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Amphibolus weglarskae (Dastych), a new addition to the Tardigrada of Iceland with an updated checklist of Icelandic species. (Eohypsibiidae, Eutardigrada)

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Summary

During the examination of the extensive Tardigrada collections held at the Royal Museums of Scotland, specimens and sculptured eggs belonging to *Amphibolus weglarskae* (Dastych) were identified in the Morgan Icelandic collection. This species had not previously been reported from Iceland. A checklist of Icelandic Tardigrada species is also provided.

Introduction

THE Tardigrada are microscopic animals which can be found around the world in a very wide variety of habitats including marine, brackish, freshwater and terrestrial interstitial systems. As a phylum they show great diversity in their feeding, reproductive and survival strategies. Feeding preferences range from bacteria and plant cells for some species, to Rotifera, Nematoda and other Tardigrada for carnivorous species. There are even a few parasitic species, including *Tetrakentron synaptae* Cuénot which lives on the tentacles of the sea cucumber, *Leptosynapta galienei* Herapath, in the English Channel, (Ramazzotti & Maucci 1983). During unfavourable micro-climate conditions many of the freshwater species encyst until optimal conditions return. However, terrestrial species have been shown to have remarkable survival abilities. Many of the terrestrial species can retract their legs and shrink their bodies into a barrel-shaped *tun*. Inside this structure they lose almost all of their water content and can then either be dispersed by the wind to a more favourable niche, or remain quiescent until the return of more favourable conditions. Once optimal conditions have returned and rehydration has taken place, active life rapidly resumed.

A summary of the few previous Icelandic Tardigrada references was given by Morgan (1980). The present new addition to the Icelandic fauna record was identified from

slides in the Morgan collection held at the National Museums of Scotland, Edinburgh. Due to the very sparse number of records available on the Tardigrada from Iceland it was considered a significant find. An updated taxonomic checklist to Iceland's tardigrada species has been included because of the progress made since Morgan (1980) on the systematics of the entire phylum.

Results

Amphibolus weglarskae (Dastych)

Occurrence: Ólafsjördur, near Siglufjördur. Slide reference: Ice 18/S254 Aug. '75, from the Morgan Collection held at the National Museums of Scotland.

Description

Twenty-four specimens including fourteen eggs were examined. The specimens were well preserved, although some were positioned underneath the edge of the coverslip and covered by the transparent ringing material. The cuticle of the hatched specimens was smooth and without obvious pigmentation, unfortunately, however, many of the techniques used for preserving Tardigrada dissolve their pigmentation. The claws were of the distinctive *Amphibolus*-type, with the basal tract, primary and secondary arms clearly defined, Fig 1. The primary arms had two well developed accessory points. Smooth lunules were present at the base of all the claws. On each of the first three pairs of legs, two long thin cuticular bars were positioned posterior to the lunules of the double claws. The buccal tube was short, rigid and relatively wide, (54.7µm by 9.1µm in a specimen 457µm long). The buccal aperture was surrounded by fourteen peribuccal lamellae, but these were not visible on all specimens. The aperture at the top of the buccal tube was wide and deep, with a posterior band of teeth,

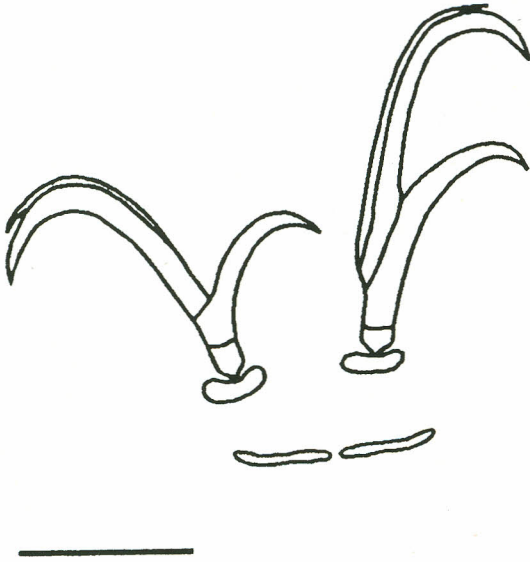


FIG 1. Claws on leg II of *Amphibolus weglarskae* (Dastych). Bar=10 μ m

variable in size and shape. The apophysis for the insertion of the stylet muscles were large ridges without the sub-divisions discussed by Biserov (1992). The pharyngeal bulb contained large apophysis and three macroplacoids. The macroplacoids were rod-shaped, the second the shortest and the third the longest. The first two macroplacoids were touching in many specimens, thereby appearing as a single very large macroplacoid with a heavy medial constriction. The latter condition was reported by some authors as the first two macroplacoids looking similar to the number 1. There was no microplacoid or septulum. The large furcae of the stylet supports had pronounced lateroventral processes terminating with bulbous expansions with a reticulate surface, Fig 2.

The identification of this species was facilitated by the presence of a large number of sculptured eggs. None of the eggs contained well developed embryos. They ranged in diameter, excluding projections, from 77 μ m to 105 μ m, projections were up to 37 μ m high. The species-specific chorionic projections consisted of a network of inter-connecting membranous walls which had a fine reticulate sculpturing on their surface. The egg surface between the membranous projects was reticulate with approximately five or six irregularly shaped pores per partitioned section

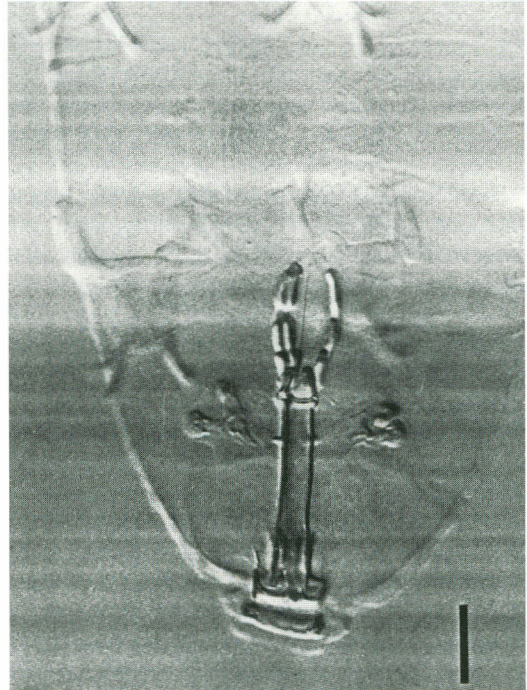


FIG 2. Buccopharyngeal apparatus of *Amphibolus weglarskae* (Dastych). Bar=20 μ m

Discussion

This species had not previously been recorded in Iceland, however it had been reported in Poland, Greenland and Norway (Dastych, 1988). This species may have had a widespread distribution in Iceland and was probably euryhydric or hydrophilic. During unfavourable microclimatic conditions, *ie* when the interstitial water was lost, this species was recorded to form cysts, (Marley, unpublished).

In addition to the *A. weglarskae* specimens examined on the slide, there were 2 specimens and one sculptured egg belonging to *Macrobiotus harmsworthi*. However, it should be noted that the label on the slide indicated that *Macrobiotus harmsworthi* and *Macrobiotus pullari* were present. *Macrobiotus pullari* was transferred to another genus by Bertolani & Pilato (1988), and should now be referred to as *Murrayon pullari* (Murray). No specimens of the latter species were present on the slide, therefore the specimens identified as *M. pullari* were in fact *A. weglarskae*. *Murrayon pullari* had previously been reported in Iceland by De Connick (1939).

Checklist of Icelandic Tardigrada species

Since Morgan (1980), the nomenclature for the Tardigrada has been reorganised many

times. The following checklist, based on the nomenclature used in Ramazzotti & Maucci (1983), includes relevant modifications published since that monograph being incorporated. The literature referenced for the new taxa designated since Morgan (1980) are as follows: Echiniscidae, *Testechiniscus* (Kristensen, 1987); Eohypsibiidae, *Amphibolus* (Bertolani, 1981; Bertolani & Kristensen, 1987); *Hebesuncus*, *Mesocrista*, *Diphascon* (*Diphascon*), *Diphascon* (*Adropion*), Itaquasconinae (Pilato, 1987); Diphasconinae (Dastych, 1992); *Pseudobiotus*, *Minibiotus*, *Dactylobiotus* (Schuster *et al*, 1980); *Ramazzottius* (Binda and Pilato, 1986); *Murrayon* (Bertolani and Pilato, 1988). The designations of the sub-genera *Macrobiotus* (*Macrobiotus*) and *Macrobiotus* (*Orthomacrobiotus*), (Biserov, 1990a, b), have not been included within this checklist, due to the questions raised in Bertolani and Rebecchi (1993). Morgan (1980) noted that the processes on the eggs of *Macrobiotus hufelandi* were variable and later published scanning electron

micrographs of two eggs, (Morgan, 1982). In light of Biserov (1990a, b) and Bertolani & Rebecchi (1993) it was assumed that more than one species from the *Macrobiotus hufelandi* group was present within the Icelandic fauna. Of the remaining amendments presented below: *Pseudechiniscus tridentifer* Bartoš has been synonymised with *Pseudechiniscus victor* (Ehrenberg) Dastych (1980); *Isohypsibius sattleri* (Richters) was designated as a *nomen nudum* in Ramazzotti & Maucci (1983) in favour of *Isohypsibius bakonyiensis* (Richters), but this was revised by Dastych (1990) who recognised *I. sattleri* as a valid species following the re-discovery of some of Richters' preserved material. The status of *Dactylobiotus macronyx* remained in question, Ramazzotti & Maucci (1983) left the status open, as did Morgan (1980). More recently, Biserov (1991), reclassified his records of *D. macronyx* to *Dactylobiotus selenicus* Bertolani. Until specimens of all questioned species can be re-examined they have all been left on the fauna list.

TABLE 1

Checklist of Icelandic Tardigrades.

Class Heterotardigrada	
Order Echiniscoidea	reported by Morgan (1980) as
Family Echiniscidae	
<i>Bryodelphax parvulus</i> Thulin	<i>Echiniscus</i> (<i>Bryodelphax</i>)
<i>Echiniscus blumi</i> Richters	<i>Echiniscus</i> (<i>Echiniscus</i>)
<i>Echiniscus granulatus</i> (Doyère)	<i>Echiniscus</i> (<i>Echiniscus</i>)
<i>Echiniscus merokensis</i> Richters	<i>Echiniscus</i> (<i>Echiniscus</i>)
<i>var. suecicus</i> Thulin	
<i>Echiniscus wendti</i> Richters	<i>Echiniscus</i> (<i>Echiniscus</i>)
<i>Pseudechiniscus islandicus</i> (Richters)	
<i>Pseudechiniscus suillus</i> (Ehrenberg)	
<i>Pseudechiniscus victor</i> (Ehrenberg)	<i>Pseudechiniscus tridentifer</i> Bartoš
<i>Testechiniscus spitsbergensis</i> (Scourfield)	<i>Echiniscus</i> (<i>Echiniscus</i>)
Class Eutardigrada	
Order Parachela	
Family Eohypsibiidae	
* <i>Amphibolus weglarskae</i> (Dastych)	<i>Macrobiotus pullari</i> (<i>partim.</i>)
Family Hypsibiidae	
Sub-Family Diphasconinae	
<i>Diphascon</i> (<i>Adropion</i>) <i>arduifrons</i> (Thulin)	<i>Hypsibius</i> (<i>Diphascon</i>)

<i>Diphascon (Adropion) belgicae</i> Richters	<i>Hypsibius (Diphascon)</i>
<i>Diphascon (Adropion) scoticum</i> Murray	<i>Hypsibius (Diphascon) scoticus</i>
<i>Diphascon (Diphascon) alpinus</i> Murray	<i>Hypsibius (Diphascon) alpinum</i>
<i>Diphascon (Diphascon) chilense</i> Plate	<i>Hypsibius (Diphascon) chilensis</i>
<i>Diphascon (Diphascon) oculatum</i> Murray	<i>Hypsibius (Diphascon) oculatus</i>
<i>Diphascon (Diphascon) pingue</i> Marcus	<i>Hypsibius (Diphascon) pinguis</i>
<i>Hebesuncus conjungens</i> (Thulin)	<i>Hypsibius (Hypsibius)</i>
Sub-Family Hypsibiinae	
<i>Hypsibius convergens</i> (Urbanowicz)	<i>Hypsibius (Hypsibius)</i>
<i>Hypsibius dujardini</i> (Doyère)	<i>Hypsibius (Hypsibius)</i>
<i>Hypsibius zetlandicus</i> (Murray)	<i>Hypsibius (Hypsibius)</i>
<i>Isohypsibius granulifer</i> Thulin	<i>Hypsibius (Isohypsibius)</i>
<i>Isohypsibius prosostomus</i> Thulin	<i>Hypsibius (Isohypsibius)</i>
var. <i>cambrensis</i> Morgan	
<i>Isohypsibius sattleri</i> Richters	<i>Hypsibius (Isohypsibius)</i>
<i>Isohypsibius schaudinni</i> (Richters)	<i>Hypsibius (Isohypsibius)</i>
<i>Pseudobiotus augusti</i> (Murray)	<i>Hypsibius (Isohypsibius)</i>
<i>Ramazottius oberhaeuseri</i> (Doyère)	<i>Hypsibius (Hypsibius)</i>
Sub-Family Itaquasconinae	
<i>Mesocrista spitzbergense</i> (Richters)	<i>Hypsibius (Diphascon) spitzbergensis</i>
Family Macrobiotidae	
<i>Dactylobiotus ambiguus</i> (Murray)	<i>Macrobiotus</i>
<i>Dactylobiotus dispar</i> (Murray)	<i>Macrobiotus</i>
<i>Dactylobiotus macronyx</i> (Dujardini)	<i>Macrobiotus</i>
<i>Macrobiotus areolatus</i> Murray	
<i>Macrobiotus echinogenitus</i> Richters	
<i>Macrobiotus furciger</i> Murray	
<i>Macrobiotus harmsworthi</i> Murray	
<i>Macrobiotus hufelandi</i> group	<i>Macrobiotus hufelandii</i>
<i>Macrobiotus islandicus</i> Richters	
<i>Macrobiotus occidentalis</i> Murray	
<i>Macrobiotus richtersi</i> Murray	
<i>Minibiotus intermedius</i> (Plate)	<i>Macrobiotus</i>
<i>Murrayon hastatus</i> (Murray)	<i>Macrobiotus</i>
<i>Murrayon pullari</i> (Murray)	<i>Macrobiotus (partim.)</i>

Class Apochela

Family Milnesiidae

Milnesium tardigradum Doyère

* new additions to the Icelandic Tardigrada fauna list.

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