



**Southern Scientific Centre of the Russian Academy of Sciences
Institute of Arid Zones SSC RAS**

**The Faculty of Geography of M.V. Lomonosov Moscow State University
Biodiversity Center "Naturalis" (The Netherlands)**

EU Horizon 2020-ITN "PRIDE" (Drivers of Pontocaspian Biodiversity Rise and Demise)

WHERE EAST MEETS WEST: Pontocaspia, the historical dimension of the evolution of a unique biodiversity

Abstracts
of the International youth school-conference

**Rostov-on-Don / Kagal'nik, Astrakhan', Russia
August 21 – September 02, 2017**

Rostov-on-Don
SSC RAS Publishers
2017

**CURRENT TRENDS IN TAXONOMY
OF FRESH- AND BRACKISHWATER GASTROPODA
OF THE PONTO-CASPIAN REGION**

M.V. Vinarski

Saint Petersburg State University, Saint Petersburg, Russia
radix.vinarski@gmail.com, m.vinarsky@spbu.ru

**СОВРЕМЕННЫЕ ТЕНДЕНЦИИ В СИСТЕМАТИКЕ ПРЕСНОВОДНЫХ
И СОЛОНОВОДНЫХ БРЮХОНОГИХ МОЛЛЮСКОВ
ПОНТО-КАСПИЙСКОГО РЕГИОНА**

М.В. Винарский

Санкт-Петербургский государственный университет, Санкт-Петербург, Россия

The general aim of my contribution is to outline the current situation with assessment of taxonomic diversity of fresh- and brackishwater snails (Gastropoda) in the Ponto-Caspian region (the region is restricted here to lower courses of the rivers of the Azov and northern Black Sea basins as well as the Caspian Sea basin). There are two ways to define the Ponto-Caspian fauna. The first one is to take into consideration all the species living in the region, including taxa widely distributed in Eurasia and numerous invasive species of exotic origin. The second approach is to focus on taxa, whose ranges lie (entirely or mainly) within the borders of the region (=Ponto-Caspian species *sensu stricto*). Here I follow the later definition restricting myself to the systematics of endemic and subendemic species and genera of the studied region. The malacofauna defined in such a manner includes mostly various representatives of the families of branchiate snails such as Hydrobiidae *s. lato*, Neritidae, and Melanopsidae. An interesting and still underexplored part of this diversity is constituted by the aquatic gastropods living in caves of Caucasus. This group includes several genera and more than 15 species of hydrobiid snails, all endemics with very narrow ranges [Palatov & Vinarski, 2015]. The number of pulmonate taxa that may be treated as true Ponto-Caspian endemics is quite low, though there are several species of Planorbidae limited in their distribution to the Caspian Sea.

The history of systematic description of the Recent Ponto-Caspian malacofauna had started more than 220 years ago (S.G. Gmelin, P.S. Pallas), with several significant contributions made during the 19th century (works by Eichwald, von Baer, Grimm, W. Dybowski, Andrusov). Our current taxonomic knowledge

of fresh- and brakishwater snails of the region is based chiefly on large revision works published in the 1960s-1970s [Golikov & Starobogatov, 1972 for the Black Sea; Logvinenko & Starobogatov, 1966, 1968 for the Caspian Sea]. Recently, large contributions were made by Ukrainian malacologists led by V. Anistratenko [Anistratenko, Stadnichenko, 1995; Anistratenko, Anistratenko, 2001; Anistratenko, 2007, 2013; Anistratenko et al., 2011]. M. Son [2007] published a review of non-indigenous aquatic Mollusca of the Northern Black Sea Maritime territory.

In 2016, an updated version of the catalogue of the continental aquatic Mollusca of the ex-USSR area was published [Vinarski, Kantor, 2016]. The authors listed all nominal species of the Ponto-Caspian snails that may serve as a starting point for the future investigations. However, it is utterly impossible to give here more or less exact estimate of diversity of the Ponto-Caspian fresh- and brakishwater Gastropoda at the species and generic level. Simply put, the current state of their systematics may be characterized as a chaotic one. First of all, many nominal species of snails of this region were described on a purely conchological basis and are still known from a very limited number of specimens that prevents their exact delimitation by means of biometrical study. Though there are several publications dealing with anatomical structure of the Ponto-Caspian endemics (for example, [Sitnikova et al., 1992; Sitnikova & Starobogatov, 1998]), the existing keys for species identification are based chiefly on shell characters. I have to note that, in the situation when the extent of intraspecific conchological variation of most species is unknown, such purely conchological keys may be misleading or completely useless. The so called 'comparatorial method' invented by Logvinenko & Starobogatov [1971] and once used intensively for identification of species and description of new taxa of the Ponto-Caspian snails (see, for example, [Anistratenko, 2007]) has recently been strongly criticized as leading to unwarranted splitting of species ([Graf, 2007; Bolotov et al., 2013]; but see objections presented by [Bogatov, 2012, 2013]).

Second, the molecular data are also unavailable for most species of the Ponto-Caspian fresh- and brakishwater snails. The absence of genetic data makes it almost impossible to assess the validity of endemic (morpho-)species and to resolve their true generic placement as well as phylogenetic affinities. Two serious shortcomings may result from it. We actually are not able to reveal the probable extent of the cryptic taxonomic diversity among the Ponto-Caspian gastropods that may be hidden behind apparent uniformity in shell characters of some species. On the other hand, the lack of molecular information may lead to taxonomic inflation due to ranking intraspecific morphs as valid species. Also I wish to highlight that the molecular study of the Ponto-Caspian snails is highly desirable since it may shed more light on evolutionary processes in this basin. High number of

endemic taxa of the genus and species rank living in this area (especially among hydrobiid snails) indicates that extensive processes of adaptive (or, perhaps, non-adaptive; see [Wilke et al., 2010]) radiation may have taken place here in the past. It would be very tempting to study these processes in detail and to compare them with analogous events known to occur in other ancient lake basins of Eurasia (the Baikal and Ohrid lakes, the Miocene lake Steinheim in Germany, the Pliocene Chuskye Lake in Mountain Altai).

At last, the third impediment to taxonomic progress in the field is the nomenclatorial problems concerned with many species of the Ponto-Caspian snails. I mean chiefly such difficulties as the loss of the type series, inadequate and/or incomplete original descriptions, unresolved synonymies and so on.

Thus nobody is able today to say definitely neither how many species of fresh- and brackishwater Gastropoda inhabit the Ponto-Caspian region nor how to name them correctly. The data on geographic and bathymetric distribution of many taxa are also still lacking. All current estimates of species diversity as well as any schemes of biogeographic regionalization based on lists of nominal species (like those lists presented in [Vinarski & Kantor, 2016]) should be considered as very rough, and their scientific importance is rather limited. The situation needs to be improved in the nearest future since the endemic Ponto-Caspian malacofauna is currently threatened with many negative factors including habitats degradation, invasions of alien species, water pollution and some others. Several Ponto-Caspian endemic species of aquatic snails have already been assessed by the IUCN continental mollusks specialist group as vulnerable or critically endangered (see The IUCN Red List of Threatened Species web-site).

I see several ways how to increase the taxonomic awareness of the Ponto-Caspian aquatic snails among zoologists, biogeographers and conservation practitioners. 1. Extensive fieldworks are needed to gain more information about current distribution and abundance of the Ponto-Caspian endemic mollusks. It is especially important for the Caspian endemics, many species of which are still known from a handful of findings. To obtain fresh materials on these species means also to obtain specimens for macroanatomical and molecular genetic studies of these poorly known taxa; 2. The taxonomic revisions of endemic and subendemic genera and groups of higher rank (such as Pyrgulinae) should be carried out on the basis of the 'integrative' approach combining the morphological, molecular, zoogeographic and ecological data; 3. Special studies of intra- and interspecific variation in morphological traits of the Ponto-Caspian snails are desirable to develop reliable and 'user-friendly' identification keys for the use by non-malacologists. As a good example of this kind I would like to cite the identification key for the bivalve species of the Caspian Sea published several years ago (Kijashko in [Bogutskaya et al., 2013]).

As a conclusion, I wish to stress that efforts of a single nation are far from enough to complete the systematic description of the Ponto-Caspian malacofauna in accordance with the modern scientific standards. International collaborations such as PRIDE are strongly needed to form the team of experts in various branches of sciences (morphologists, taxonomists, molecular geneticists, paleontologists) working in different countries able to finish the process started more than 200 years ago by the first explorers of malacological diversity of the Azov, Black, and Caspian seas.

This study was partially funded by the Russian Fund for Basic Research (project No. 14-04-01236_a) and by the President of Russia Grant Council (project No. MD-2394.2017.4).