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The Tardigrada Fauna of Mongolia (Central Asia) with a Description of *Isohypsibius altai* sp. nov. (Eutardigrada: Hypsibiidae)

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Łukasz Kaczmarek and Łukasz Michalczyk (2006) The Tardigrada fauna of Mongolia (Central Asia) with a description of *Isohypsibius altai* sp. nov. (Eutardigrada: Hypsibiidae). *Zoological Studies* **45**(1): 11-23. The Tardigrada fauna of Mongolia was analyzed on the basis of the historical literature, specimens collected in 1980 by A. Pacyna, and the present research (conducted in 2000). In this paper, a list of 62 species known from Mongolia is given. During the study, 15 species were identified as new to Mongolia and 6 as new to science. Five of the new species (*Itaquascon mongolicus* Kaczmarek et al., *Platicrista horribilis* Kaczmarek and Michalczyk, *Bryodelphax asiaticus* Kaczmarek and Michalczyk, *Isohypsibius archangajensis* Kaczmarek and Michalczyk and *Minibiotus weglarskae* Michalczyk et al., 2005) were described in separate papers, and the 6th species, *Isohypsibius altai* sp. nov. is described herein. It differs from the most-similar *I. macrodactylus* (Maucci) and *I. irregibilis* Biserov by the presence of only 2 macroplacoids in the pharynx and a narrower buccal tube. It also differs from *I. irregibilis* by the presence of microplacoids and the lack of a projection on the upper part of the internal claws. *Diphascon sexbullatum* Ito was recorded during the present research. This is only the 2nd record of this species, and the 1st microphotographs of this species are provided in this paper. A key is provided for determining the species currently reported from Mongolia.
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Key words: New species, New records, Taxonomy, Faunistics.

The phylum Tardigrada consists of small (50-1200 μm), bilaterally symmetrical micrometazoans commonly called "water bears". Tardigrada are divided into 3 classes: Heterotardigrada (armored), Eutardigrada (unarmored) and Mesotardigrada (with only 1 dubious species, *Thermozodium esakii* Rahm, known from Japanese thermal springs). Currently, more than 800 terrestrial and/or freshwater species are known (McInnes 1994, Guidetti and Bertolani 2005 and later descriptions).

Papers on Mongolian tardigrades were first published by Iharos (1965 1968 1973) and Maucci (1988). These papers reported a total of 43 taxa, including: *Echiniscus filamentosus mongoliensis* Iharos and *E. filamentosus f. aspinosa* Iharos which are now considered synonyms of *Echiniscus testudo* (Doyére), and *Macrobiotus mongolicus* Maucci which was new to science. Another species mentioned in Iharos (1973) as *Hypsibius* sp. was an unidentifiable exuvium that could have been either a *Hypsibius* or *Diphascon*. In 1980, Prof. Anna Pacyna (Jagiellonian University, Kraków, Poland) collected environmental samples in the Altai Mountains, some of which were analyzed by Prof. Barbara Węglarska (Jagiellonian University), but the results of that investigation were never published. We have reexamined this material using modern taxonomic methods. An additional 75 moss and lichen sam-

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ples were collected during a scientific expedition to Mongolia in 2000 in which the 1st author participated.

In this paper 62 species of Mongolian tardigrades are reported. The list is based on earlier papers published by Iharos (1965 1968 1973) and Maucci (1988), slides made by Prof. Węglarska, and specimens found in the samples collected from northern Mongolia in 2000. During the study, 15 species were identified as new records for Mongolia and 6 were new to science. Five of the new species: *Itaquascon mongolicus* Kaczmarek et al., *Platicrista horribilis* Kaczmarek and Michalczyk, *Bryodelphax asiaticus* Kaczmarek and Michalczyk, *Isohypsibius archangajensis* Kaczmarek and Michalczyk, and *Minibiotus weglarskae* Michalczyk et al., 2005 were described in separate papers (see Kaczmarek and Michalczyk 2003 2004, Kaczmarek et al. 2002, Kaczmarek and Michalczyk 2004, Michalczyk et al. 2005). The 6th new species, *Isohypsibius altai* sp. nov., was found in the collection of Prof. Węglarska, and is described in this paper.

MATERIALS AND METHODS

During a scientific expedition to Mongolia in 2000, the 1st author collected 75 moss and lichen samples in the northern part of the country. Samples were collected, prepared, and examined using standard methods (e.g., Dastych 1988). Tardigrades found in Mongolia in 1980 and 2000 were identified using a key to the world Tardigrada fauna (Ramazzotti and Maucci 1983) and original papers.

All measurements of the new species both in the description and on the plates are given in micrometers [μm]. Structures were measured only if their orientation was suitable. Body length was measured from the anterior tip to the end of the body, not including the hind legs. Buccal tube length and the level of the stylet support insertion point were measured according to Pilato (1981). Buccal tube widths were measured as the external diameters at the level of the stylet support insertion point. Lengths of the claw branches were measured from the base of the claw to the top of the branch, including accessory points. The *pt* ratio is the ratio of the length of a given structure to the length of the buccal tube expressed as a percentage (Pilato 1981). In the description of the holotype, the *pt* ratio is given after the value in micrometers in square brackets and italics ([*12.9*]).

Photomicrographs were made using a phase-contrast microscope and a Nomarski differential interference contrast (DIC) microscope. All drawings were made using a camera lucida associated with the DIC microscope.

Measurements of *I. macrodactylus* (Maucci) and *I. irregibilis* Biserov were taken from the original descriptions (Maucci 1978, Biserov 1992).

Numbers of specimens and samples in which the specimens were found are given in parentheses after the elevation (in meters above sea level); e.g. (10/4) indicates 10 specimens found in 4 samples, and (2+5/3) indicates 2 specimens and 5 eggs found in 3 samples).

If the name of a researcher is not indicated, it means that the specimens were collected and prepared by Ł. Kaczmarek.

RESULTS

List of species recorded in Mongolia
[a]Species found during the present study as new to Mongolia.
[b]Species found in Mongolia and described as new to science.

Class Heterotardigrada Marcus
Order Echiniscoidea Marcus
Family Echiniscidae Thulin

Genus *Bryodelphax* Thulin

1. ***Bryodelphax asiaticus*** Kaczmarek and Michalczyk 2004[b]

Localities in Mongolia: Chubsugul Ajmak, Chubsugul National Park (NP), *Larix* sp. forest near Chubsugul Lake: mosses from rocks 1650 (2 specimens/1 sample), 1850 (3/1), 1900 m (3/1), 29 July 2000.

Genus *Cornechiniscus* Maucci and Ramazzotti

2. ***Cornechiniscus cornutus*** (Richters)
Cornechiniscus cornutus (Richters): Maucci 1988.

Localities in Mongolia: Ömnogöw Ajmak (Maucci 1988).

3. ***Cornechiniscus holmeni*** (Petersen)
Cornechiniscus holmeni (Petersen): Maucci 1988.

Localities in Mongolia: Ömnogöw Ajmak (Maucci 1988).

4. ***Cornechiniscus lobatus*** (Ramazzotti)
Pseudechiniscus lobatus Ram.: Iharos 1973.

Localities in Mongolia: Ömnogöw Ajmak (Iharos 1973); Gow-Altaj Ajmag (material from

Prof. Węglarska's collection).

Genus *Echiniscus* Schultze

5. ***Echiniscus baius*** Marcus

Echiniscus baius Marcus: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

6. ***Echiniscus blumi*** Richters[a]

Localities in Mongolia: Arhangaj Ajmag, Terchijn Cagaan Nuur NP: Tarbagataj Mts., lichens and mosses from rocks 2300 (9/2), 2500 (6/2), 2600 m, (88/1), 19 July 2000; Gow-Altaj Ajmag (material from Prof. Węglarska's collection).

7. ***Echiniscus canadensis*** Murray

Echiniscus canadensis J. Murr.: Iharos 1973.

Localities in Mongolia: Ömnogöw Ajmak (Iharos 1973); Arhangaj Ajmag, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (1/1), 18 July 2000, Tarbagataj Mts., moss from rocks 2400 m, (1/1), 19 July 2000; Gow-Altaj Ajmag (material from Prof. Węglarska's collection).

8. ***Echiniscus granulatus*** (Doyére)

Echiniscus granulatus Doy.: Iharos 1973.

Localities in Mongolia: Ömnogöw Ajmak (Iharos 1973); Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: mosses from rocks 1700 (3/2), 1850 m elev., (16/1), 29 July 2000.

9. ***Echiniscus merokensis*** Richters[a]

Localities in Mongolia: Arhangaj Ajmag, Terchijn Cagaan Nuur NP: Tarbagataj Mts., mosses from rocks 2200 (1/1), 2500 (3/1), 2800 m, (1/1), 19 July 2000.

10. ***Echiniscus reticulatus*** Murray[a]

Localities in Mongolia: Arhangaj Ajmag, Terchijn Cagaan Nuur NP: Tarbagataj Mts., mosses from rocks 2500 m, (2/1), 19 July 2000.

11. ***Echiniscus simba*** Marcus

Echiniscus simba Marcus: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

12. ***Echiniscus testudo*** (Doyére)

Echiniscus testudo Doy.: Iharos 1968; *E. filamentosus mongoliensis* Iharos, 1973: Iharos 1973; *E. filamentosus* f. *aspinosa* Iharos, 1973: Iharos 1973; *E. testudo* (Doy.): Maucci 1988.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Ömnogöw Ajmak (Iharos 1973); Ömnogöw Ajmak (Maucci 1988); Gow-Altaj Ajmag (material from Prof. Węglarska's collection).

13. ***Echiniscus trisetosus*** Cuénot

Echiniscus trisetosus Cuenot: Iharos 1973.

Localities in Mongolia: Ömnogöw Ajmak (Iharos 1973); Arhangaj Ajmag, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (2/1), 18 July 2000, Tarbagataj Mts., lichen from rocks 2600 m, (70/1), 19 July 2000.

14. ***Echiniscus wendti*** Richters

Echiniscus wendti Richt.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Ömnogöw Ajmak (Maucci 1988); Gow-Altaj Ajmag (material from Prof. Węglarska's collection).

Genus *Pseudechiniscus* Thulin

15. ***Pseudechiniscus jiroveci*** Bartoš[a]

Localities in Mongolia: Arhangaj Ajmak, east slope of valley near the city of Cecerleg: mosses from stones, 1600 m, (7/2), 15 July 2000; Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (1/1), 18 July 2000, Tarbagataj Mts., mosses from rocks, 2200 (3/1), 2400 (2/1), 2500 (6/2), 2700 (4/1), 2800 m, (1/1) 19 July 2000.

16. ***Pseudechiniscus suillus*** (Ehrenberg)

Pseudechiniscus suillus Ehrb.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

Genus *Testechiniscus* Kristensen

17. ***Testechiniscus spitsbergensis*** (Scourfield)

Echiniscus spitsbergensis Scourf.: Maucci 1988.

Localities in Mongolia: Ömnogöw Ajmak (Maucci 1988); Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (11/1), 18 July 2000, Tarbagataj Mts., mosses from rocks, 2200 (1/1), 2500 (40/1), 2700 m, (19/2), 19 July 2000;

Chubsugul Ajmak, Chubsugul NP, Larix sp. forest near Chubsugul Lake: mosses from rocks and soil 1650 (9/1), 1850 m, (10/2), 29 July 2000.

Class Eutardigrada Marcus
Order Parachela Schuster et al.
Family Macrobiotidae Thulin

Genus *Macrobiotus* Schultze

18. ***Macrobiotus areolatus*** Murray
Macrobiotus areolatus J. Murr.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from a wet, shallow cave, 1600 m, (2 specimens + 1 egg/1 sample), 18 July 2000.

19. ***Macrobiotus harmsworthi*** Murray[a]

Localities in Mongolia: Arhangaj Ajmak, east slope of valley near the city of Cecerleg: mosses from stones and soil, 1600 m, (45+3/4), 15 July 2000; Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), lichen from lava, 1600 m, (5/1), Tarbagataj Mts., mosses from rocks, 2200 (111+12/7), 2400 (11+1/2), 2500 (11/1) 2700 (29+3/1), 2800 m, (13/2), 19 July 2000, lichen from rock, 2700 m, (3+6/1), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: lichen from rocks 1850 m, (1/1), 29 July 2000, moss from stone, 1700 (1/1), 1900 m, (4/1), 29 July 2000, moss from fine gravel, 1950 m, (2/1), 29 July 2000, moss from cut tree, 1550 m, (5/1), 30 July 2000.

20. ***Macrobiotus hufelandi*** Schultze
Macrobiotus hufelandii C.A.S. Schultze: Iharos 1965; Macrobiotus *hufelandii* Schultze: Iharos 1968; *Macrobiotus hufelandii* Schultze: Iharos 1973.

Localities in Mongolia: Chentej Ajmak (Iharos 1968), Töw Ajmak (Iharos 1965 1968); Ömnogöw Ajmak (Iharos 1973); Arhangaj Ajmak, east slope of valley near the city of Cecerleg: mosses and lichen from stones, soil and dead wood 1600 m, (28/4), 15 July 2000; Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), mosses and lichens from lava, 1600 m, (166+5/5), 18 July 2000, Tarbagataj Mts., mosses from rocks, 2200 (75+5/5), 2300 (29+6/2), 2400 (74+1/2), 2500 (52+2/2), 2700 (33+6/1), 2800 m, (14+4/1), 19 July 2000, lichen from rocks, 2200 (6/1), 2600 m, (33+7/1), 19 July 2000, moss from soil, 2200 (46), 2400 m, (30+1/1), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: mosses from dead wood and soil 1650 (1/1), 1850 m, (2/1), 29 July 2000, moss from rocks, 1850 m, (1+1/1), 29 July 2000; Bulgan Ajmak, valley near the city of Bugat, 23 km to the N of Bulgan, *Larix* sp. forest, 1300 m, moss from rock (3+6/1) 2 Aug. 2000.

21. ***Macrobiotus islandicus*** Richters
Macrobiotus islandicus Richt.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

22. ***Macrobiotus mongolicus*** Maucci[b]
Macrobiotus mongolicus sp. nov.: Maucci 1988.

Localities in Mongolia: Ömnogöw Ajmak (Maucci 1988).

23. ***Macrobiotus montanus*** Murray[a]

Localities in Mongolia: Arhangaj Ajmak, east slope of valley near the city of Cecerleg: moss from dead wood, 1600 m, (1+1/1), 15 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: moss from soil 1850 m, (48/3), 29 July 2000.

24. ***Macrobiotus richtersi*** Murray
Macrobiotus richtersi J. Murr.: Iharos 1965; *Macrobiotus richtersi* J. Murr.: Iharos 1968; *Macrobiotus richtersi* J. Murr.: Iharos 1973.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Ömnogöw Ajmak (Iharos 1973); Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), mosses from lava, 1600 m, (6+1/2), 18 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: moss from soil, 1600 m, (1/1), 29 July 2000.

25. ***Macrobiotus spectabilis*** Thulin[a]

Localities in Mongolia: Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from a wet, shallow cave, 1600 m, (70+2/1), 18 July 2000.

26. ***Macrobiotus willardi*** Pilato[a]

Localities in Mongolia: Gow-Ałtaj Ajmag (material from Prof. Węglarska's collection).

Genus *Minibiotus* Schuster

27. ***Minibiotus intermedius*** (Plate)
Macrobiotus intermedius Plate: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Arhangaj Ajmak, east slope of valley near the city of Cecerleg: moss and lichen from stone, 1600 m, (9/2), 15 July 2000; Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (9/2), 18 July 2000, near the top of volcano Chorgijn Togoo (Chorgo), moss from volcanic rubble, 1900 m, (2/1), 18 July 2000, Tarbagataj Mts., mosses from rocks and soil, 2400 (7+1/2), 2700 m, (33+4/1), 19 July 2000; Bulgan Ajmak, valley near the city of Bugat, 23 km N of Bulgan, *Larix* sp. forest, 1300 m, moss from rocks (75+2/2) 2 Aug. 2000.

28. ***Minibiotus weglarskae*** Michalczyk, Kaczmarek and Claxton, 2005[b]

Localities in Mongolia: Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), mosses and lichen from lava, 1600 m, (6/3), 18 July 2000, Tarbagataj Mts., mosses from rocks, 2200 (3/2), 2400 m, (21/1), 19 July 2000, lichen from rocks, 2700 m, (40+2/1), 19 July 2000.

Genus *Murrayon* Bertolani and Pilato

29. ***Murrayon hibernicus*** (Murray)[a]

Localities in Mongolia: Arhangaj Ajmak, Terchijn Cagaan Nuur NP: Tarbagataj Mts., moss from rocks, 2700 m, (1/1), 19 July 2000.

Genus *Richtersius* Pilato and Binda

30. ***Richtersius coronifer*** (Richters)
Macrobiotus coronifer Richt.: Iharos 1973; *Adorybiotus coronifer* (Richters): Maucci 1988.

Localities in Mongolia: Ömnogöw Ajmak (Iharos 1973, Maucci 1988); Arhangaj Ajmak, Terchijn Cagaan Nuur NP: Tarbagataj Mts., mosses from rocks, 2500 (27+18/1), 2700 ml, (12+3/2), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: moss from rock, 1650 (28+20/1), 1850 m, (10+2/1), 29 July 2000.

Family Calohypsibiidae Pilato

Genus *Calohypsibius* Thulin

31. ***Calohypsibius ornatus*** (Richters)
Hypsibius ornatus Richt.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Arhangaj Ajmak, Terchijn Cagaan Nuur NP: Tarbagataj Mts., moss from rocks, 2500 m, (1/1), 19 July 2000.

Family Hypsibiidae Pilato

Genus *Hypsibius* Ehrenberg

32. ***Hypsibius convergens*** Urbanowicz
Hypsibius convergens Urb.: Iharos 1965; *Hypsibius convergens* Urb.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Arhangaj Ajmak, east slope of valley near the city of Cecerleg: moss from stone, 1600 m, (1/1), 15 July 2000; Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (2/1), 18 July 2000, Tarbagataj Mts., mosses from rocks, 2200 (8/1), 2800 m, (9/2), 19 July 2000, lichen from rocks, 2300 m, (1/1), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugl Lake: moss from dead wood, 1650 m, (3/2), moss from soil, 1650 m, (1/1), 29 July 2000, moss from cut tree, 1550 m, (1/1), 30 July 2000.

33. ***Hypsibius dujardini*** (Doyére)
Hypsibius dujardini Doy.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Arhangaj Ajmak, east slope of valley near the city of Cecerleg: moss from soil, 1600 m, (3/1), 15 July 2000; Arhangaj Ajmag, Terchijn Cagaan Nuur NP field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from a wet, shallow cave, 1600 m, (23/2), 21 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugl Lake: moss from soil, 1650 m, (2/1), moss from dead wood, 1650 m, (3/2), 29 July 2000.

34. ***Hypsibius microps*** Thulin
Hypsibius microps Thul.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

35. ***Hypsibius novemcinctus*** Marcus
Hypsibius novemcinctus Marcus: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

36. ***Hypsibius pallidus*** Thulin
Hypsibius pallidus Thul.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Arhangaj Ajmak, Terchijn Cagaan Nuur NP: Tarbagataj Mts., moss from rocks, 2800 m, (3/1), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugl Lake: moss from cut tree, 1550 m, (3/1), 29 July 2000, moss from dead wood, 1550 m, (3/1), 29 July 2000.

37. ***Hypsibius scabropygus*** Cuénot[a]

Localities in Mongolia: Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugl Lake: lichen from tree 1550 m, (2/1), 30 July 2000.

38. ***Hypsibius*** sp. (exuvium)
Hypsibius sp.: Iharos 1973.

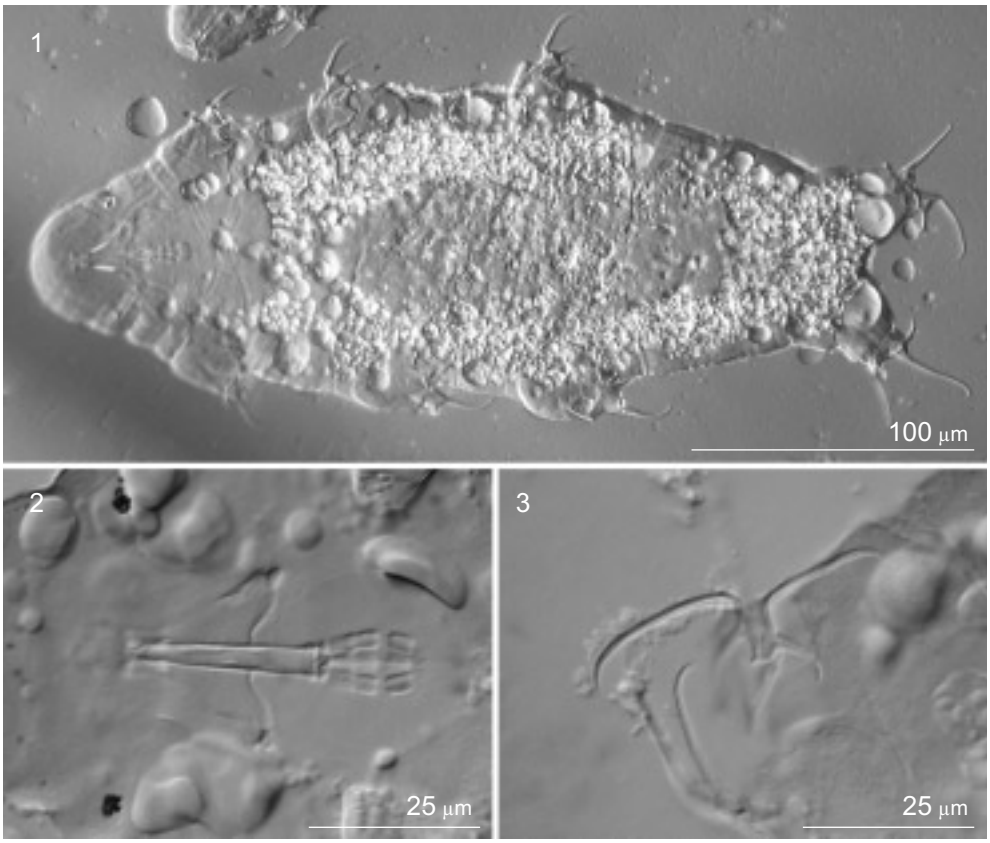
Localities in Mongolia: Ömnogöw Ajmak (Iharos 1973).

Genus *Isohypsibius* Thulin

39. ***Isohypsibius altai*** Kaczmarek and Michalczyk sp. nov.

Description (Figs. 1-5): Measurements and *pt* values of all found specimens of the new species are provided in Tables 1-2.

Holotype: Body length 260.3 (Fig. 1). Body transparent, eyes large, composed of small black dots. Cuticle smooth on dorsal and ventral sides of body. Bucco-pharyngeal apparatus of *Isohypsibius* type (Figs. 2, 4). Mouth anteroventral. Buccal tube 29.5 long and 3.8 [*12.9*] wide. At end of buccal tube triangular apophyses present. Stylet supports inserted on buccal tube at 19.5 [*66.1*]. Pharyngeal bulb spherical with 2 macroplacoids and microplacoid. First macroplacoid 5.7 [*19.3*] long with central constriction, 2nd one 3.8 [*12.9*] long. Microplacoid 1.4 [*4.7*] long. Macroplacoid row 10.5 [*35.6*] long. Placoid row 12.4 [*42.0*] long. Claws of *Isohypsibius* type and very long (Figs. 3, 5). External claws on leg I: primary branch (pb): 21.9, secondary branch (sb): 9.5, leg II: pb: 23.8, sb: 9.5, leg III: pb: 26.6, sb: 11.4, leg IV: pb: 31.4, sb: 14.3. Primary branches of claws without accessory points. Lunules absent but bases of claws expanded (Figs. 3, 5). Cuticular bars on first 3 pairs of legs present near base of claw (Fig. 1). Eggs white, smooth, and deposited in exuvium.



Figs. 1-3. *Isohypsibius altai* sp. nov. **1.** Habitus; **2.** buccal apparatus; **3.** claws of the 4th pair of legs (DIC).

Etymology

The name "*altai*" refers to the name of the Altai Mts. in Mongolia where the species was found.

Material examined

Holotype and 5 paratypes: Southern Mongolia, Altai Mts. 2500 m, leg. A. Pacyna. Specimens from the collection of Prof. Węglarska.

Additional material: One specimen in the simplex stage and 4 exuvia with eggs.

Type depositories: Holotype is deposited at the Zoological Museum of Jagiellonian University, Ingardena 6, 30-060 Kraków, Poland; 3 paratypes are preserved at the Department of Animal Taxonomy and Ecology, A. Mickiewicz University, Poznań; 2 paratypes are preserved in the collection of Ł. Michalczyk (Jagiellonian University).

Differential diagnosis

Isohypsibius altai sp. nov. is similar to *I. macrodactylus* and *I. irregibilis* by the length of the claws. The new species differs from *I. macrodactylus* and *I. irregibilis* by the presence of only 2 macroplacoids in the pharynx and a generally narrower buccal tube (3.3-4.3 in *I. altai* sp. nov., about 4.0-6.0 in *I. macrodactylus* and 3.1-6.8 in *I. irregibilis*). It also differs from *I. irregibilis* by the presence of microplacoids and the lack of a the projection in the upper part of the internal claws.

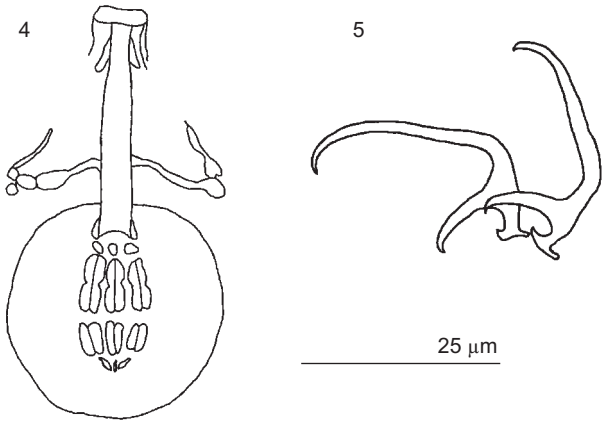
40. ***Isohypsibius archangajensis*** Kaczmarek and Michalczyk[b]

Localities in Mongolia: Arhangaj Ajmak, Terchijn Cagaan Nuur NP: Tarbagataj Mts., mosses from soil, 2200 m, (3/1), 19 July 2000.

41. ***Isohypsibius mihelcici*** (Iharos)

Hypsibius mihelcici Iharos: Iharos 1965; *Hypsibius mihelcici* Iharos: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Arhangaj Ajmak, east slope of valley near the city of Cecerleg: mosses from soil, 1600 m, (2/2), 15 July 2000; Arhangaj Ajmak, Terchijn



Figs. 4, 5. *Isohypsibius altai* sp. nov. **4.** Buccal apparatus; **5.** claws of the 4th pair of legs.

Table 1. Measurements (in μm) of selected morphological characters of all found specimens of *Isohypsibius altai* sp. nov. (in order of increasing body length)

Character	Paratype 1	Paratype 2	Holotype	Paratype 3	Paratype 4	Paratype 5
Body length	213.8	227.1	260.3	280.3	289.8	332.5
Buccal tube length	30.4	27.6	29.5	32.3	31.4	30.4
Level of the stylet support insertion point	20.0	18.1	19.5	21.9	20.9	20.0
Buccal tube external width	3.8	3.8	3.8	5.2	4.3	4.3
Macroplacoid 1 length	6.2	5.7	5.7	8.6	7.6	7.6
Macroplacoid 2 length	3.8	3.3	3.8	4.8	4.3	4.3
Microplacoid length	1.9	1.4	1.4	2.4	?	2.4
Macroplacoid row length	11.9	11.4	10.5	14.3	13.3	13.3
Placoid row length	14.3	13.3	12.4	17.1	16.2	15.7
Primary branch of claw 1 length	20.0	19.0	21.9	25.7	?	?
Secondary branch of claw 1 length	9.5	7.6	9.5	11.4	?	?
Primary branch of claw 2 length	?	23.8	23.8	25.7	?	26.6
Secondary branch of claw 2 length	?	10.5	9.5	11.4	?	11.4
Primary branch of claw 3 length	22.8	?	26.6	28.5	?	28.5
Secondary branch of claw 3 length	11.4	?	11.4	13.3	?	12.4
Primary branch of claw 4 length	34.2	30.4	31.4	42.8	?	?
Secondary branch of claw 4 length	14.3	11.4	14.3	28.5	?	?

Cagaan Nuur NP: Tarbagataj Mts., moss from rock, 2200 (1/1), 2800 m, (4/2), 19 July 2000.

42. ***Isohypsibius nodosus*** (Murray)[a]

Localities in Mongolia: Gow-Altaj Ajmag (material from Prof. Węglarska's collection).

43. ***Isohypsibius sattleri*** (Richters)

Hypsibius bakonyiensis Iharos: Iharos 1965; *Hypsibius bakonyiensis* Iharos: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Arhangaj Ajmak, east slope of valley near the city of Cecerleg: mosses from stones, 1600 m, (3/2), 15 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: mosses from rocks and soil, 1850 m, (2/2), 29 July 2000, moss from dead wood, 1650 m, (1/1), 29 July 2000; Bulgan Ajmak, valley near the city of Bugat, 23 km N of Bulgan, *Larix* sp. forest, 1300 m, moss from rocks (1/1) 2 Aug. 2000.

44. ***Isohypsibius schaudinni*** (Richters)

Hypsibius schaudinni Richt.: Iharos 1968; *Hypsibius schaudinni* Richt.: Iharos 1973.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Ömnogöw Ajmak (Iharos 1973).

45. ***Isohypsibius tuberculatus*** (Plate)

Hypsibius tuberculatus Plate: Iharos, 1965; *Hypsibius tuberculatus* Plate: Iharos, 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968).

Genus *Thulinius* Bertolani

46. ***Thulinius augusti*** (Murray)

Hypsibius augusti J. Murr.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

Remarks: The taxonomic status of *Hypsibius augusti* is still unclear (Bertolani et al. 1999, Nelson et al. 1999) and without examination of the material examined by Iharos, it is impossible to decide to which genus it should be attributed. At this stage we have decided to attribute this species to the genus *Thulinius*, but future research is required on this matter.

Genus *Astatumen* Pilato

47. ***Astatumen ramazzotti*** (Iharos)

Itaquascon ramazzotti Iharos: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

This species is probably a synonym of *A. trinacriae* (Arcidiacono).

48. ***Astatumen trinacriae*** (Arcidiacono)[a]

Localities in Mongolia: Arhangaj Ajmak, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (2/1), 18 July 2000.

Table 2. Ratio of selected morphological character length to buccal tube length (*pt*) of all found specimens of *Isohypsibius altai* sp. nov. (in the same order as in table 1)

Character	Paratype 1	Paratype 2	Holotype	Paratype 3	Paratype 4	Paratype 5
Body length	703.13	824.14	883.87	867.65	924.24	1093.75
Level of the stylet support insertion point	65.63	65.52	66.13	67.65	66.67	65.63
Buccal tube external width	12.50	13.79	12.90	16.18	13.64	14.06
Macroplacoid 1 length	20.31	20.69	19.35	26.47	24.24	25.00
Macroplacoid 2 length	12.50	12.07	12.90	14.71	13.64	14.06
Microplacoid length	6.25	5.17	4.84	7.35	?	7.81
Macroplacoid row length	39.06	41.38	35.48	44.12	42.42	43.75
Placoid row length	46.88	48.28	41.94	52.94	51.52	51.56
Primary branch of claw 1 length	65.63	68.97	74.19	79.41	?	?
Secondary branch of claw 1 length	31.25	27.59	32.26	35.29	?	?
Primary branch of claw 2 length	?	86.21	80.65	79.41	?	87.50
Secondary branch of claw 2 length	?	37.93	32.26	35.29	?	37.50
Primary branch of claw 3 length	75.00	?	90.32	88.24	?	93.75
Secondary branch of claw 3 length	37.50	?	38.71	41.18	?	40.63
Primary branch of claw 4 length	112.50	110.34	106.45	132.35	?	?
Secondary branch of claw 4 length	46.88	41.38	48.39	88.24	?	?

Genus *Itaquascon* Barros

49. ***Itaquascon mongolicus*** Kaczmarek, Michalczyk and Węglarska, 2002[b]

Localities in Mongolia: Arhangaj Ajmak, Terchijn Cagaan Nuur NP: Tarbagataj Mts., moss from rock, 2500 m, (1/2), 19 July 2000.

Genus *Diphascon* Plate
Subgenus *Diphascon* Pilato

50. ***Diphascon*** (***D.***) ***brevipes*** (Marcus)
Diphascon brevipes (Marcus): Maucci 1988.

Localities in Mongolia: Ömnogöw Ajmak (Maucci 1988).

51. ***Diphascon*** (***D.***) ***bullatum*** Murray
Hypsibius bullatus J. Murr.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

52. ***Diphascon*** (***D.***) ***pingue*** (Marcus)
Hypsibius pinguis Marcu: Iharos 1965; *Hypsibius pinguis* Marcus.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Arhangaj Ajmag, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from a wet, shallow cave, 1600 m, (3/1), 21 July 2000, Tarbagataj Mts., moss from rock, 2200 (1/1), 2400 (4/1), 2800 m, (2/1), 19 July 2000, moss from soil, 2400 m, (2/1), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: mosses from a cut tree, dead wood, and soil 1550 m, (30/4), 30 July 2000, moss and lichen from soil, 1600 m, (19/2), 29 July 2000, moss from soil, 1650 m, (9/1), 29 July 2000, moss from dead wood, 1700 m, (5/1), 29 July 2000.

53. ***Diphascon*** (***D.***) ***recamieri*** Richters
Hypsibius recamieri Richt.: Iharos 1965; *Hypsibius recamieri* Richt.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968).

54. ***Diphascon*** (***D.***) ***sexbullatum*** Ito (Figs. 6-12)[a]

Localities in Mongolia: Arhangaj Ajmak, east slope of valley near the city of Cecerleg: mosses from stones, 1600 m, (1/1), 15 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: mosses from soil 1650 (4/1), 1850 m, (15/1), 29 July 2000, moss from fine gravel, 1950 m, (2/1), 29 July 2000.

This is the 2nd record of this species. We also provide here for the very 1st time photomicrographs of the holotype of this species (Figs 8,10,12).

Subgenus *Adropion* Pilato

55. ***Diphascon*** (***A.***) ***belgicae*** Richters
Hypsibius belgicae Richt.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

56. ***Diphascon*** (***A.***) ***prosirostre*** Thulin
Hypsibius prosirostris Thul.: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Arhangaj Ajmag, Terchijn Cagaan Nuur NP: Tarbagataj Mts., moss from rocks, 2500 (1/1), 2800 m, (1/1), 19 July 2000.

57. ***Diphascon*** (***A.***) ***scoticum*** Murray
Hypsibius scoticus J. Murr: Iharos 1968.

Localities in Mongolia: Töw Ajmak (Iharos 1968).

Genus *Hebesuncus* Pilato

58. ***Hebesuncus conjugens*** (Thulin)[a]

Localities in Mongolia: Arhangaj Ajmag, Terchijn Cagaan Nuur NP: Tarbagataj Mts., mosses from rocks, 2800 m, (9/2), 19 July 2000.

Figs 6, 7. *Diphascon sexbullatum*; habitus. **6.** Specimen from Mongolia, found during the present research (DIC); **7.** holotype (PCM).

Genus *Platicrista* Pilato

59. ***Platicrista horribilis*** Kaczmarek and Michalczyk[b]

Localities in Mongolia: Archangaj Ajmag, Tehijn Cagan Nuur NP: Tarbagataj Mts., mosses from rocks, 2700 m, (3/2), 19 July 2000.

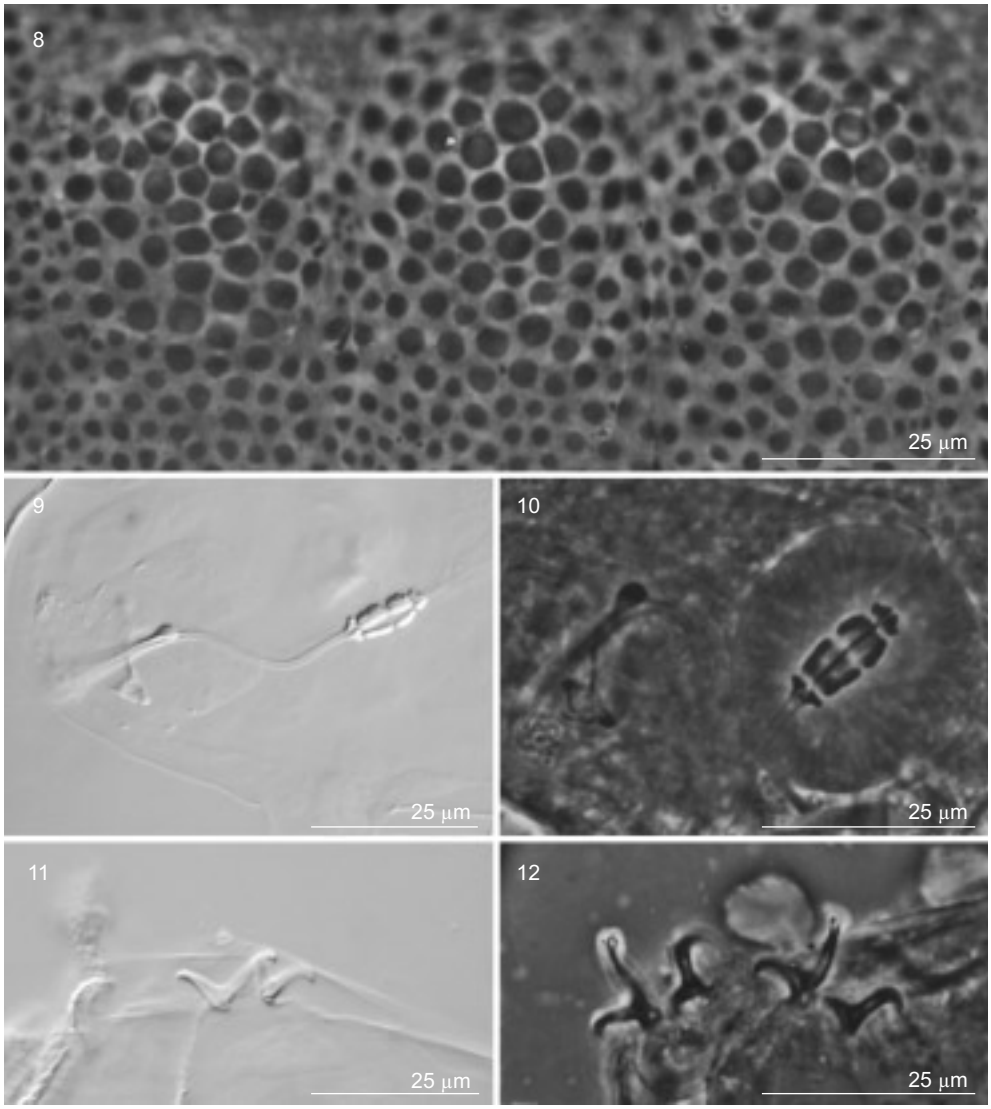
Genus *Ramazzottius* Binda and Pilato

60. ***Ramazzottius oberhaeuseri*** (Doyére)

Hypsibius oberhaeuseri Doy.: Iharos 1968; *Hypsibius oberhaeuseri* Doy.: Iharos 1973.

Localities in Mongolia: Töw Ajmak (Iharos 1968); Ömnogöw Ajmak (Iharos 1973); Arhangaj Ajmag, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (2/1), 18 July 2000, Tarbagataj Mts., moss from rock, 2600 m, (8/1), 19 July 2000, lichen from rock, 2300 m, (3/1), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: lichens from tree, 1550 m, (4/2), 30 July 2000, lichen from soil, 1600 m, (2/1), 29 July 2000; Bulgan Ajmak, valley near the city of Bugat, 23 km N of Bulgan, *Larix* sp. forest, 1300 m, moss from rock (24/1) 2 Aug. 2000.

Order Apochela Schuster et al.
Family Milnesiidae Ramazzotti



Figs. 8-12. *Diphascon sexbullatum*. **8.** Dorsal cuticle with gibbosities; **9. 10.** buccal apparatus; **11. 12.** claws of the 4th pair of legs (8, 10, and 12: holotype, PCM; 9 and 11: a specimen from Mongolia, found during the present research, DIC).

Genus *Milnesium* Doyére

61. ***Milnesium* cf. *eurystomum*** Maucci[a]

Localities in Mongolia: Archangaj Ajmag, Tehijn Cagan Nuur NP: Tarbagataj Mts., mosses from rocks, 2800 m, (41/1), 19 July 2000.

62. ***Milnesium tardigradum*** Doyére

Milnesium tardigradum Doy.: Iharos 1965; *Milnesium tardigradum* Doy.: Iharos 1968; *Milnesium tardigradum* Doy.: Iharos 1973; *Milnesium tardigradum* Doy.: Maucci 1988.

Localities in Mongolia: Töw Ajmak (Iharos 1965 1968); Ömnogöw Ajmak (Iharos 1973, Maucci 1988); Arhangaj Ajmag, Terchijn Cagaan Nuur NP: field of lava (with *Larix* sp. and *Pinus* sp. forest) near the dead volcano Chorgijn Togoo (Chorgo), moss from lava, 1600 m, (2/1), 18 July 2000, Tarbagataj Mts., mosses and lichens from rocks, 2300 (5/2) 2500 (12/2), 2600 (4/1), 2800 (40/1), 2700 m, (2/2), 19 July 2000; Chubsugul Ajmak, Chubsugul NP, *Larix* sp. forest near Chubsugul Lake: lichen from tree, 1550 m, (1/1), 30 July 2000, moss from dead wood, 1650 m, (2/1), 29 July 2000; Bulgan Ajmak, valley near the city of Bugat, 23 km N of Bulgan, *Larix* sp. forest, 1300 m, moss from rocks (4/1) 2 Aug. 2000.

A key to species reported from Mongolia (without *Hypsibius*/*Diphascon* exuvium found by Iharos (1973) and *Echiniscus filamentosus mongoliensis* and *Echiniscus filamentosus* f. *aspinosa* which are synonyms of *Echiniscus testudo*).

1. Dorsal side of body covered with cuticular plates, lateral cirrus *A* present 2
- Dorsal side of body without plates, lateral cirrus *A* absent 18
2. Pseudosegmental plate present 3
- Pseudosegmental plate absent 7
3. Cirri *A* in the shape of filaments 4
- Cirri *A* in the shape of short, thick cones 5
4. Between scapular and median plate I 4 additional plates present .....*Pseudechiniscus jiroveci* Bartoš
- Additional plates absent..... .....*Pseudechiniscus suillus* (Ehrenberg)
5. Besides cirri *A*, other lateral or dorsal filaments, spines, or teeth absent 6
- Lateral filaments *C* and *D*, dorsal spine D^d, and teeth on the margin of pseudosegmental plate present ....*Cornechiniscus holmeni* (Petersen)
6. Posterior margin of pseudosegmental plate smooth, large triangular teeth absent from pair IV of legs..... ..... *Cornechiniscus cornutus* (Richters)
- Posterior margin of pseudosegmental plate with 2 lobes or teeth, large triangular teeth on pair IV of legs present.... .....*Cornechiniscus lobatus* (Ramazzotti)
7. Median plates I and II not divided, incisions on terminal plate present 8
- Median plates I and II divided, incisions on terminal plate absent ....*Bryodelphax asiaticus* Kaczmarek and Michalczyk
8. Two rows of ventral plates absent 9
- Two rows of ventral plates present .... *Testechiniscus spitsbergensis* (Scourfield)
9. Lacking any other lateral or dorsal appendages than cirrus *A* 10
- Lateral or/and dorsal appendages other than cirrus *A* present 11
10. Median plate III present, terminal plate facetted, smooth transverse band absent from anterior part of paired plates I and II .....*Echiniscus reticulatus* Murray
- Median plate III absent, terminal plate not facetted, smooth transverse band present in anterior part of paired plates I and II .....*Echiniscus wendti* Richters
11. Dorsal appendages (spines and/or filaments) absent ..... *Echiniscus baius* Marcus
- Dorsal appendages (spines and/or filaments) present 12
12. Lack of any other lateral appendages than cirrus *A* ....*Echiniscus canadensis* Murray
- Lateral appendages other than cirrus *A* present..... 13
13. Appendages *E* present 14
- Appendages *E* absent or with very small difficult-to-see spine 16
14. All lateral appendages as filaments 15
- Lateral appendages *B*, *D*, and *E* as spines..... ..... *Echiniscus simba* Marcus
15. Appendage *B* absent, appendage *D* present .... *Echiniscus merokensis* Richters
- Appendage *B* present, appendage *D* absent .... *Echiniscus testudo* (Doyére)
16. Appendages *B* present 17
- Appendages *B* absent ..... *Echiniscus trisetosus* Cuénot
17. Dorsal appendages *C* as filaments, spine *E* absent, external claws on IV pair of legs with 1-3 spurs .... *Echiniscus blumi* Richters
- Dorsal appendages *C* as thick spines, very small spine *E* present, internal claws on pair IV of legs with spurs .... *Echiniscus granulatus* (Doyére)
18. Peribuccal and cephalic papillae absent 19
- Peribuccal and cephalic papillae present 60
19. Claws symmetrical; external and internal claws identically developed (of similar size and shape) 20
- External and internal claws always more or less dissimilar in shape and/or size 32
20. Thickness of buccal tube wall decreasing from posterior to anterior part ..... *Richtersius coronifer* (Richters)
- Thickness of buccal tube wall not decreasing from posterior to anterior part 21
21. Peribuccal lamellae present, peribuccal papulae absent, stylet supports inserted at more than 73% of buccal tube length, buccal tube wide (> 12% of buccal tube length) 23
- Peribuccal lamellae absent, peribuccal papulae present, stylet supports inserted at 54% of buccal tube length, buccal tube narrow (≤ 6.8% of buccal tube length) 22
22. Cuticle smooth without pores .... *Minibiotus intermedius* (Plate)
- Cuticle with distinct pores ..... *Minibiotus weglarskae* Michalczyk, Kaczmarek and Claxton, 2005
23. Claws of pullari type, cuticle with distinct areas of evident granulation on lateral side of body ....Murrayon hibernicus (Murray)

Claws of *hufelandi* type, cuticle without granulations on lateral side of body 24
24. Cuticle with pores 25
- Cuticle without pores 29
25. Pharynx with 2 macroplacoids 26
- Pharynx with 3 macroplacoids 28
26. Microplacoid present 27
- Microplacoid absent ..... *Macrobiotus islandicus* Richters
27. Eggs of *hufelandi* type with inverted goblet-shaped processes..... *Macrobiotus hufelandi* Schultze
- Eggs of tenuis type with processes in the shape of truncated cones ..... *Macrobiotus mongolicus* Maucci
28. Pores present on entire cuticle, egg surface between processes with areolation, processes in the shape of truncated cones ..... *Macrobiotus richtersi* Murray
- Pores present only on legs, egg surface between processes without areolation, processes in the shape of flexible cones ..... *Macrobiotus willardi* Pilato
29. Pharynx with 2 macroplacoids .... *Macrobiotus spectabilis* Thulin
- Pharynx with 3 macroplacoids 30
30. Microplacoid present, egg surface between processes without areolation, macroplacoids rounded 31
- Microplacoid absent, egg surface between processes with areolation, macroplacoids elongated .... *Macrobiotus areolatus* Murray
31. Egg processes in shape of cones with reticular design on surface, surface between processes without punctuation ..... *Macrobiotus harmsworthi* Murray
- Egg processes in the shape of small hemispheres, surface between processes with punctuations which form a reticular design .....*Macrobiotus montanus* Murray
32. Claws of *Calohypsibius* type, less then 5 μm long, dorsal side of the body covered by spines arranged in transverse bands ..... *Calohypsibius ornatus* (Richters)
- Claws of different type, more then 5 μm long, dorsal side of body with tubercles/gibbosities 33
33. Claws of *Isohypsibius* type, external and internal claws similar in shape and usually differing in size..... 34
- Claws of different type, external and internal claws differing in size and shape 41
34. Twelve peribuccal lamellae present, 3rd band of teeth present, freshwater species ..... *Thulinius augusti* (Murray)
- Twelve peribuccal lamellae absent, 3rd band of teeth absent, terrestrial species..... 35
35. Dorsal cuticle without gibbosities 36
- Dorsal cuticle with gibbosities arranged in transverse rows 38
36. Cuticle smooth, without undulations 37
- Cuticle on dorsal side of body with rounded depressions forming reticular design and with 14-16 undulations .... *Isohypsibius archangajensis* Kaczmarek and Michalczyk
37. Pharynx with 3 macroplacoids, claws on pair IV of legs - 20 μm long .....*Isohypsibius schaudinni* (Richters)
- Pharynx with 2 macroplacoids, claws on pair IV of legs 30.4-42.8 μm long ..... *Isohypsibius altai* sp. nov.
38. All rows containing even number of gibbosities 39
- Some rows containing odd number of gibbosities 40
39. Gibbosities arranged in 7 transverse rows: rows 1-5 with 6 gibbosities, rows 6 and 7 with 4 .... *Isohypsibius nodosus* (Murray)
- Gibbosities arranged in 9 transverse rows with 2, 4, or 6 gibbosities; tubercles/gibbosities with 2 or 3 short spines at tips ..... *Isohypsibius sattleri* (Richters)
40. Gibbosities arranged in 10 transverse rows: 1st and 10th rows with 5 gibbosities; 2nd, 4th, 6th, and 8th rows with 4; 3rd, 5th, and 7th rows with 6; and 9th row with 2 gibbosities ..... *Isohypsibius tuberculatus* (Plate)
- Gibbosities arranged in 8 transverse rows: 7th row with 2 gibbosities; 2nd, 4th, and 6th rows with 4; 1st, 3rd, 5th, 8th rows with 3 ..... *Isohypsibius mihelcici* (Iharos)
41. Claws of *Ramazzottius* type, main branches of external claws completely separated from rest of claw ..... *Ramazzottius oberhaeuseri* (Doyére)
- Claws of *Hypsibius* type, main branches of external claws connected with rest of claw 42
42. Buccal tube rigid without spiral thickenings 43
- Buccal tube divided into rigid anterior part (buccal tube) and flexible posterior part (pharyngeal tube) with spiral thickenings 48
43. Cuticle on dorsal side of body smooth 45
- Cuticle on dorsal side of body sculptured 44
44. Cuticle on dorsal side of caudal end body covered by irregular plates, eggs with tiny granulations .... *Hypsibius scabropygus* Cuénot
- Cuticle on dorsal side with 9 transverse bands of pigmentation, eggs smooth ..... *Hypsibius novemcinctus* Marcus
45. Septula present ..... *Hypsibius dujardini* (Doyére)
- Septula absent 46
46. Macroplacoids rod-shaped, clearly longer then wide, 1st macroplacoid with a constriction in middle, small transversal bar between claws on pair IV of legs present, eyes usually absent ..... *Hypsibius convergens* Urbanowicz
- Macroplacoids rounded or granular, small transverse bar on pair IV of legs absent, large eyes present 47
47. Basal portions of claws the same length or longer than secondary branches .....*Hypsibius pallidus* Thulin
- Basal portions of claws clearly shorter than secondary branches) ..... *Hypsibius microps* Thulin
48. Pharynx with 1 very slender macroplacoid 49
- Pharynx with more than 1 macroplacoid 51
49. Stylet supports present, dentate lunules present ..... *Itaquascon mongolicus* Kaczmarek, Michalczyk and Węglarska
- Stylet supports absent, dentate lunules absent 50
50. Pharynx elongated oval, claws long and slender .... *Astatumen ramazzotti* (Iharos)
- Pharynx oval, claws short and massive .... *Astatumen trinacriae* (Arcidiacono)
51. Apophyses for the insertion of stylet muscles in the shape of "blunt hooks", pharyngeal tube shorter than buccal tube ..... *Hebesuncus conjugens* (Thulin)
- Apophyses for the insertion of stylet muscles shaped differently, pharyngeal tube longer than buccal tube 52
52. Apophyses for insertion of stylet muscles in shape of "very wide and flat ridges", buccopharyngeal tube short and wide .... Platicrista horribilis Kaczmarek and Michalczyk
- Apophyses for insertion of stylet muscles in the shape of "semilunar hooks", buccopharyngeal tube very long and narrow 53
53. Drop-like structure between buccal and pharyngeal tube present 54
- Drop-like structure between buccal and pharyngeal tube absent 58
54. Cuticle on dorsal side of body smooth 55
- Cuticle on dorsal side of body with gibbosities covered with reticular design 57
55. Pharynx with 2 macroplacoids and septula or microplacoid 56

- Pharynx with 3 macroplacoids, septula, and microplacoid ..... *Diphascon* (*Diphascon*) *pingue* (Marcus)

56. Septula present .... *Diphascon* (*Diphascon*) *brevipes* (Marcus)
- Microplacoid present .... *Diphascon* (*Diphascon*) *recamieri* Richters

57. Gibbosities arranged in 9 transverse rows with 2 gibbosities in each row .... *Diphascon* (*Diphascon*) *bullatum* Murray
- Only 1 longitudinal row with 6 gibbosities .... *Diphascon* (*Diphascon*) *sexbullatum* Ito

58. Pharynx with 2 macroplacoids .... *Diphascon* (*Adropion*) *belgicae* Richters
- Pharynx with 3 macroplacoids 59

59. Microplacoid and septula absent .... *Diphascon* (*Adropion*) *prosirostre* Thulin
- Microplacoid and septula present .... *Diphascon* (*Adropion*) *scoticum* Murray

60. Buccal tube decreasing in width from anterior to posterior part ..... *Milnesium* cf. *eurystomum* Maucci
- Buccal tube not decreasing in width from anterior to posterior part .....*Milnesium tardigradum* Doyére

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