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Distribution and zoogeographical characteristics of mollusks (Mollusca) from Bulgarian national parks

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Abstract. A total of 132 species of mollusks have been reported from Bulgarian National Parks. They belong to 72 genera, 31 families and 4 orders of the classes Gastropoda and Bivalvia. The largest number of species have been established in Central Balkan National Park – 90, followed by Pirin National Park – 87 and Rila National Park – 57 species. It is assumed that about 70% of the species in the protected areas are known. The most numerous are the families Clausiliidae (16 species) and Zonitidae (18 species). The species are divided into 31 zoogeographical categories, combined into 3 groups. A total of 33 endemics, 10 relicts and 16 rare species have been established. Sixty species have conservation significance, of which 8 are of world importance. A great part of the parks territory remains unexplored.

Key words: Mollusca, National Parks, Bulgaria, faunistic composition, zoogeography

Introduction

Despite the prolonged investigations, the level of study of the mollusks in the Bulgarian National Parks (Central Balkan, Rila and Pirin) remains insufficient. The published data are fragmentary and do not present malacofauna as a whole. The differences in the number of species in the separate park regions are considerable. They are related to the places visited as tourist sites or accessible to transport. There is a lack of malacological information from large territories of the parks. The popularity of the three parks, especially after the inclusion of Central Balkan and Rila national parks in the system of PAN Parks, calls for updating of the available information and a comparative review of their fauna as well.

The aim of this study is to collect all published data on the species composition and to present vertical distribution, zoogeographical character and conservation significance of the malacofauna in the Bulgarian national parks.

Review of the investigations

Central Balkan. There is a lack of malacological research related to the Stara Planina Mts. but 23 works include data for the territory of the Central Balkan National Park or its vicinities (WAGNER, 1927; URBANSKI, 1960, 1967, 1969, 1977; URBANSKI & WIKTOR, 1967;

PINTER, 1968; DAMJANOV & PINTER, 1969; HUDEC & VAŠATKO, 1971; ANGELOV, 1972, 2000; DAMJANOV & LIKHAREV, 1975; WIKTOR, 1977, 1983; BOETERS et al., 1989; RIEDEL, 1996; IRIKOV, 2006). The authors who have published catalogues of the Bulgarian cave fauna have contributed to the research of the mollusks as well (GUÉORGUIEV & BERON, 1962; BERON & GUÉORGUIEV, 1967; BERON, 1972, 1994). The conservation significance of the malacofauna in the Central Balkan National Park is scrutinized by POPOV et al. (2000) and DELCHEV et al. (2000a). In these two works, many subspecies requiring a current revision are included.

A big part of the park's territory is poorly investigated – especially the areas from Dobrila Peak to Kostenurkata Peak and Botev Shelter and from Rusaliyski Pass to Mazalat Hut and Triglav massif. These regions are visited rarely, include separated massifs and the karst is poorly revealed there.

Rila. There are no data concerning Rila Mt. in particular, but 28 publications refer to the territories included in the Rila National Park or its vicinities. Data for the terrestrial gastropods are reported by IURINITSH (1908), WAGNER (1927), WAGNER (1934), PETRBOK (1941), DRENSKY (1947), JAECKEL (1954a, 1954b), JAECKEL et al. (1957), URBANSKI (1960, 1964), RIEDEL (1967, 1969, 1975), URBANSKI & WIKTOR (1967), DAMJANOV & PINTER (1969), SMARDA et al. (1969), HUDEC & VAŠATKO (1971), DAMJANOV & LIKHAREV (1975), NORDSIECK (1977), WIKTOR (1977, 1983, 1987), KÖRNIG (1983), BOETERS et al. (1989). Data for the water mollusks are reported in the works of VALKANOV (1932, 1934), ANGELOV (1960, 1976, 2000) and HUBENOV (2006). The conservation significance of the malacofauna in the Rila National Park is discussed by DELCHEV et al. (2000b). The data in these publications are fragmentary and do not present the malacofauna as a whole. About half of the park's territory is poorly investigated and there is a lack of malacological information for Skakavishko and Arizmanishko Ridge in general.

Pirin. The first data for the mollusks of Pirin Mt. are reported by WAGNER (1927), WAGNER (1934) and PETRBOK (1941, 1948). Data for the water mollusks are known from the studies of VALKANOV (1932, 1934), ANGELOV (1976, 2000) and HUBENOV (2006). Data for the terrestrial mollusks are published by JAECKEL (1954a, 1954b), RIEDEL (1957, 1963, 1967, 1969, 1972, 1975, 1978), BERON & GUÉORGUIEV (1967), URBANSKI (1964, 1978), HUDEC & VAŠATKO (1971, 1973), DAMJANOV & LIKHAREV (1975), KÖRNIG (1983), NORDSIECK (1973, 1974), WIKTOR (1983, 1987, 1997), BOETERS et al. (1989); BERON (1994), DEDOV & MITOV (1998), DEDOV (1998) and HUBENOV (2005). The data are fragmentary, concern separate parts of the mountain massif and are scattered in different articles which do not specially refer to Pirin. Most data come from the territories included in popular tourist routes. The study of DEDOV & MITOV (1998) refers to gastropods in the coniferous and alpine zone of Pirin. It is the result of a long-term research and contains data for 23 species from 2 mountain regions – the valley of Banderitsa River with Vihren Peak massif and the surroundings of Sinanitsa Peak. The investigations of the mollusks in the park's territory are insufficient. This applies to the karst part of North Pirin northwest of Kamenititsa Peak and the regions in the silicate mountain's part that are not near to tourist routes.

Investigated regions, material and methods

The three parks include from 3 to 4 altitude zones and 4 vegetation belts each[1]: Central Balkan National Park (716 km^2, 500-2376 m a.s.l.) – 4 altitude zones and 4 vegetation belts; Rila National Park (810 km^2, 800-2925 m a.s.l.) and Pirin National Park (403 km^2, 1000-2915 m a.s.l.) – 3 altitude zones and 4 vegetation belts each. However, the karst forms are well developed in Central Balkan and Pirin national parks, whereas in Rila National Park they are almost absent.

Data for the mollusks in the Bulgarian national parks and their neighbouring territories are generalized in this paper. Mollusks from 2 classes (Gastropoda and Bivalvia) are presented. The current review is based mainly upon reported data. Information for some species from the collections of the National Museum of Natural History in Sofia has been included as well.

The vertical distribution of the species includes only parks and begins with the lowest park territory for the corresponding species. To compare the malacofauna, Czekanowski-Dice-Sörensen coefficient of similarity was used. Zoogeographical categorization of the species was done on the basis of current data on their distribution. To classify the areas, some principles from papers by MALICKY et al. (1983), GORODKOV (1984) and VIGNA TAGLIANTI et al. (1999) were used.

The ecological data come from Bulgarian malacological literature. The conservation value of taxa is determined in terms of their populations which inhabit Bulgaria. For local endemics, 100 % of their populations are localized in Bulgaria, therefore they are given the highest conservation category (world importance). This category also includes regional endemics because of their restricted distribution and species from the IUCN Red List. Taxa of European importance include Balkan endemics and subendemics as well as species from ESC Red List, Bern Convention, Habitats Directive and CORINE lists. Relicts and rare taxa (if not listed under other category) form the group of national importance.

Abbreviations used: Distribution: CB – Central Balkan National Park; **P** – Pirin National Park; **R** – Rila National Park; **?** – species, established around the park boundaries; **??** – questionable species in Bulgaria.

Zoogeographical categories: **am** – Atlantomediterranean; **ban** – Balkan-Anatolian; **cee** – Central and East European; **cse** – Central and South European; **csean** – Central and South European-Anatolian; **csee** – Central and Southeast European; **cseean** – Central and Southeast European-Anatolian; **des** – Disjunct Eurosiberian; **e** – European; **ean** – European-Anatolian; **Eb** – Balkan endemic; **Ebg** – Bulgarian endemic; **Ebs** – Balkan subendemic; **eca** – European-Central Asian; **El** – local endemic; **Er** – regional endemic; **et** – European-Turanian; **h** – Holarctic; **hes** – Holoeurosiberian; **hm** – Holomediterranean; **hp** – Holopalearctic; **kb** – Carpathian-Balkan; **mca** – Mediterranean-Central Asian; **mo** – montane; **mom** – Montane Mediterranean; **nem** – Northeast Mediterranean; **nm** – North Mediterranean; **nmca** – North

[1] According to relief vertical segmentation, the territory of Bulgaria includes 5 zones (GALABOV, 1966; 1982; SIMEONOV & TOTZEV, 1997; STEFANOV, 2002): 1) Lowlands – up to 200 m a.s.l.; 2) Hills – from 200 to 600 m a.s.l.; 3) Low mountains – from 600 to 1000 m a.s.l.; 4) Middle mountains – from 1000 to 1600 m a.s.l.; 5) High mountains – above 1600 m a.s.l. The vegetation in Bulgaria is differentiated in a system of 6 vegetation belts (STOYANOV, 1966; VELCHEV et al., 1982, 1989; VELCHEV & TONKOV, 1986): 1) xerothermic oak forests – up to 600-700 m a.s.l.; 2) mesophilic and xeromesophilic oak-hornbeam forests – from 600-700 to 900-1000 m a.s.l.; 3) beech forests - from 900-1000 to 1500-1600 m a.s.l.; 4) coniferous forests – from 1300-1600 to 2000-2200 m a.s.l.; 5) sub-alpine vegetation – from 2000-2200 to 2500 m a.s.l.; 6) alpine vegetation – above 2500 m a.s.l.

Mediterranean-Central Asian; **nmt** – North Mediterranean-Turanian; **p** – Pontian; **pat** – Palaearctic-Afrotropical; **pm** – Pontomediterranean; **Rg** – glacial relict; **Rp** – preglacial relict; **se** – South European; **see** – Southeast European; **seean** – Southeast European-Anatolian; **tp** – Transpalearctic; **wces** – West and Central Eurosiberian; **wcp** – West and Central Palearctic; **wes** – West Eurosiberian; **wp** – West Palearctic; ● – occurrence of endemic subspecies.

Ecological data and conservation importance: **α** – α-mesosaprobic; **BC** – Bern Convention; **ca** – calciphilous; **CORINE** – species, included in CORINE lists; **cr** – crenobiont; **E** – European importance; **ESC** – the Red List of threatened animals and plants in Europe; **eu** – eurybiont; **HD** – Habitats Directive; **hd** – hydrophilous; **hg** – hygrophilous; **li** – lithophilous; **me** – mesophile; **N** – national importance; **pe** – pelophilous; **ph** – phytophilous; **po** – potamophilous; **ps** – psammophilous; **r** – rare; **rh** – rhithrophilous; **sw** – stagnant water; **tr** – troglophile; **tx** – trogloxene; **VU** – Vulnerable; **W** – world importance; **x** – xenosaprobic; **xph** – xerophile.

Results and discussion

Until now 132 species of mollusks have been recorded in the Bulgarian national parks. They belong to 72 genera, 31 families and 4 orders of the classes Gastropoda and Bivalvia (Table 1). The largest number of species has been found in the Central Balkan National Park – 90, followed by Pirin National Park – 87 and Rila National Park – 57 species. The lack of karst determines the poorer species composition of the Rila National Park. It is assumed that about 70% of the species composition in the protected areas is known. (Usually when investigating such territories, about 30-40% of the species composition of the poor movable groups, richest in endemics, are established – about 80-110 species). Best represented are the families Zonitidae (18 species), Clausiliidae (16 species) and Helicidae (12 species). Only 8 water species of mollusks have been reported (6 from Gastropoda and 2 from Bivalvia) because of the lack of investigations on water mollusks in the three national parks.

Most of the species have been established in the low mountains and oak-hornbeam forests – 114 (86.4%) in each zone (Table 2). This species composition is related to Central Balkan and Rila since the protected areas in Pirin are above 1000 m a.s.l. In Pirin National Park the great number of species has been found in the middle mountains (80 species, or 91.9%) and beech forests (74 species, or 85.1%). In Rila National Park the known malacofauna (57 species) is reported from the beech forests belt. In the Central Balkan National Park 85 species (94.4%) are found in the beech forests belt as well. Probably the well-expressed karst in Central Balkan and Pirin determines the greater number of common species (51 species) and higher degree of similarity of the malacofauna (69.4%) between the two parks (Table 3). The number of species decreases abruptly in the coniferous forest belt (Table 4) – from 45 to 59 species (65.5 to 78.9%) have been established. This tendency becomes higher in the sub-alpine vegetation belt where some 18 to 25 species have been found (27.7 to 31.6%). The smaller number of species (9 and 11) is established in the alpine belt of Rila Mt. and Pirin Mt. (this belt lacks in the Stara Planina Mts.). Among them only *Macedonica marthae*, *Wladislawia polinskii* and *W. sztolcmani* – local Pirin endemics, are typical for regions over 2000 m a.s.l. It should be noted that these regions are insufficiently investigated.

On the basis of vertical distribution, the established mollusks could be divided into 3 groups: distributed in one vegetation belt (20 species, or 15.2%), distributed in more than one vegetation belt (100 species, or 75.7%) and distributed in all vegetation belts of the parks (12 species, or 9.1%). These groups are largely provisional (especially the first one) and depend on mollusks peculiarities as well as on the level of investigation. Only 4 species with Mediterranean-Central Asian (*Pyramidula rupestris*), European (*Arion subfuscus*), European-Turanian (*Phenacolimax annularis*) and Central and Southeast European (*Lehmannia nyctelia*) distribution were found in all mountain parts (Table 1). The species established above 2000 m a.s.l. (22 species, or 16.7%) are with Holarctic, Holopalearctic, West and Central Palearctic, West Palearctic, European-Turanian, West Eurosiberian, Disjunct Eurosiberian, European, Central and Southeast European-Anatolian, Central and Southeast European, Southeast European and Mediterranean-Central Asian distribution or they are endemics. *Phenacolimax annularis* could be accepted as Montane-Mediterranean species, whereas *Eucobresia diaphana* and *Oxychilus depressus* – as Montane ones. The species *Sphyradium doliolum*, *Chondrina avenacea*, *Ch. clienta*, *Oxychilus glaber*, *O. inopinatus* and *Discus perspectivus* are accepted as montane by some authors (DAMJANOV & LIKHAREV, 1975; SCHILEYKO, 1978, 1984; GROSSU, 1983, 1986, 1987, KERNEY et al., 1983; SCHÜTT, 1996); however they are not established above 1900-2000 m a.s.l. There is a correlation between the horizontal and vertical distribution of the mollusks. Species with wide horizontal distribution often are spread in more altitude zones. This is natural as these species usually are more ecologically flexible.

Zoogeographical categorization of the species (Table 1) was done on the basis of current data about their distribution. Thus the mollusks of the Bulgarian National Parks are divided into 31 zoogeographical categories, combined into 3 large groups; the endemics and relicts are discussed particularly (Table 2).

Species distributed in Palaearctic and beyond it. This group (15 species, or 11.4%) includes 2 zoogeographical categories, the first of which includes 14 Holarctic species. Only *Vertigo antivertigo* – Palaearctic-Afrotropical species (some authors accept it as Palaearctic) belongs to the second category. The group is well represented (60 to 100%) in the three altitude zones (without the high mountain zone) and in forest belts as well. In the sub-alpine zone *Galba truncatula* and *Deroceras laeve* have been established, but other species from this group are also expected to be found there because of their distribution. Representatives of the group have not been found in the zone of alpine vegetation; however 4 species have been established in the high mountain zone. This group is not important for the zoogeographical characteristics of the mollusks because of the small number of species. The group includes from 7.4 to 13.2% (2 to 15 species) of the species composition of the vegetation belts in which its representatives have been established and from 7.0 to 13.8% (4 to 15 species) of the species composition of the altitude zones. It combines mesophile and eurybiont forms, as *G. truncatula* is the only freshwater species. The group is better represented in Central Balkan and Pirin (11-12 species) and poorly represented in Rila (6 species).

Species distributed only in the Palaearctic, but in more than one subregion. A total of 12 species (9.1%) from this group has been established in the three parks. Its character is determined by West Palaearctic species which are the most numerous (4 species, or 3.0%), followed by Holopalaearctic ones (3 species, or 2.3%). The correlation of these categories remains the same in the first 3 vegetation belts. West Palaearctic and European-Central Asian species have not been found in the sub-alpine and alpine belts. Three species – *Phenacolimax*

annularis (European-Turanian with Montane Mediterranean distribution), *Deroceras agreste* (West and Central Palaearctic) and *Pisidium casertanum* (Holopalearctic) have been established in the alpine belt. Two species (16.6%) from the taxa found in all vegetation belts and one species (*Hippeutis complanatus*) from those found only in one belt belong to this group. The prevalent part of the group – 9 species (75.0%) has been established in more than one vegetation belt. It includes from 8.8 to 21.4% (3 to 11 species) of the species composition of the separate vegetation belts and from 8.5 to 12.3% (7 to 11 species) of the species composition of altitude zones. Five of the freshwater species belong to this group (Table 1). The terrestrial forms are mesophile, as *Truncatellina cylindrica* and *Vitrea contracta* are calciphilous. The group is best represented in Pirin (10 species, or 11.5%) and poorly represented in Central Balkan and Rila (5-6 species, or 0.5 to 10.5%).

Species distributed within one Palaearctic subregion. A total of 71 species (53.8%) with Eurosiberian and Mediterranean type of distribution belong to this group. The species with Mediterranean type of distribution are accepted as a broad category and include elements (Submediterranean, Atlantic, Subiranian, Euxinian and Pontian), that could be considered separately as well (GRUEV & KUSMANOV, 1994). There are 49 (37.1%) Eurosiberian species, of which the best represented are the European (14 species, or 10.6%), Central and Southeast European (9 species, or 6.8%) and Southeast European (8 species, or 6.1%). It should be noted that the Southeast European-Anatolian and Southeast European species have a distribution very close to that of the species from the Mediterranean group and their separation is under discussion. There are 37 exclusively European species, of which 27 are found all over Europe and 10 – in its separate areas. The correlation of these categories remains the same in the first 3 vegetation belts. In the high mountain zone West and Central Eurosiberian, European-Anatolian and Central and South European-Anatolian species have not been found. Two European, 2 Central and Southeast European and 1 Carpathian-Balkan species have been established in the belt of alpine vegetation. According to their distribution, it is possible that still one Disjunct Eurosiberian (*Vertigo alpestris*), Central and Southeast European (*Balea biplicata*), European (*Balea perversa*) and West Eurosiberian (*Aegopinella pura*) species could also be found. Only *V. alpestris* is with longitudinal disjunction (in regard to Siberia) of its range. A total of 6 species, accepted as montane by some authors, belong to this group (*Eucobresia diaphana*, *Vitrea diaphana*, *Oxychilus glaber*, *O. inopinatus*, *Daudebardia brevipes* and *Discus perspectivus*). The finding of part of them at a low altitude can hardly be related to their montane character (DAMJANOV & LIKHAREV, 1975; SCHILEYKO, 1978, 1984; GROSSU, 1983, 1986, 1987, KERNEY et al., 1983; SCHÜTT, 1996). Finding of Montane forms in Bulgarian lowlands has been reported by JOSIFOV (1963, 1976). It is assumed that the humid mountain valleys characterized by cooler climate, have facilitated the migration of these species to the lowlands in many regions of the country. Four species (8.2%) found in all vegetation belts and 6 species (12.2%) reported from a single belt are Eurosiberian. Taxa established in more than one vegetation belt (39 species, or 79.6%) predominate. The largest number of species (45 species, or 39.5%) has been established in the low mountain zone. The group includes 35.7 to 48.1 % (5 to 46 species) from the species composition of separate vegetation belts. The freshwater Central and East European species – *Bythinella austriaca*, found in Rila, belongs to this group. The Eurosiberian species are mainly meso-hygrophilous, rare – xero-mesophile and calciphilous (Table 1). Only *Succinea oblonga* is hygro-hydrophilous. Eleven species (22.4%) from 9 families are accepted as calciphilous. *Zebrina detrita* and *Chondrula tridens* are xerophile but belong to genera of fore Asian

Table 1
Malacofaunistic diversity of Bulgarian National Parks

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
GASTROPODA						
MESOGASTROPODA						
Hydrobiidae						
Bythinella austriaca (Frauenfeld, 1857)		+		800-1720	Rg, cee	cr, po, x, N
Pomatiasidae						
Pomatias elegans (O. F. Müller, 1774)			?	800-900	Rp, am	me, ca, N
P. rivulare (Eichwald, 1829)	+		+	500-1200	Rp, pm	me, ca, N
Aciculidae						
Acicula similis (Reinhardt, 1880)	+		?	500-800	see	hg, ca, r, N
BASOMMATOPHORA						
Ellobiidae						
Carychium minimum O. F. Müller, 1774			+	900-1000	wes	hg
Lymnaeidae						
Radix peregra (O. F. Müller, 1774)	+	+	+	500-2300	hp	eu, ph, pe
Galba truncatula (O. F. Müller, 1774)	+	+	+	500-2000	h	eu, pe, ph
Ancylidae						
Ancylus fluviatilis O. F. Müller, 1774			+	1000-2300	wp	cr, po, rh
Planorbidae						
Hippeutis complanatus (Linnaeus, 1758)			?	550-700	wcp	ph, sw, α, r, N

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
STYLOMMATOPHORA						
Cochlicopidae						
Cochlicopa lubrica (O. F. Müller, 1774)	+		+	500-1300	h	me-eu
C. lubricella (Rossmässler, 1835)	+		+	500-1750	h	me-eu, ca
Pyramidulidae						
Pyramidula rupestris (Draparnaud, 1801)	+		+	500-2700	mca	me, ca
Vertiginidae						
Vertigo pusilla O. F. Müller, 1774		+	+	800-1600	eca	me
V. antivertigo (Draparnaud, 1801)			+	900-1000	wcp, ?pat	me-hg
V. pygmaea (Draparnaud, 1801)	+		+	500-1500	h	me, eu
V. alpestris Alder, 1838	+	+		1000-2300	Rg, des	me-hg
Truncatellina claustralis (Gredler, 1856)	+		+	500-1000	nm, mom	me-xph, ca
T. cylindrica (Férussac, 1821)			+	1000-1850	wp, ?e	xph-me, ca, li
Columella edentula (Draparnaud, 1805)		+		800-1500	h	me-hg, r, N
Pupillidae						
Pupilla muscorum (Linnaeus, 1758)	+		+	500-1200	h	me-eu
Argna macrodonta (Hesse, 1916)	+			500-1200	Eb	me, ca, li, tr, E

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
Orculidae						
Sphyradium doliolum (Bruguière, 1792)	+	+	+	500-1900	nmca, mo	me, eu, ca
Chondrinidae						
Granaria frumentum (Draparnaud, 1801)	+			500-1500	csee	me, ca
Chondrina avenacea (Bruguière, 1792)	+			500-1800	se, mom	xph, ca, li
Ch. clienta (Westerlund, 1883)	+			500-1900	● nm, mo	xph, ca, li, r, E
Valloniidae						
Vallonia costata (O. F. Müller, 1774)	+		+	500-1300	h	me, eu
V. pulchella (O. F. Müller, 1774)	+		+	500-1200	h	me, eu
V. excentrica Sterki, 1892	+			500-1200	h	me, r, N
Acanthinula aculeata (O. F. Müller, 1774)	+		+	500-1500	wp	me
Enidae						
Merdigera obscura (O. F. Müller, 1774)	+	+	+	500-2000	wp	me
M. montana (Draparnaud, 1801)	+	+	+	500-2000	e	me-hg
Zebrina detrita (O. F. Müller, 1774)	+		+	500-2500	● cseean	xph, ca, E
Chondrula tridens (O. F. Müller, 1774)	+		+	500-1900	et, ?nmt	xph-me
Ch. microtragus (Rossmässler, 1848)	+		+	500-1000	pm, ?nem	xph-me, ca

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
Ch. macedonica A. Wagner, 1915			+	500-1000	Eb	xph-me, ca, r, E
Clausiliidae						
Cochlodina laminata (Montagu, 1803)	+	+		500-2000	e	me, ca
Macedonica marginata (Rossmässler,1835)			+	1000-1900	● Ebs	me-xph, ca, E
?? *M. macedonica* (Rossmässler, 1839)			+	1000-2000	Eb	me-xph, ca, E
M. frauenfeldi Rossmässler, 1856	+			500-800	Eb	me, ca, E
M. marthae Sajo, 1968			+	2400	El	me, ca, r, W
Idyla castalia (Roth, 1856)			+	1000-2600	Eb	me-xph, ca, E
Clausilia pumila C. Pfeiffer, 1828			+	1000-1900	see	me
Laciniaria plicata (Draparnaud, 1801)	+	+	+	500-1500	● cee	me, ca, E
L. bajula (A. Schmidt, 1868)		+		800-1500	Er	me-hg, ca, r, W
Balea biplicata (Montagu, 1803)	+	+		500-2300	csee	me
B. perversa (Linnaeus, 1758)	+			600 (2400)	e	me-xph, ca, VU, ESC, CORINE, W
Vestia ranojevici (Pavlović, 1912)	+	+	+	500-1800	● see	me
Bulgarica vetusta (Rossmässler,1836)	+			550-1000	see	me-hg

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
B. varnensis (L. Pfeiffer, 1848)	+			500-1350	● Eb	me, ca, E
?? *B. rugicollis* (Rossmässler,1836)	?			250-400	see, ?Ebs	me, ca
B. denticulata (Olivier,1801)			+	1000-1600	Eb	me, E
Succineidae						
Succinea oblonga (Draparnaud, 1801)	+			500-1300	wces	hg
Oxyloma elegans (Risso, 1826)			?	700-800	h	hg-hd
Ferussaciidae						
Cecilioides acicula (O. F. Müller, 1774)			+	900-1000	ean, ?et	me, ca
C. jani (De Betta et Martinati, 1855)			+	900-1000	Eb, ?nem	me, ca, E
Arionidae						
Arion lusitanicus Mabille, 1868	+			450-550	e, ?se, ?i	me-hg
A. subfuscus (Draparnaud, 1801)	+	+	+	500-2900	e	me
A. silvaticus Lohmander, 1937	+	+	+	500-1600	e	me-hg
Euconulidae						
Euconulus fulvus (O. F. Müller, 1774)	+	+	+	500-1500	h	me
Vitrinidae						
Vitrina pellucida (O. F. Müller, 1774)	+	+		500-1800	h	me-hg

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
Eucobresia diaphana (Draparnaud, 1805)		+	+	1500-2600	e, mo	me-hg
Phenacolimax annularis (Studer, 1820)	+		+	500-2800	et, mom	me
Zonitidae						
Vitrea diaphana (Studer, 1820)	+	+		500-1300	csee, ?mo	me, tx
V. subrimata (Reinhardt, 1871)	+	+		500-2000	hm	me
V. bulgarica Damjanov et Pinter, 1969	+	+	+	500-1900	Eb	me, E
V. neglecta Damjanov et Pinter, 1969	+			500-1200	Ebg	me, E
V. contracta (Westerlund, 1871)	+	+	+	500-1400	wp	me, ca
V. pygmaea (O. Boettger, 1880)	+			500-1400	Rp, hm	me-xph, N
Spinophallus umińskii (Riedel, 1960)	+			500-1500	El	tr, r, W
Aegopinella pura (Alder, 1830)	+	+	+	500-2400	wes	me
A. minor (Stabile, 1864)		+		800-1200	csee	me-xph
Balcanodiscus frivaldskyanus (Rossmässler, 1848)	+			500-1100	Eb	me, ca, tr, E
Oxychilus hydatinus (Rossmässler, 1838)	+	+		500-1100	Rp, hm	me, tr, N
O. glaber (Rossmässler, 1835)	+	+	+	500-1850	cse, mo	me-hg, tr

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
O. inopinatus (Uličný, 1887)	+	+	+	500-2000	csee, mo	me-hg, ca
O. depressus (Sterki, 1880)	+	+	+	500-2600	csee, mo	me-hg, tr
Nesovitrea hammonis (Ström, 1765)	+	+	+	500-1500	wces	me-xph
Daudebardia rufa (Draparnaud, 1805)	+	+	+	500-1500	csean, ?hm	me-hg, tx
D. brevipes (Draparnaud, 1805)	+	+	+	500-1500	csean, mo	me-hg, tx
Carpatica stussineri (A. Wagner, 1895)		+		500-1400	see	me-hg
Milacidae						
Milax parvulus Wiktor, 1968	+			500-1300	Ebg	me-hg, ca, E
M. verrucosus Wiktor, 1969	+			500-1200	Er	me, W
Tandonia kusceri (H. Wagner, 1931)	+		+	500-2000	Eb	me, eu, tx, E
T. serbica (H. Wagner, 1931)	+	+	+	500-1800	Eb	me, ca, E
T. budapestensis (Hazay, 1881)		+		800-2200	see	me, eu
T. piriniana Wiktor, 1983			?	700-800	Er	me, r, W
T. cristata (Kaleniczenko, 1851)	+			500-1500	pm	me
Punctidae						
Punctum pygmaeum (Draparnaud, 1801)	+	+		500-1500	h	me

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
Discus perspectivus (Megerle v. Mühlfeld, 1816)	+			500-1500	csee, mo	me, ca, r, N
Limacidae						
Limax maximus Linnaeus, 1758	+		+	500-1500	e, ?wp	me
L. subalpinus Lessona, 1880		+		1400-1600	se	me, r, N
L. cinereoniger Wolf, 1803	+	+	+	500-2500	e	me
L. punctulatus Sordelli, 1870	+			500-1500	cse	me
L. macedonicus Hesse, 1928	+	+	+	500-2000	Eb	me, E
L. conemenosi O. Boettger, 1882			+	1000-1300	Eb	me-hg, E
L. flavus Linnaeus, 1758			?	800-900	Rp, p, nm	me, N
Lehmannia nyctelia (Bourguignat, 1861)	+	+	+	500-2700	?csee, ?kb	me
L. brunneri (H. Wagner, 1931)	+	+	+	700-2650	Eb	me-hg, E
L. horezia Grossu et Lupu, 1962	+			500-2200	kb	me, r, N
Agriolimacidae						
Deroceras laeve (O. F. Müller, 1774)	+	+		500-2500	h	me-hg
D. sturanyi (Simroth, 1894)			?	800-900	e	me-hg
D. panormitanum (Lessona et Pollonera, 1882)			+	1000-1500	e	me

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
D. turcicum (Simroth, 1894)	+	+	+	500-2000	see	me-hg
D. agreste (Linnaeus, 1758)		+		800-2600	● wcp	me, E
D. bureschi (H. Wagner, 1934) ?	+	+	+	500-2000	Eb	me-hg, tx, E
Krynickillus urbanskii (Wiktor, 1971)	+			500-1300	Rp, ban, p	tx, N
Helicidae						
Arianta arbustorum (Linnaeus, 1758)	+			500-1500	e	me-hg, r, N
A. pelia (Hesse, 1912)	+	+		1000-2700	Ebg	me-hg, ?ca, E
Helicigona trizona (Rossmässler,1835)	+	+	+	500-1700	● see	me-hg, ca, E
H. haberhaueri (Sturany, 1897)	+	+	+	800-2000	Ebg	me-hg, li, E
H. kattingeri (Knipper, 1941)			?	300-500	Eb	me, r, E
Wladislawia polinskii (A. Wagner, 1927)			+	1800-2914	El	me-hg, ca, W
W. sztolcmani (A. Wagner, 1927)			+	2000-2700	El	me, ca, r, W
Cepaea vindobonensis (Férussac, 1821)	+		+	500-1500	pm	xph
Helix albescens Rossmässler,1839		?	?	650-750	Rp, p	xph-me, N
H. lucorum Linnaeus, 1758		+	+	800-1200	● nmt	xph-me, eu, E

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
H. pomatia Linnaeus, 1758	+	+	+	500-1900	● e	me-hg, CORINE, ESC, BC-3, HD-V, E
H. figulina Rossmässler,1839			?	400-700	Rp, pm, p	me, N
Bradybaenidae						
Bradybaena fruticum (O. F. Müller, 1774)	+	+	+	500-1770	hes	me-hg
Helicodontidae						
Lindholmiola girva (Frivaldszky, 1835)		+	+	800-2000	● pm	me-xph, E
Hygromiidae						
Trichia erjaveci Brusina, 1870	+		+	500-1230	Ebs	me-hg, E
Xerolenta obvia (Menke, 1828)	+	+	+	500-1900	● seean	xph, E
Helicella macedonica Hesse, 1928			+	1200-2000	Eb	xph-me, E
H. rhabdotoides (A. Wagner, 1927)	+			500-800	Eb	xph, ca, E
Pseudotrichia rubiginosa (Rossmässler,1838)			?	500-800	hes, ?tp	me-hg
Monachoides incarnatus (O. F. Müller, 1774)	+	+	+	500-1600	csee, ?mo	me-hg
Cernuella jonica (Mousson, 1854)	+			500-800	nem	xph
Monacha cartusiana (O. F. Müller, 1774)			+	900-1000	nm	me-xph

Table 1
Continued

Taxa	Distribution				Zoogeographical category	Ecological data and conservation importance
	Central Balkan	Rila	Pirin	Vertical (m)		
M. carascaloides (Bourguignat, 1855)	+			500-1000	ban	me-xph, ca
Euomphalla strigella (Draparnaud, 1801)	+	+	+	500-1600	e	me-hg, ?ca
BIVALVIA						
Veneroida						
Sphaeriidae						
Pisidium amnicum (O. F. Müller, 1774)			+	1000-2000	hp	rh, po, sw
P. casertanum (Poli, 1791)	+	+	+	500-2370	hp	po, sw, ps, tx

origin (DAMJANOV & LIKHAREV, 1975). The group is best represented in Rila (31 species, or 54.4%) and poorly represented in Central Balkan (39 species, or 43.3%) and Pirin (33 species, or 37.9%).

The Mediterranean species are 22 (16.6%) and their number rapidly decreases with the altitude. This group is divided into many subgroups with different origin, distribution and ecological peculiarities. This complexity contributes to establishing of various zoogeographical classifications for Bulgaria (JOSIFOV, 1981, 1986, 1988, 1998, 1999; GRUEV, 1988, 1995, 2000a, 2000b, 2000c, 2000d, 2002; HEISS & JOSIFOV, 1990; GRUEV & KUSMANOV, 1994; HUBENOV, 1996; POPOV, 2002). With the exception of the Mediterranean-Central Asian species *Pyramidula rupestris* (found in all altitude zones and vegetation belts), Mediterranean species are represent in the first 3 vegetation belts but most of them (10 species, or 45.4%) have been established in a single belt only. It is possible that some of the latter species could be found in neighbouring vegetation belts as well, under further investigations. The great number of Mediterranean species, known from a single vegetation belt only, the lack of them in the sub-alpine and alpine belts are due to the lower ecological flexibility of the species from this group in comparison with the previous ones. The mesophile, xerophile and meso-xerophile species predominate. Nine species (40.9%) from 7 families are calciphilous. The family Zonitidae includes more Mediterranean species (4 species, or 22.2%). The largest is the number of Pontomediterranean (6 species, or 27.3%), followed by Holomediterranean and North Mediterranean (3 species of each category, or 13.6%) species. A total of 19 species are with Mediterranean distribution only, of which 7 species are widely spread in the subregion and

12 – in its separate areas (Table 2). The group includes 7.1 to 18.4% (1 to 21 species) from the species composition of separate vegetation belts. The great number of species (21 species in each, or 95.4%) has been established in the low mountain zone and the first vegetation belt. The group is best represented in Central Balkan (14 species, or 15.5%) and poorly in Pirin (12 species, or 13.8%) and Rila (7 species, or 12.3%). The fewer number of Mediterranean species in Pirin National Park is connected with the high lower border (about 1000 m) of the park, whereas in Rila National Park the lack of karst determines almost half as many Mediterranean forms.

Endemics. This category includes taxa, which are not distributed outside the Balkan Peninsula. The endemics are divided into Balkan (found in more than one Balkan country), Bulgarian (found in Bulgaria only), regional (found in more than one locality of a certain region) and local (known only from one locality). Endemics are of high conservation value for the evaluation of any territory and reflect the unique character of the fauna. There are no endemic forms among the freshwater mollusks established in the parks. A total of 33 endemic species (25.0%) has been established (Table 2). Terrestrial mollusks could be considered richest in endemics. The presence of appreciable number of endemic subspecies should be noted. However, they are not considered in this work/paper because of the uncertain status of most of them. Most numerous are the Balkan endemics – 19 species (57.6%), followed by the Bulgarian and local ones – 4 species each (12.1%). Endemic taxa have been established in 9 families (Table 1). The family Clausilidae is the richest in endemics (9 species, or 56.2%), followed by Milacidae (5 species, or 71.4%), Helicidae (5 species, or 41.6%) and Zonitidae (4 species, or 22.2%). The other families (Pupillidae, Ferussaciidae, Limacidae, Agriolimacidae and Hygromiidae) include from 1 to 3 endemics. The main part of the endemics is localized in the first 3 altitude zones (19 to 23 species, or 57.5 to 69.7%) and the first 2 vegetation belts (22–23 species, or 66.6 to 69.7%); after that their number decreases and 5-6 species have been established in the sub-alpine and alpine belt. The species (23 taxa, or 69.7%) found in a single vegetation belt are dominant, 6 of which (26.1%) are rare. More endemics are pronounced calciphilous and localized in the low mountain zones (18 species, or 54.5%) which is indication of their Mediterranean character and preglacial origin. The main part of the endemics (3 species) is related to the karst massifs of Pirin National Park. Local and subendemic forms are not known from Rila National Park. The number of Balkan endemics is almost equal in Central Balkan and Pirin National Parks (12–14 species, or 13.3 to 16.1%). The Balkan endemics are not uniform in distribution and the Bulgarian malacofauna includes a few endemic forms, which are found all over the Balkan Peninsula. This fact is historically connected with the isolated evolution of the malacofauna in the eastern and western parts of the Balkan Peninsula. The group of endemics is best represented in Pirin (21 species, or 24.1%) and Central Balkan (19 species, or 21.1%) and poorly represented in Rila (8 species, or 14.0%). The percentage of endemism in Rila is low because of the silicate character of the mountain.

Relicts. The relict elements of the fauna are the result of the palaeclimatic and palaegeographical changes from the Tertiary till now. Relicts significantly contribute to the specificity and uniqueness of the fauna and are of high conservation importance. According to their origin, the relicts are preglacial and glacial. The preglacial relicts predominate (8 species, or 80%). All of them have Mediterranean distribution and are divided into 5 zoogeographical categories. The Pontian and Holomediterranean forms dominate and include 6 species (Table 1).

Table 2

Zoogeographical characteristics and vertical distribution of the mollusks from the National Parks

Zoogeographical categories	Total number	Geographical vertical zones				Vegetation vertical belts					National Parks		
		Hills	Low mountains	Middle mountains	High mountains	Meso- and xeromesophilic oak-hornbeam forests	Beech forests	Coniferous forests	Subalpine vegetation	Alpine vegetation	Central Balkan	Rila	Pirin
Species distributed both in the Palaearctic and beyond it	15	13	15	13	4	15	13	9	2		12	6	11
Holarctic	14	13	14	13	4	14	13	9	2		12	6	10
Palearctic-Afrotropical	1		1			1							1
Species with Palaearctic distribution	83	62	77	66	38	77	66	58	19	9	59	43	55
PALAEARCTIC TYPE	12	8	11	11	7	10	11	11	5	3	6	5	10
Holopalaearctic	3	2	2	3	2	2	3	3	3	1	2	2	3
West and Central Palaearctic	2	1	2	1	1	2	1	1	1	1		1	1
West Palaearctic	4	3	3	4	2	3	4	4			2	1	3
European-Central Asian	1		1	1		1	1	1				1	1
European-Turanian	2	2	2	2	2	2	2	2	1	1	2		2

Table 2
Continued

Zoogeographical categories	Total number	Geographical vertical zones				Vegetation vertical belts					National Parks		
		Hills	Low mountains	Middle mountains	High mountains	Meso- and xeromesophilic oak-hornbeam forests	Beech forests	Coniferous forests	Subalpine vegetation	Alpine vegetation	Central Balkan	Rila	Pirin
EUROSIBERIAN TYPE	49	39	45	41	24	46	41	38	13	5	39	31	33
Holoeurosiberian	2	2	2	1	1	2	1	1			1	1	2
Disjunct Eurosiberian	1				1		1	1	1		1	1	
West and Central Eurosiberian	2	2	2	2		2	2	1			2	1	1
West Eurosiberian	2	1	2	1	1	2	2	1	1		1	1	2
European-Anatolian	1		1	1		1							1
Central and South European-Anatolian	2	2	2	2		2	2	2			2	2	2
Central and Southeast European-Anatolian	1	1	1	1	1	1	1	1	1		1		1
Southeast European-Anatolian	1	1	1	1	1	1	1	1			1	1	1
European	14	10	12	11	6	12	10	11	4	2	12	8	9

Table 2
Continued

Zoogeographical categories	Total number	Geographical vertical zones				Vegetation vertical belts					National Parks		
		Hills	Low mountains	Middle mountains	High mountains	Meso- and xeromesophilic oak-hornbeam forests	Beech forests	Coniferous forests	Subalpine vegetation	Alpine vegetation	Central Balkan	Rila	Pirin
Central and East European	2	1	2	2	1	2	2	2			1	2	1
Central and South European	2	2	2	2	1	2	2	2			2	1	1
Central and Southeast European	9	8	9	9	4	9	9	7	3	2	7	7	6
Southeast European	8	7	7	6	5	8	6	6	1		6	5	5
Carpathian-Balkan	2	2	2	2	2	2	2	2	2	1	2	1	1
MEDITERRANEAN TYPE	22	15	21	14	7	21	14	9	1	1	14	7	12
Mediterranean-Central Asian	1	1	1	1	1	1	1	1	1	1	1		1
North Mediterranean-Central Asian	1	1	1	1	1	1	1	1			1	1	1
North Mediterranean-Turanian	1		1	1		1	1					1	1
Holomediterranean	3	3	3	3	1	3	3	1			3	2	1
Atlantomediterranean	1		1			1							1

Table 2
Continued

Zoogeographical categories	Total number	Geographical vertical zones				Vegetation vertical belts					National Parks		
		Hills	Low mountains	Middle mountains	High mountains	Meso- and xeromesophilic oak-hornbeam forests	Beech forests	Coniferous forests	Subalpine vegetation	Alpine vegetation	Central Balkan	Rila	Pirin
North Mediterranean	3	2	3	1	1	3	1	1			2		1
South European	2	1	1	2	2	1	2	2			1	1	
Pontomediterranean	6	5	6	4	1	6	4	3			4	1	4
Pontian	2		2			2						1	2
Balkan-Anatolian	2	2	2	1		2	1				2		
ENDEMICS:	33	19	22	23	15	22	23	16	6	5	19	8	21
Local	4	1	1	1	3	1	1	2	3	2	1		3
Regional	3	1	3	2		2	2	1			1	1	1
Bulgarian	4	2	3	4	2	3	4	2	1	1	4	2	1
Balkan	19	14	14	14	9	15	14	10	2	2	12	5	14

Table 2
Continued

Zoogeographical categories	Total number	Geographical vertical zones				Vegetation vertical belts					National Parks		
		Hills	Low mountains	Middle mountains	High mountains	Meso- and xeromesophilic oak-hornbeam forests	Beech forests	Coniferous forests	Subalpine vegetation	Alpine vegetation	Central Balkan	Rila	Pirin
Subendemic	3	1	1	2	1	1	2	1			1		2
RELICTS:	10	5	9	5	2	9	6	2	1		5	4	6
Glacial	2		1	1	2	1	2	2	1		1	2	
Preglacial	8	5	8	4		8	4				4	2	6
Rare species	17	10	13	10	4	13	11	9	2		8	5	6
Total	132	94	114	102	57	114	102	83	27	14	90	57	87

Table 3
Similarity of the malacofauna of the National Parks

National Park	Common species	Coefficient of similarity
Central Balkan – Rila	44	59.9%
Central Balkan – Pirin	51	69.4%
Rila – Pirin	38	52.7%

Five families include preglacial relicts, of which Pomatiasidae, Zonitidae and Helicidae comprise 2 species each. The mesophilous, xeromesophilous and mesohygrophilous taxa predominate. *Bythinella austriaca* (freshwater species, found in Rila National Park and the west Bulgarian mountains) and *Vertigo alpestris* (Disjunct Eurosiberian, Boreomontane species, distributed in the mountains above 1000 m a.s.l, known from Central Balkan and Rila National Parks) are glacial relicts. The relicts are almost equally represented in the three parks.

Rare species. This category includes taxa with scarce populations or such known from single localities only. Usually these are stenotopic forms related to specific habitats and ecology. The number of rare species depends on the level of study as well. Their number is likely to change under further investigations in the parks. Seventeen rare species (12.9%) have been established, the main part of which are localized in the first 2 vegetation belts (11–13 species, or 64.7 to 76.4%) Most of the rare taxa (13 species, or 11.4%) have been found in the low mountain zone. Their number decreases with increasing of altitude. Four species have been established in the high mountain zone, followed by the sub-alpine vegetation belt – 2 species. Rare taxa have not been found in the alpine belt (Table 2). Rare species are represented in each of the 3 main zoogeographical groups but notably increase in number to Eurosiberian and endemic forms (6 species each). Twelve families include rare species, of which Clausillidae and Helicidae are the richest ones (3 species each). The mesophilous and mesohygrophilous taxa predominate (6 species each). Rare species are almost equally represented in the three parks.

Taxa with high conservation value. The conservation value of the species is especially high when more than one criterion are applied for one taxa (rare and endemic, rare and relict, etc.). Sixty species (45.4%) have conservation significance. Among the freshwater mollusks, *Bythinella austriaca* and *Hippeutis complanatus* are of national importance. Among the terrestrial mollusks, 58 species (43.9%) can be considred as important in terms of conservation. Of these, 8 species (6.1%) are of world importance; 33 species (25.0%) of European importance; and 17 species (12.9%) of national importance. Nine species (6.8%) combine more than one criterion for conservation significance (Table 1). A great/the greatest number of taxa with high conservation value has been established in the Central Balkan National Park (36 species, or 60.0%), followed by Pirin National Park (32 species, or 53.3%) and Rila National Park (21 species, or 15.9%). The differences between the first two parks are determined by the species of national importance, which are almost half as many in Central Balkan National Park (Table 4). Species of international conservation status are better represented in Central Balkan National Park as well (Table 1). These are *Balea perversa*, found in Middle Stara Planina Mts. and *Helix pomatia*, found all over the country (sometimes up to 1900 m a.s.l.). These species are included

Table 4
Comparative data for mollusks from the three National Parks

Data for the Mollusca	Central Balkan (500-2376 m)	Rila (800-2925 m)	Pirin (1000-2915 m)
Hills	86		
Low mountains	88	55	
Middle mountains	85	56	80
High mountains	45	42	48
Meso- and xeromesophilic oak-hornbeam forests	87	52	
Beech forests	85	56	74
Coniferous forests	59	45	57
Subalpine vegetation	25	18	22
Alpine vegetation		9	11
IUCN – Vulnerable	1		
Red List of threatened animals and plants in Europe	2	1	1
Bern Convention	1	1	1
Habitats Directive	1	1	1
CORINE	2		1
National importance	11	6	6
European importance	22	14	22
World importance	3	1	4
Hydrophilic			1
Hygrophilic	30	27	25
Mesophile	80	55	74
Xerophile	16		16
Eurybiont	11	5	16
Lithophilic	6	1	3
Calciphilic	25	10	23
Psammophilic	1	2	1
Pelophilic	2	1	2

Table 4
Continued

Data for the Mollusca	Central Balkan (500-2376 m)	Rila (800-2925 m)	Pirin (1000-2915 m)
Rhithrophilic			2
Phytophilic	2	2	3
Stagnant water	1	1	3
Potamophilic	1	2	3
Crenobiont		1	1
Troglophile	7	4	2
Trogloxene	7	5	5
α-mesosaprobic			1
Xenosaprobic		1	

Note. Most species are included in more than one ecological category (Table 1), so the number of taxa seems to be greater than their real number.

in IUCN Red List (*B. perversa*), ESC Red List (*B. perversa* and *H. pomatia*), Bern Convention and Habitats Directive (*H. pomatia*) and CORINE (*B. perversa* and *H. pomatia*). There are no troglobionts among the known mollusks. At the same time they are elements of the subterranean ecosystems and are/must be protected in the caves at any rate. Seven troglophilic and seven trogloxenic taxa have been recorded (Table 1). The greatest number of subterranean species has been established in Central Balkan National Park (Table 4).

Conclusion

The malacofauna of the three parks could be divided into 2 group: 1) Species with Mediterranean type of distribution – more thermophilic and distributed mainly in the southern parts of the Palaearctic (44 species, or 33.3%); *Phenacolimax annularis* (European-Turanian and Montane Mediterranean species) and endemics (Mediterranean with preglacial origin) could be also formally included in this group. 2) Species with Palaearctic and Eurosiberian type of distribution – more cold-resistant and more widely distributed in the Palaearctic (88 species, or 66.7%). Holarctic and Palaearctic-Afrotropical species and postglacial endemics can be formally related to this group as well. The distribution of these groups is different in the separate vegetation belts.

Mesophilic and xeromesophilic oak-hornbeam forests (114 species, or 83.2%). These forests are not included within the boundaries of Pirin National Park. From the species with Mediterranean type of distribution (35 species, or 30.7%), endemics (14 species, or 12.3%) and Pontomediterranean (6 species, or 5.3%) species are the most numerous, and from the

species with Palaearctic and Eurosiberian type of distribution (79 species, or 69.3%) – the Holarctic (14 species, or 12.3%), followed by European (12 species, or 10.5%) and Central and Southeast European (9 species, or 7.9%) species. Disjunct Eurosiberian species have not been established.

Beech forests (102 species, or 77.3%). All known species from Rila National Park and a great part of the species of Pirin National Park are included here. From the species with Mediterranean type of distribution (29 species, or 28.4%), the Pontian-Mediterranean (4 species, or 3.9%) and Holomediterranean (3 species, or 2.9%) species and endemics (15 species, or 14.7%) are better represented, and from the species with Palaearctic and Eurosiberian type of distribution (73 species, or 71.6%) – the Holarctic (13 species, or 12.7%), European (10 species, or 9.8%) and Central and Southeast European (9 species, or 8.8%) species. Palaearctic-Afrotropical, European-Anatolian, Atlantomediterranean and Pontian species are absent.

Coniferous forests (83 species, or 62.9%). From the species with Mediterranean type of distribution (17 species, or 20.5%) South European, Pontian-Mediterranean (2-3 taxa of each category) and endemics (8 species, or 9.6%) occur, and from the species with Palaearctic and Eurosiberian type of distribution (66 species, or 79.5%) the Holarctic (9 species, or 10.8%) species are better represented, followed by the European (11 species, or 13.2%) and Central and Southeast European (7 species, or 8.4%) species. Palaearctic-Afrotropical, European-Anatolian, North Mediterranean-Turanian, Atlantomediterranean, Pontian and Balkan-Anatolian species are absent.

Subalpine vegetation (27 species, or 20.4%). Five species with Mediterranean type of distribution (Mediterranean-Central Asian *Pyramidula rupestris*, Montane Mediterranean *Phenacolimax annularis* and endemics *Idyla castalia*, *Wladislawia polinskii* and *W. sztolcmani*) occur and 23 species with Palaearctic and Eurosiberian type of distribution, of which Holopalearctic, European and Central and Southeast European species are better represented.

Alpine vegetation (14 species, or 10.6%). It is well developed in Rila and Pirin national parks. There are almost the same species with Mediterranean type of distribution as in the subalpine vegetation belt and 10 species with Palaearctic and Eurosiberian type of distribution, represented by Holopalearctic, European-Turanian, West and Central Palearctic, European, Central and Southeast European, Carpathian-Balkan species and endemic taxa.

A total of 132 species of mollusks has been reported from Bulgarian national parks. They belong to 72 genera, 31 families and 4 orders of the classes Gastropoda and Bivalvia. The greatest number of species has been established in Central Balkan National Park – 90, followed by Pirin National Park – 87 and Rila National Park – 57 species. It is assumed that about 70% of the species in the protected areas are known. The most numerous are the families Clausiliidae (16 species) and Zonitidae (18 species). The species are divided into 31 zoogeographical categories. A total of 33 endemics, 10 relicts and 16 rare species have been established. Sixty species have conservation significance, of which 8 are of world importance. A great part of the parks' territories remains unexplored.

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Разпространение и зоогеографска характеристика на мекотелите (Mollusca) от българските национални паркове

Здравко ХУБЕНОВ

(Р е з ю м е)

В българските национални паркове са установени 132 вида мекотели, които спадат към 72 рода, 31 семейства и 4 разреда на класовете Gastropoda и Bivalvia. Най-много видове са намерени в парка Централен Балкан – 90, следван от Пирин – с 87 и Рила – с 57 вида. Предполага се, че са известни към 70% от видовете на защитените територии. С най-много видове са представени семействата Clausiliidae (16 вида) и Zonitidae и (18 вида). Най-много видове – по 114 (86.4%) са установени в нископланинската зона и в пояса на смесените гори, след което броят им намалява и над 2000 m са констатирани само 25 вида. В Централен Балкан най-много видове са намерени в нископланинската зона (88 вида – 97.8) и в пояса на смесените гори (87 вида – 96.7%), а в Рила – в среднопланинската зона (56 вида – 88.9-98.2%) и в пояса на буковите гори (57 вида – 100%). Защитената част на Пирин е разположена над 1000 m, поради което и в този парк най-мого видове са намерени в среднопланинската зона (80 вида – 91.9%) и в пояса на буковите гори (74 вида – 85.1%). Видовете са разпределени в 31 зоогеографски категории, обединени в няколко групи. Установени са 33 ендемита, 10 реликта и 16 редки вида. Консервационна стойност имат 60 вида, 8 от които са световно заначими. Голяма част от територята на парковете не е проучена. От направения преглед се вижда, че в малакофауната на парковете се очертават 2 групи: 1) видове с медитерански тип на разпространение (44 вида – 33.3%) – по-топлолюбиви и разпространени предимно в южните части на Палеарктика, към които формално са включени ендемитите с медитерански характер и преглациален произход; 2) видове с палеарктоевросибирски тип на разпространение (88 вида – 66.7%) – по-студенолюбиви и по-широко разпространени в Палеарктика, към които формално са включени палеарктo-афротропичните, холарктичните видове и постглациалните ендемити. Тези групи са представени различно в отделните растителни пояси.