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An annotated list of Alaskan *Tardigrada*

1. Introduction

Only seven species of *Tardigrada* from the whole Alaskan territory were known. One species was reported by M a t h e w s (1938), other six were quoted by S c h u s t e r and G r i g a r i c k (1965). Those data reflect the poor state of knowledge of water-bears fauna of Arctics — a region, which studies seem to be very promising.

2. Materials

Mr. Richard H. Thomas has very kindly given me 64 samples of mosses collected mainly in the Brooks Range Mountains and Alaska Range Mountains. Eighteen samples did not contain *Tardigrada* while in 46 others I have found 447 specimens belonging to 27 species. The mosses were collected in the following localities:

1. (65°19′ N, 149°06′ W). Approximately 110 km S of Yukon River; moss from soil between *Eriophorum vaginatum tussocks* 730 m a.s.l. (5 samples).

2. (66°05′ N, 150°30′ W). About 3 km W of No Name Creek, moss from soil from wet sheltered *Picea mariana stand*, 180 m a.s.l. (2 samples).

3. (66°17′ N, 150°30′ W). About 6 km S of Olsons Lake near Kanuti River, mosses from soil from a mesic meadow, 400 m a.s.l. (4 samples).

4. (66°46′ N, 150°38′ W). Gobbler's Knob, about 2 km S of Prospect Creek, moss overlying non-calcareous rock, 670 m a.s.l. (1 samples).

5. (67°07′ N, 150°25′ W). About 10 km SE of Twelvemile Mountain, from soil from a wet *Salix* area, 300 m a.s.l. (3 samples).

6. (67°35′ N, 149°50′ W). About 6 km SW of Sukakpak Mountain, moss from soil from an area of *Salix* and *Betula* shrubs, 450 m a.s.l. (2 samples).

7. (68°00′ N, 149°45′ W). About 20 km NW of Snowden Mountain, moss from soil from *Salix* dominated shrubs tundra, 800 m a.s.l. (5 samples).

8. (68°10′ N, 149°25′ W). Atigun Camp, moss from soil from sedge tundra, 1000 m a.s.l. (2 samples).

9. (68°16′ N, 149°24′ W). About 10 km N of Atigun Camp, moss from soil from wet *Salix* — *Carex* tundra, 900 m a.s.l. (2 samples).

10. (68°38′ N, 149°34′ W). Toolik Camp, moss from soil underlain by non-calcareous rock, 760 m a.s.i. (8 samples).

11. (68°50′ N, 148°47′ W). About 6 km SW of Kakuktukruich Bluff, moss from soil from wet *Carex* tundra, 450 m a.s.l. (4 samples).

12. (69°25′ N, 148°42′ W). About 32 km S of Franklin Bluffs Camp, mosses from soil from tussock tundra (*Eriophorum vaginatum*), 400 m a.s.l. (2 samples).

13. (69°27′ N, 148°35′ W). About 28 km S of Franklin Bluffs Camp, tundra with northern-most *Betula*, mosses from soil, 180 m a.s.l. (2 samples).

14. (63°23′ N, 145°45′ W). Terminal moraine of the Castner Glacier with *Betula* and *Salix* shrubs. Mosses from soil, 1000 m a.s.l. (3 samples).

15. (63°25′ N, 145°34′ W). Tundra vegetation about 13 km up the Castner Glacier from the above mentioned locality. Mosses from soil, 1525 m a.s.l. (15 samples).

16. (63°43′ N, 148°56′ W). Mount McKinley National Park, Riley Creek Campground, *Picea glauca* dominated forest. Moss from soil, 610 m a.s.l. (1 sample).

17. (63°31′ N, 149°58′ W). Mount McKinley National Park, Polychrome Pass. Alpine tundra with *Betula nana* and *Salix* sp. shrubs, mosses from soil. 1100 m a.s.l. (3 samples).

The samples from localities 1—13 were collected in June, 1978 and other samples in August, 1979.

3. Species list

Echiniscus (Hypechiniscus) gladiator Murray, 1905.

Length 190 μm. The outer claws of IV pair of legs with a small spine (about 0.5 μm long) near their bases. The other features in accordance with Petersen's (1951) and Argue's (1971) descriptions.

Locality: 17(1) [1]).

Echiniscus (Echinisscus) merokensis merokensis Richters, 1904 [2]).

Length 150—200 μm. Two specimens without dorsal appendages D_2. Other features agree with the description of Thulin (1911), Petersen (1951) and Lattes (1975).

Macrobiotus hufelandi Schultze, 1834.

Length 230—910 μm. The chorion processes of eggs and surface between them agree with description of Toftner, Grigarick and Schuster (1975) (Figs. 9, 10 and 14).

Localities: 1(47 + 5 eggs), 2(2), 3(1), 6(9), 7(1), 8(5), 9(12), 10(28 + 13 eggs), 11(44 + egg), 12(7 + egg), 14(19 + 5 eggs), 15(24).

[1]) The figure before parentheses indicates the number of locality, in parentheses is the number of specimens found.

[2]) Species new for the Alaskan fauna.

Macrobiotus echinogenitus Richters, 1904 [3]).

Length 200—320 μm. The specimens and eggs in accordance with Argue (1971) description.

Localities: 1(1 + 6 eggs), 3(3 + 2 eggs), 8(2), 9(1), 10(11 + 7 eggs).

Macrobiotus spectabilis Thulin, 1928 [4]).

Length 260—720 μm. The specimens and eggs conforming with redescription of Dastych (1973) and Maucci and Pilato (1974).

Locality: 15(13 + 2 eggs).

Macrobiotus granulatus Richters, 1903 [4]). (Fig. 1).

Length 630 and 750 μm. Distribution of body granulation (0.5—1.0 μm in size) agree with the description of Durante Pasa and Maucci (1979). Buccal tube of *coronifer*-type, narrower before stylets supports (outer diameter 6 μm) than beyond them (9.5 μm). Inner diameter of buccal tube 2 μm (in the specimens 630 μm long). The surface of chorion egg between processes with very narrow (0.5 μm in width) and irregular striation (Fig. 1). Other features developed typically (Petersen 1951, Hallas 1972).

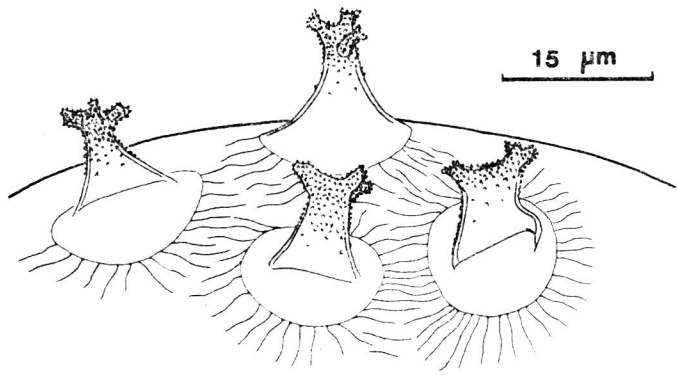

Fig. 1. *Macrobiotus granulatus* Richters — fragment of egg

Locality: 17(2 + eggs).

Macrobiotus islandicus Richters, 1904.

Length 360 μm. The surface of egg processes is covered with very small (about 0.3 μm) and irregular granulation. The ring without granulation around the processes does not occur. Other features agree with Petersen's (l.c.) description.

Locality: 17(1 + egg).

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[3]) Species new for the Alaskan fauna.

[4]) Species new for the United States fauna.

Macrobiotus cfr. *willardi* Pilato, 1977

Length 130—820 μm. The specimens are almost identical with the original description (P i l a t o 1977 a) except the position of marcoplacoids (the first and second ones) which are lying closer to each other in this form. Unfortunately the lack of eggs makes impossible the exact determination of this species.

Locality: 17(2).

Macrobiotus hibernicus Murray, 1907 [5])

Length 170—210 μm. Cuticle with characteristic developed granulation (M a r c u s 1936).

Locality: 12(4).

Macrobiotus harmsworthi Murray, 1907 [6])

Lengh 210—310 μm. Typical specimens (A r g u e 1971).

Localities: 1(5 + egg), 3(5), 6(1), 8(4 + egg), 9(14 + egg), 10(2), 12(8). 15(1), 17(6 + 2 eggs).

Macrobiotus montanus Murray, 1910 [6])

Length 190—310 μm. The specimens and eggs in accordance with the A r g u e' s (1971) description. The surface of eggs processes in phase microscope without "pseudopores" which were described in Californian population (G r i g a r i c k, S c h u s t e r and T o f t n e r 1973).

Localities: 1(8 + 3 eggs), 9(4 + egg).

Macrobiotus intermedius Plate, 1888 [6])

Length 140—210 μm. Typical specimens and eggs (A r g u e 1971).

Localities: 1(1 + eggs), 6(2).

Isohypsibius tuberulatus (Plate, 1888) [6])

Length 180—218 μm. Typical specimens (A r g u e 1971).

Locality: 14(3).

Isohypsibius bakonyiensis (Iharos, 1964 [5])

Length 180 μm. Specimen agrees well with P i l a t o's (1973) redescription.

Locality: 1(1).

Isohypsibius sp.

Length 155 μm. The dorsum with 6 rows of tubercules. In the rows 1, 3 and 5 there are three tubercules, rows 2, 4 and 6 each with seven. Moreover cuticle is covered with large granulation (2 μm in size) distincly developed in the front of the body, less distinct on particular tubercules. Pharynx oval with two macroplacoids; the first one has a tiny incision on the outer side and is a little longer than the second macroplacoid. The claws small (7 μm on IV-th pair of legs). Inner claws of I—III pair of legs without cuticular swellings at their bases.

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[5]) Species new for United states fauna.

[6]) Species new for the Alaskan fauna.

This specimen belongs to "*tuberculatus*" — group which needs a complete revision. The poorly preserved specimen makes an exact determination impossible.

Locality: 9(1).

Hypsibius pallidus Thulin, 1911 [7])

Length 210—230 μm. Typical specimens (Petersen 1951).
Localities: 1(1), 6(1), 15(1).

Hypsibius convergens (Urbanowicz, 1925) [7])

Length 180—200 μm .Typical specimens (Petersen 1951).
Localities: 10(3), 14(5).

Hypsibius oberhaeuseri (Doyère 1840) [7])

Length 160—250 μm. Cuticle smooth, pigment light yellow-rose.
Localities: 1(23 + 3 eggs), 14(1).

Diphascon angustatum Murray, 1905 [7])

Length 680—710 μm. Typical specimens (Argue 1971, Pilato 1973).
Localities: 10(1), 11(1), 17(2).

Diphascon spitzbergense Richters, 1903 [7])

Length 280—290 μm. Typical specimens (Argue 1971, Pilato 1973).
Localities: 3(3), 10(1).

Diphascon prosirostre Thulin, 1928 [8])

Length 170—290 μm. Buccal tube without dropshaped thickening. Typical specimens (Thulin 1928, Argue 1971).

Localities: 1(1), 10(4), 14(19), 15(2).

Diphascon bullatum Murray, 1905 [8])

Length 220—240 μm. The specimens are in accordance with the Argue's (1974) description.
Locality: 14(2).

Diphascon iltisi (Schuster and Grigarick, 1965 [8])

Length 180—200 μm. Typical specimens (Schuster and Grigarick 1965, Dastych 1974).
Locality: 12(3).

Diphascon scoticum Murray, 1905 [8])

Length 250—450 μm. The specimens agree with the Pilato's (1974) redescription.
Localities: 1(1), 6(1), 9(4), 10(11), 11(10), 17(3).

Diphascon alpinum Murray, 1906

Length 150—210 μm. Specimens with 3 macroplacoids of increasing size and a microplacoid and a septulum. Also other features are in ac-

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[7]) Species new for the Alaskan fauna.

cordance with the Petersen's (1951) description. Very confused situationin the whole "alpinus" — group (including "*arduifrons* — *prosirostris*") needs a redescription, according to a Pilato's opinion (1977 b).

Localities: 1(3), 9(1), 10(3), 11(1), 12(1), 14(6), 17(7).

Diphascon cfr. *rugosus* (Bartoš, 1935)

Length 240—260 μm. The dorsum is covered with densely distributed granulation which is a little irregular in shape (2 μm in size). Buccal apparatus not developed ("simplex" stage). Inner claws of I—III pair of legs with cuticular swellings.

Locality: 9(2).

Milnesium tardigradum Doyère, 1840 [8])

Length 310—620 μm. Typical specimens (Argue 1971, Pilato 1973).

Localities: 1(1), 9(1), 15(1).

4. Discussion

The ecology and zoogeography of *Tardigrade* are still little known and many conclusions have a provisional character. A limited material presented in this paper and the reasons mentioned above allow for only a few general remarks.

Seven species of *Tardigrada* were only quoted from Alaska Mathews 1938, Schuster and Grigarick (1965). They were: *Echiniscus* (*E.*) *robertsi* Schuster and Grigarick, *Echiniscus* (*H.*) *gladiator* Murray, *Pseudechiniscus suillus* Ehrenberg, *Calohypsibius ornatus* (Richters), *Diphascon alpinum* Murray, *Macrobiotus hufelandi* Schultze and *Macrobiotus islandicus* Richters. Taking into consideration the material being discussed 27 species are known at present from that area, 3 of uncertain systematic position such as *Macrobiotus* cfr. *willardi* Pilato, *Isohypsibius* sp. and *Diphascon* cfr. *rugosus* (Bartoš). Of these 20 are new records for the Alaska fauna, and four of them, *Macrobiotus spectabilis* Thulin, *M. granulatus* Richters, *M. hibernicus* Murray and *Isohypsibius bakonyiensis* (Iharos) [10]) were not previously reported from the United States; the first two are new for the North America fauna.

Most of the discussed species are very widely distributed, while *Echiniscus* (*E.*) *robertsi* Schuster and Grigarcik is only known from Alaska. *Macrobiotus spectabilis* Thulin, *M. granulatus* Richters and *Diphascon iltisi* Schuster and Grigarick are worthy of notice. At present, known distribution of *M. spectabilis* Thulin (Hallas 1977, Durante Pasa and Maucci 1979, Dastych 1980, the author knows this species also from Caucasus and Spitsbergen) and *D. iltisi* Schuster and Grigarick (the mountains of California and Korea — Schuster and Grigarick 1965, Dastych 1974) allows to include these species in boreal — mountain element. *M. granulatus* Richters represents probably an arctic element and was quoted till now from Norway (Richters 1903, Hal-

[8]) Species new for the Alaskan fauna.

[10]) In the light of the Pilato's redescription (1973) of *Isohypsibius sattleri*.

las 1972, Durante Pasa and Maucci 1979) and Greenland (Petersen 1951).

The composition of *Tardigrada* fauna may indicate the acidity or basicity of substratum from which the samples were collected. In the investigated material the greater part of species belong to meso-, oligo-, and acalciphilous ones which are connected with acid substratum (comp. Dastych 1980); no eucalciphilous species was found there. These observations agree well with the description of localities and collector remarks (Richard H. Thomas ,in litt.) though it must be addmitted that role (chemical reaction) of substratum, which is probably of great importance in the distribution of *Tardigrada*, requires much more investigation.

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5. References

1. Argue C. W. 1971 — Some terrestrial Tardigrades from New Brunswick, Canada — Can. J. Zool., 49: 401—415.
2. Argue C. W. 1974 — Tardigrades from New Brunswick, Canada — Can. J. Zool. 52: 919—922.
3. Dastych H. 1973 — Redescription of *Macrobiotus spectabilis* Thulin, 1928 (*Tardigrada*) — Bull. Acad. Pol. Sc., 24: 823—825.
4. Dastych H. 1974 — North Korean *Tardigrada* — Acta zool. cracov., 19: 125—145.
5. Dastych H. 1980 — Niesporczaki (*Tardigrada*) Tatrzańskiego Parku Narodowego — Monografie Fauny Polski, 9: 1—232.
6. Durante Pasa M. V., Maucci W. 1979 — Moss *Tardigrada* from the Scandinavian Peninsula — Zesz. nauk. Uniw. Jagiell., 25: 47—85.
7. Grigarick A. A. Schuster R. O., Toftner E. C. 1973 — *Macrobiotus montanus* from California (*Tardigrada: Macrobiotidae*). Pan Pacific Entomol. 43: 229—231.
8. Hallas T. 1972 — Some consequences of varying egg-size in *Eutardigrada* — Vidensk. Meddr. dansk. naturh. Foren., København, 135: 21—31.
9. Hallas T. 1977 — Survey of the *Tardigrada* of Finland — Ann. Zool. Fennici, 14: 173—183.
10. Lattes A. 1975 — Differences in the sculpture between adults and juveniles of *Echiniscus quadrispinosus*. A note on the importance of quantitative parameters in the systematics of the *Echiniscidae* — Mem. Ist. Ital. Idrobiol., 32 (Suppl.): 171—176.
11. Marcus E. 1936 — *Tardigrada* — Das Tierreich, 66: 1—340.
12. Mathews G. B. 1938 — *Tardigrada* from North America — Amer. Midl. Nat., 19: 619—627.
13. Maucci W., Pilato G. 1974 — *Macrobiotus spectabilis* Thulin, 1928 e Macrobiotus grandis Richters, 1911: due buone specie di *Eutardigrada* — Animalia, 1: 245—255.
14. Petersen B. 1951 — The Tardigrade — Fauna of Greenland — Medd. Grønland, København, 150: 1—94.

15. Pilato G. 1973 — Precisazioni e rettifiche alla descrizione di alcune specie di Tardigradi e considerazioni su alcuni problemi inerenti al loro studio — Boll. Accad. Gioenia Sc. Nat. Catania, 12: 157—175.
16. Pilato G. 1974 — Studio su *Diphascon scotium* J. Murr., 1905 (*Eutardigrada*) e alcune altre specie ritenute ad esso affini — Animalia, 1: 73—88.
17. Pilato G. 1977 a — *Macrobiotus willardi*, a new species of *Tardigrada* from Canada — Can. J. Zool., 55: 628—630.
18. Pilato G. 1977 b — Precisazioni e rettifiche alla descrizione di alcune specie di Tardigradi (seconda nota) — Animalia, 4: 35—51.
19. Richters F. 1903 — Nordische Tardigraden — Zool. Anz., 27: 168—172.
20. Schuster R., Grigarick A. 1965 — *Tardigrada* from Western North America with emphasis on the fauna of California — Univ. Calif. Publ. Zool., 76: 1—67.
21. Thulin G. 1911 — Beitrag zur Kenntnis der Tardigradenfauna Schwedens — Ark. Zool., 7: 1—60.
22. Thulin G. 1928 — Über die Phylogenie und das System der Tardigraden — Hereditas, 11: 207—266.
23. Toftner E. C., Grigarick A. A., Schuster R. O. 1975 — Analyses of scanning electron microscope images of *Macrobiotus* eggs — Mem. Ist. Ital. Idrobiol., 32 (Suppl.): 393—411.

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