

# The Tardigrada of the Komandorskiye Islands, with a description of *Dactylobiotus dervizi* sp. n. (Eutardigrada, Macrobiotidae)

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(With 21 figures)

## Abstract

Forty two species of tardigrades were recorded from terrestrial samples collected in the two largest islands of the Komandorskiye Islands in the Bering Sea; three species are new to the Russian fauna [*Echiniscus robertsi* Schuster & Grigarick, *Hypechiniscus gladiator* (Murray) and *Adorybiotus granulatus* (Richters)] and three new to science (two species are not described here). *Dactylobiotus dervizi* sp. n. differs from other species of the genus mainly by the peculiarities of its egg shell and relatively long claws in adult animals. *Isohypsibius antonovae* Biserov, 1990 is transferred to the genus *Hypsibius*. The most common species of the fauna represent cosmopolitan and Holarctic element.

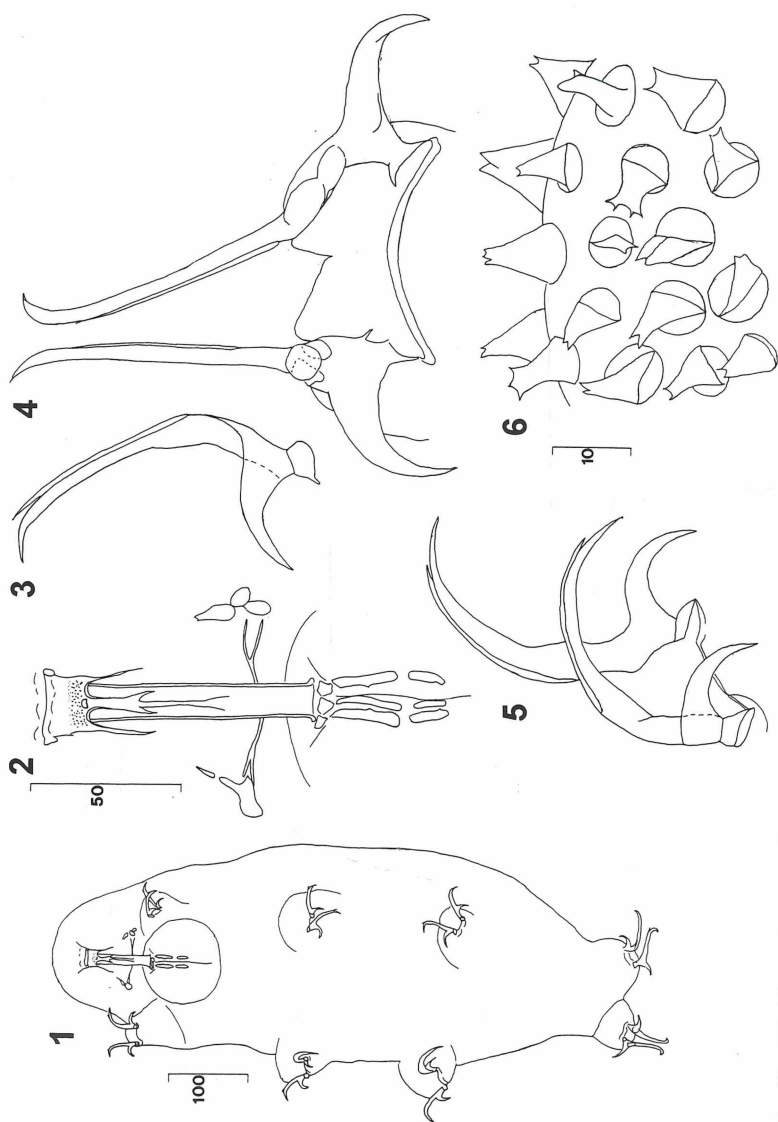
## Introduction

The Komandorskiye (= Commander) Islands are a group of four islands in the extreme east of Russia. The group is situated in the southwestern part of the Bering Sea, about 180 km east of the Kamchatka Peninsula. The climate is cold, with about 500 mm of precipitation annually. The two largest islands, Bering and Medny, were studied for tardigrades. Up to present only one species, *Hypsibius zetlandicus* (Murray, 1907), was known from this archipelago (Biserov 1988).

## Material and methods

The examined material consisted of moss and lichen samples collected on Medny Island, kindly supplied by J. Trunova (a former student of the Moscow State University) in 1985, and on Bering Island, kindly provided by D. Derviz and A. Vasiljeva (Moscow) in 1995. Altogether, 38 samples from the Komandorskiye Islands were examined: all six samples from Medny Island and 29 of 32 samples from Bering Island contained tardigrades.

The specimens were prepared as described in Biserov (1991, 1996). The holotype of the new species and some paratypes are deposited in Biserov's Collection at the Institute of Inland Water Biology, Borok, Russia; some paratypes are housed in the Zoologisches Museum Hamburg (ZMH).



Figs 1-6. *Dactylobiotus dervizi* sp. n.: 1 - habitus; 2 - bucco-pharyngeal apparatus; 3 - claw of legs IV; 4 - claws of legs IV, other specimen, another aspect; 5 - claws of legs III; 6 - detail of egg (scale bars in  $\mu\text{m}$ ).

## Results

The species list with the number of specimens found and samples in which they occurred is provided in Table 1. Below some remarks are given concerning certain species.

### *Adorybiotus granulatus* (Richters, 1904)

The species has been newly reported from Russia. A view of its egg from Bering Island is shown in Fig. 17.

### *Doryphoribius* sp.

Very probably that two specimens found belong to a new species of the genus *Doryphoribius* with two macroplacoids. Not enough material does not permit to identify the individuals exactly.

### *Hypsibius antonovae* (Biserov, 1990) **comb. n.**

Already during its description I had some doubts regarding generic attribution of this species. Unfortunately, then a small number of specimens and the absence of laterally positioned individuals to study the form of appendages for insertion of stylet musculature, did not permit correct generic attribution. After finding several specimens of *I. antonovae* from diverse Arctic regions, including the Komandorskiye Islands, and information from G. Pilato, I could reinvestigate the problem. The new study revealed that the appendages for insertion of stylet musculature are in shape of almost symmetrical hooks (perhaps the specimens are observed not exactly in profile) and claws are of *Hypsibius* rather than *Isohypsibius*-type. Thus, the species belong to the genus *Hypsibius* and not *Isohypsibius*. It is a single member of *Hypsibius* with a sculpture which is very similar to that of the *tuberculatus*-group in the genus *Isohypsibius*.

### *Isohypsibius elegans* (Binda & Pilato, 1971)

The specimens correspond well to the description of the species, but have slightly developed tubercles.

### *Macrobiotus harmsworthi obscurus* Dastych, 1985

The adult animals correspond to the original description (Dastych 1985); eggs have very well developed areolation. According to Dastych (pers. comm.) this is a good species and not subspecies.

### *M. hufelandi* Schultze, 1834

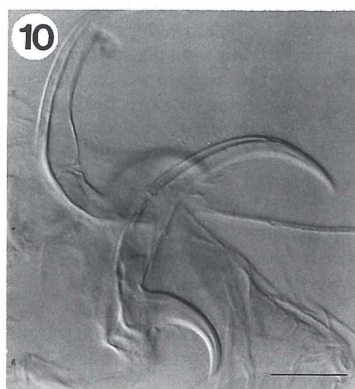
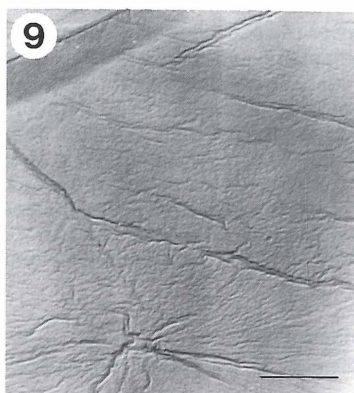
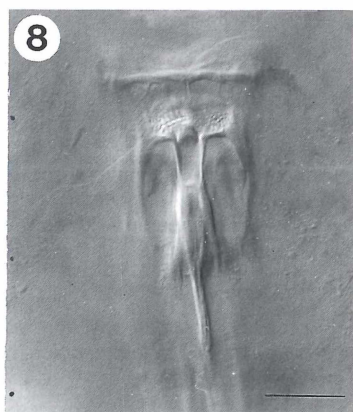
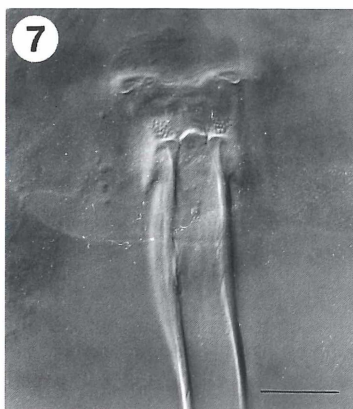
Its egg from Bering Island is shown in Fig. 18.

### *M. joannae* Pilato & Binda, 1983

Typically developed animals and eggs. A general view of eggs and their surface from Bering Island is shown in Figs 16, 19.

### *M. hufelandi*-group sp. n. 1

Only two eggs have been found in the archipelago. I found numerous specimens of this species on the Chukotka Peninsula. It will be described in a paper on tardigrades from this region.



*M. hufelandi*-group sp. n. 2

The description of this species is now in preparation in a work on tardigrades of *M. hufelandi*-group. It was also found in the Taimyr Peninsula (Biserov 1996).

*M. islandicus* Richters, 1904

Similar to specimens from the Spitsbergen (Dastych 1985). A single specimen has the thin and indistinct microplacoids.

*Murrayon pullari* (Murray, 1907)

Adult animals of this species have a very tiny cuticular granulation, invisible at light microscopic level (Fig. 20). A detail of egg from Bering Island is shown in Fig. 21.

## Description of a new species

*Dactylobiotus dervizi* sp. n.

(Figs 1-15)

**HOLOTYPE.** Adult female and egg, slide No. 2000 (3) collected by D. Derviz, 8 August 1995 in Bering Island. Deposited in the Institute of Inland Biology, Borok, Russia (Biserov Collection).

**TYPE LOCALITY.** The Komandorskiye Islands, S of Bering Island, valley of Peredovaya River, moss on the humid stones. Four specimens and 10 eggs. The new species was found together with *Amphibolus* sp., *Diphascon rugosum* (Bartoš, 1935), *Hypsibius dujardini* (Doyère, 1840), *Macrobiotus crenulatus* Richters, 1904, and *M. richtersi* Murray, 1911.

**PARATYPES.** One specimen [No. 2000 (2)] and one egg [No. 2000 (4)], data as for holotype, are deposited in the Zoologisches Museum Hamburg (ZMH Reg. No. A57/98). Three other paratypes [No. 2000 (1), 2000 (5-7)], including nine paratypic eggs are housed in Borok (data as for holotype).

**Other material.** N of Bering Island, moss sample on soil, 500 m from sea coast, collected by A. Vasiljeva, 18 July 1995, slides No. 2158 (1-3, 5-7). Six specimens and nine eggs of the new species were found together with *Amphibolus* sp., *Hypsibius dujardini* and *Murrayon pullari*. A slide with a specimen and egg from this locality [No. 2158 (6)] is also deposited in Hamburg (ZMH No. A 58/98).

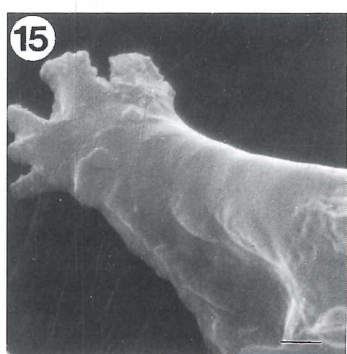
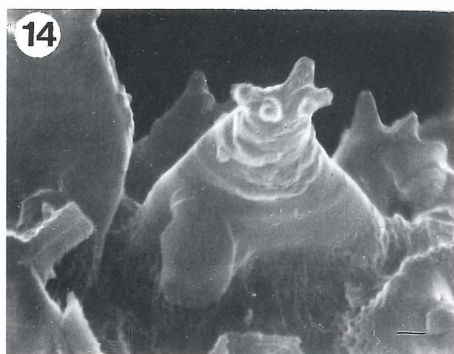
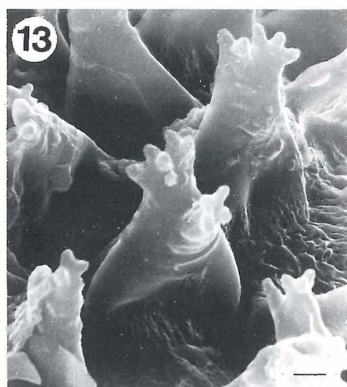
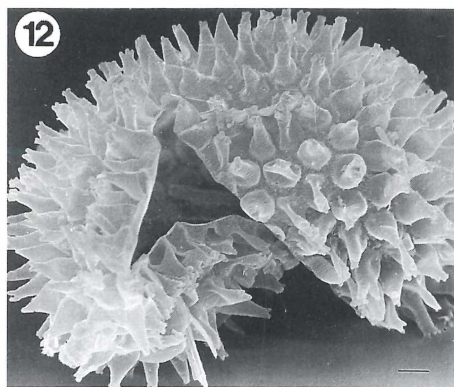
**ETYMOLOGY.** The species is dedicated to D. Derviz, who kindly collected for me the material from Bering Island.

**DIAGNOSIS.** *Dactylobiotus* without eyes and dorsolateral papillae, with long claws, especially on legs IV. Eggs with relatively large conical processes, distally bi-, tri- or polyfurcated, rarely with a pointed end.

**DESCRIPTION.** Body 390-710 µm long (holotype: 710 µm), plump, light brown. No eyes. Cuticle rugose (Fig. 9), without pores and conical papillae. Mouth opening surrounded by 10 buccal lamellae, the buccal armature similar to that of other *Dactylo-*

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Figs 7-11. *Dactylobiotus dervizi* sp. n.: 7 - buccal armature, dorsal; 8 - buccal armature, ventral; 9 - detail of the cuticle surface, dorsal; 10 - claws of legs II; 11 - detail of egg (all bars = 10 µm. Figs 7-11: DIC).



Figs 12-15. *Dactylobiotus dervizi* sp. n., eggs: 12 - general view of empty shell; 13-15, details of egg processes (all scale bars = 10  $\mu$ m. Figs 12-15: SEM).

*biotus* species: with a wide posterior band of well developed teeth, with a medio-dorsal and a medio-ventral ridges, one pair each of latero-dorsal and latero-ventral ridges (Figs 2, 7, 8). Stylets curved, with furcae. Relatively narrow buccal tube (length 75, 80, 62  $\mu$ m; diameter 7.3, 9.0, 6.0  $\mu$ m) terminating in well developed apophyses. Distance from cephalic end of buccal tube to stylet supports is 56.5, 61.0, 46.0  $\mu$ m (*pt* index = 75.3; 76.3; 74.2%, respectively).

Pharyngeal bulb round or slightly oval (75 x 75  $\mu$ m, first paratype) containing two macroplacoids (Fig. 2). First macroplacoid (24.0, 26.5, 17.0  $\mu$ m) longer than second (14.0, 17.5, 11.0  $\mu$ m) with a projection in middle; second macroplacoid with constriction at posterior part. With short rods in pharyngeal bulb between apophyses and the 1st macroplacoids.

Claws of *Dactylobiotus*-type, with very long principal branches and relatively developed secondary ones. (Figs 3-5, 10), similar to that of other *Dactylobiotus* sp. with a ball and socket link in the place of divergence of branches (this peculiarity was not reported for the genus). All claws with well developed short accessory points. The claws are connected by long and thick cuticular bars, near claws formed similarly like lunulae. The measurements of claws in the holotype: the 1st leg = 36  $\mu\text{m}$ , length of secondary branch = 12.5  $\mu\text{m}$ ; the 2nd leg = 38 and 13  $\mu\text{m}$ , respectively; the 3rd leg = 38.0 and 13.5  $\mu\text{m}$ ; 4th leg 57.0 and 15.5  $\mu\text{m}$  (*pt* index = 76.0% and 20.7%); in the paratype 390  $\mu\text{m}$  long: the 1st leg = 29 and 10  $\mu\text{m}$ ; 4th leg = 42 and 15  $\mu\text{m}$ .

Spherical eggs are ornamented and freely laid (Figs 6, 11-15). The diameter of eggs without processes 111-117  $\mu\text{m}$ . The processes of eggs are conical 7.0-11.5  $\mu\text{m}$  long, usually with bi-, tri- or polyfurcated tips, often divided into very small branches. Diameter of the process bases about 9  $\mu\text{m}$ , the distance between them 1.5 – 2.0  $\mu\text{m}$ . Among the above-mentioned processes sometimes occur conical ones (with a pointed end) or slightly bulbous in shape. The egg shell without areolation or reticulation, but with irregularly distributed and often numerous pores. On the circumference of egg occur 31-36 processes. One egg with well developed embryo.

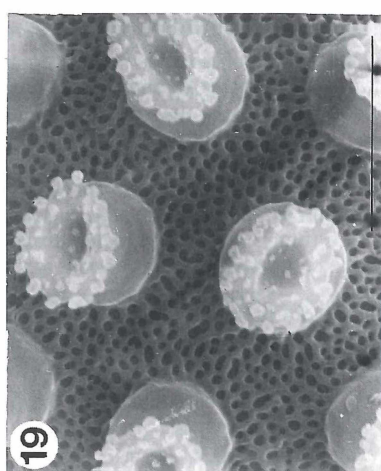
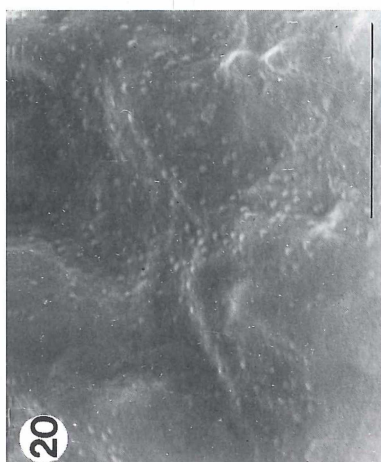
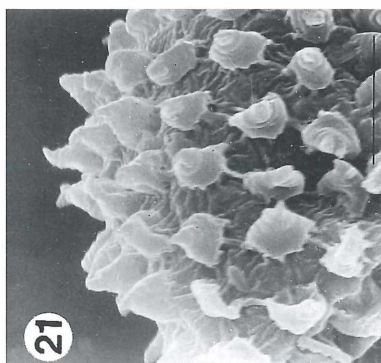
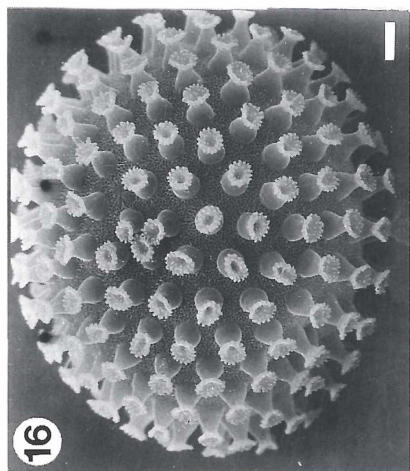
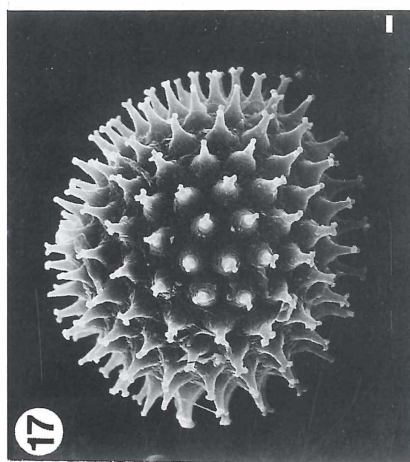
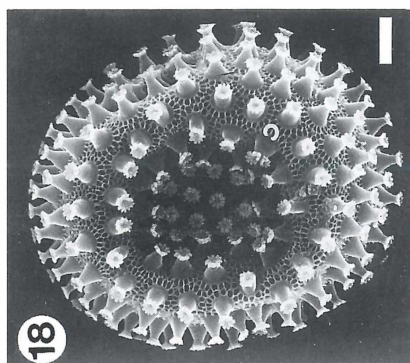
REMARKS. The new species can be easily distinguished from all species of the genus *Dactylobiotus* by the characteristic form of its egg processes. Only *D. parthenogeneticus* Bertolani, 1981 has the processes slightly similar to that of *D. dervizi* sp. n., but in the latter taxon they are considerably longer (7.0-11.5  $\mu\text{m}$  versus 4.0-4.5  $\mu\text{m}$ ). Adults of the new species can be reliably distinguished from *D. ampullaceus* (Thulin, 1911), *D. caldarellai* Pilato & Binda, 1994, *D. dispar* (Murray, 1907), *D. haplonyx* Maucci, 1980 and *D. parthenogeneticus* only by longer claws present in new taxon. From other species with long claws [*D. ambiguus* (Murray, 1907), *D. grandipes* Schuster et al., 1977 and *D. selenicus* Bertolani, 1981] the new species differs by the absence of eyes and by the presence of cuticular rods in bulb; moreover, *D. dervizi* sp. n. differs from two latter species by the absence of dorsolateral papillae and from *D. selenicus* also by the presence of accessory points on claws I-III (in the description of *D. selenicus* was erroneously reported that this species has no accessory points on all claws; in fact, these structures are present, though weakly developed on the claws IV).

## Discussion

The most common species in the Komandorskiye Islands is a cosmopolitan *Hypsibius dujardini*, found in 13 samples. Other cosmopolitan taxon, *Macrobiotus harmsworthi*, was found in 11 samples similar in distribution. *Hypsibius convergens* and *Murrayon pullari*, the latter known from the Holarctic and South America, were all found in 9 samples. The Holarctic *Macrobiotus hufelandi* was recorded in 8 samples, whilst Holarctic *Macrobiotus crenulatus*, *Diphascon rugosum*, cosmopolitan *D. pingue* and European *M. harmsworthi obscurus* were found in 6 samples. Other species occurred more rarely. Two new species are known only from this archipelago. Only 12 species are common for both islands, the Jacquard coefficient is equal 29.3%.

The tardigrade fauna of these islands is represented by the following cosmopolitan elements (the division is based on McInnes 1994: the exception is *Macrobiotus hufelandi* which I consider as a Holarctic taxon): *Diphascon pingue* (sensu PILATO &





Figs 16-21. *Macrobiotus joannae* Pilato & Binda: 16 - egg, 19 - detail of egg shell; *Adorybiotus granulatus* (Richters): 17 - egg; *Macrobiotus hufelandi* (Schultze): 18 - egg; *Murrayon pullari* (Murray): 20 - detail of the cuticle surface, dorsal; 21 - detail of egg (scale bars: 17 = 100  $\mu$ m, all other = 10  $\mu$ m. Figs 16-21: SEM).



Table 1. A list of tardigrades from the Komandorskiye Islands (the first figure indicates the number of specimens found, the second one the number of eggs; the number of positive samples is given in parentheses).

Species	Medny Island	Bering Island	Σ
<i>Echiniscus arctomys</i> Ehrenberg, 1853	1		1
<i>E. merokensis</i> Richters, 1904	1	1	2(2)
<i>E. robertsi</i> Schuster & Grigarick, 1965	1		1
<i>E. wendti</i> Richters, 1903	22(1)		22(1)
<i>Hypechiniscus gladiator</i> (Murray, 1905)		6(3)	6(3)
<i>Adorybiotus granulatus</i> (Richters, 1903)		4+2(2)	4+2(2)
<i>Amphibolus</i> sp.		7(2)	7(2)
<i>Calohypsibius ornatus</i> (Richters, 1900)		5(1)	5(1)
<b><i>Dactylobiotus dervizi</i> sp. n.</b>		10+19(2)	10+19(2)
<i>Diphascon belgicae</i> Richters, 1911		3(3)	3(3)
<i>D. higginsii</i> Binda, 1971	1	1	2(2)
<i>D. pingue</i> (Marcus, 1936)	1	36(5)	37(6)
<i>D. prorsirostre</i> Thulin, 1928		1	1
<i>D. rugosum</i> (Bartoš, 1935)		12(6)	12(6)
<i>D. scoticum</i> Murray, 1905		3(3)	3(3)
<i>Doryphoribius macrodon</i> Binda et al., 1980		1	1
<i>Doryphoribius</i> sp.		2(1)	2(1)
<i>Hypsibius antonovae</i> (Biserov, 1990)		2(1)	2(1)
<i>H. convergens</i> (Urbanowicz, 1925)	10(3)	30(6)	40(9)
<i>H. dujardini</i> (Doyère, 1840)	2(2)	84(11)	86(13)
<i>H. pallidus</i> Thulin, 1911	1	4(2)	5(3)
<i>H. zetlandicus</i> (Murray, 1907)	13(3)		13(3)
<i>Isohypsibius arbiter</i> Binda, 1980		11(2)	11(2)
<i>I. dastychi</i> Pilato et al., 1982		6(1)	6(1)
<i>I. elegans</i> (Binda & Pilato, 1971)		15(2)	15(2)
<i>I. prosostomus</i> Thulin, 1928		1	1
<i>I. sattleri</i> Richters, 1902		2(2)	2(2)
<i>Macrobiotus pallari</i> Maucci, 1954	5+1(3)	0+1	5+2(4)
<i>M. crenulatus</i> Richters, 1904	4+5(3)	2+1(3)	6+6(6)
<i>M. harmsworthi</i> Murray, 1907	0+1	29+8(10)	29+9(11)
<i>M. h. obscurus</i> Dastych, 1985		116+18(6)	116+18(6)
<i>M. hibernicus</i> Murray, 1911		10(1)	10(1)
<i>M. hufelandi</i> Schultze, 1834	14+4(2)	101+22(6)	115+26(8)
<i>M. hufelandi</i> -group sp. n. 1	0+2(1)		0+2(1)
<i>M. hufelandi</i> -group sp. n. 2	87+30(4)		87+30(4)
<i>M. joannae</i> Pilato & Binda, 1983		15+2(1)	15+2(1)
<i>M. islandicus</i> Richters, 1904	1		1
<i>M. richtersi</i> Murray, 1911		18+5(2)	18+5(2)
<i>M. tenuis</i> -group		1	1
<i>Milnesium tardigradum</i> Doyère, 1840	2(1)	3(1)	5(2)
<i>Murrayon pullari</i> (Murray, 1907)	2+10(4)	48+43(5)	50+53(9)
<i>Ramazzottius</i> sp. n.		1	1

BINDA 1977, i.e. = *D. alpinum*), *D. scoticum*, *Echiniscus arctomys*, *E. wendti*, *Macrobiotus harmsworthi*, *M. richtersi*, *Hypsibius convergens*, *H. dujardini*, *H. pallidus*, *Isohypsibius sattleri*, *Milnesium tardigradum* (11 species). The subcosmopolitan element (4 species) comprises *Echiniscus merokensis*, *Calohypsibius ornatus*, *Diphascon prorsirostre*, *Isohypsibius prosostomus*. The Holarctic element includes 7 species: *Adorybiotus granulatus*, *Diphascon belgicae*, *D. rugosum*, *Macrobiotus pallarii*, *M. crenulatus*, *M. hufelandi* and *M. hibernicus*. The Palearctic element is represented by only two species: *Hypsibius zetlandicus* and *Isohypsibius arbiter*, the Nearctic only by a single *Echiniscus robertsi*. The species *Hypsibius antonovae*, *Macrobiotus harmsworthi obscurus* and *Isohypsibius dastychi* are known from Europe; *Macrobiotus joannae*, *Isohypsibius elegans* and *Doryphoribius macrodon* from Palearctic and Australia, *Hyechiniscus gladiator* and *Diphascon higginsii* from Holarctic and New Zealand and *Macrobiotus islandicus* is known from Holarctic and Indo-Malaysia. Finally, *Murrayon pullari* was reported from the Holarctic and South America. Thus, cosmopolitan and Holarctic elements predominate tardigrade fauna of this archipelago.

### Acknowledgements

I would like to thank J. Trunova, D. Derviz and A. Vasiljeva (Moscow) for the collected samples. I am extremely grateful to Prof. R. Bertolani (Modena, Italy) for a possibility of work in his laboratory with tardigrades of the archipelago in 1996. This work was supported by grants from the Russian Foundation for Basic Research No. 97-04-48150 and the Russian Academy of Sciences No. 98.

### Literature

- Biserov, V., 1988: Limnetic tardigrades of some areas in the U.S.S.R. - Zool. Zh., **67** (12): 1798-1811. Moscow. (In Russian, English summary).
- Biserov, V., 1991: An annotated list of Tardigrada from European Russia. - Zool. Jahrb. (Syst. Ökol.), **118**: 193-216. Jena.
- Biserov, V., 1996: Tardigrades of the Taimyr Peninsula with descriptions of two new species. - Zool. Jour. Linn. Soc., **116** (1-2): 215-237. London.
- Dastych, H., 1985: West Spitsbergen Tardigrada. - Acta zool. cracov., **28**: 169-214. Kraków.
- McInnes, S. J., 1994: Zoogeographic distribution of terrestrial/freshwater tardigrades from current literature. - J. Nat. Hist., **28**: 257-352. London.

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Autor(en)/Author(s): Biserov Vladimir I.

Artikel/Article: [The Tardigrada of the Komandorskiye Islands, with a description of Dactylobiotus dervizi sp. n. \(Eutardigrada, Macrobiotidae\) 327-336](#)