original description of the given species is quite unspecific and suitable to more than one species of the genus: “*Nerita fluviatilis*, n. 632: testa rugosa, labiis edentilis. Habitat in Europa cataractis” (Linnaeus, 1758: 777). Because we have

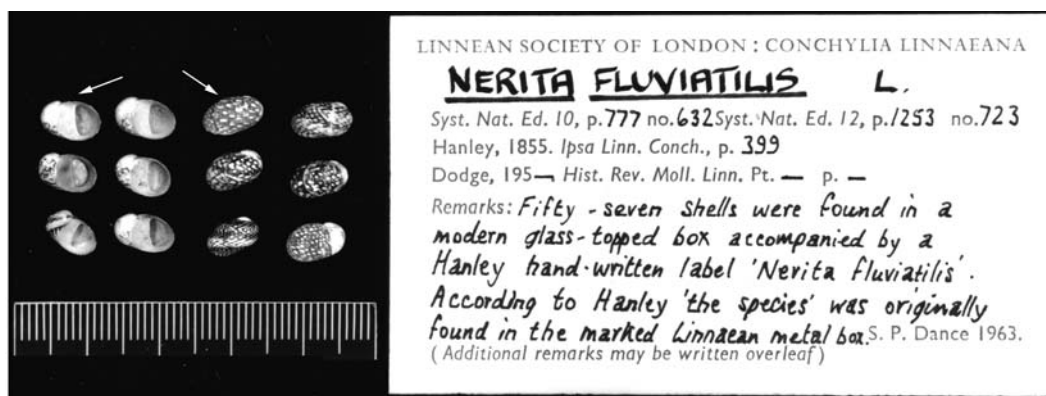


Fig. 3. Lectotype (arrowed) and paralectotypes of *Theodoxus fluviatilis*, with label.

Рис. 3. Лектотип (указан стрелкой) и паралектотипы *Theodoxus fluviatilis*, с этикеткой.

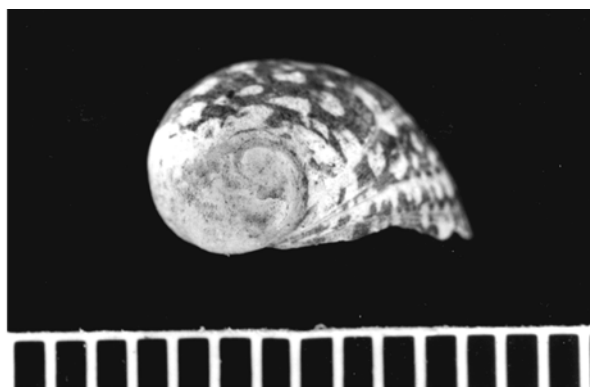


Fig. 4. Lectotype of *Theodoxus fluviatilis* (top view).

Рис. 4. Лектотип *Theodoxus fluviatilis* (вид сверху).

seen only the photograph, we can not say with confidence even whether all the paralectotypes illustrated here are conspecific for *T. fluviatilis*.

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