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SHORTER COMMUNICATION**TARDIGRADES FROM FAYETTE COUNTY, GEORGIA**

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ABSTRACT

Only three species from the Phylum Tardigrada have been reported in Georgia. Samples of leaf litter and cryptogams collected in 2003 in Fayette County, Georgia were examined for the presence of tardigrades. *Diphasccon* (*Diphasccon*) *pingue*, *Macrobiotus coronatus*, *Macrobiotus harmsworthi*, *Macrobiotus hibiscus*, *Macrobiotus rich-tersti*, *Minibiotus furcatus*, *Minibiotus intermedius*, *Isohypsibius nodosus*, and *Milnesium tardigradum* were present in the samples. All nine are additions to the fauna of Georgia.

Key Words: Tardigrade, Tardigrada, leaf litter, Georgia

Tardigrades (Phylum Tardigrada) are minute arthropod relatives commonly found in mosses, lichens, liverworts, soil, and leaf litter. The presence of over 200 species of freshwater and terrestrial tardigrade has been recorded in North America (1). Prior to the current study, only three species had been recorded in Georgia: *Parhexapodibius pilato* (Bernard, 1977), in moss on a stream bank in Putnam County in central Georgia (3); *Echiniscus cavagnaroi* Schuster & Grigarick, 1966, in fruticose lichen on St. Catherines Island, Liberty County in southeastern Georgia (4); and *Echiniscus virginicus* Riggan, 1962, in foliose lichen in Hall County in northeastern Georgia (5).

We collected leaf litter (mixed broadleaf and coniferous), liverwort (*Jungermannia* sp.), and lichen samples from a suburban yard in Fayetteville, Fayette County, Georgia on May 12 and 13, 2003. The sampling site was in the greater Atlanta metropolitan area (33°27'35.6 N, 84°29'19.1 W, elevation 259 m). For leaf litter samples, cores were taken using a metal cylinder with an internal diameter of 10.0 cm and stored in paper bags. The soil below the top 2-4 cm of the core was not saved. Each leaf litter sample was at least one meter from any other.

After soaking in deionized water overnight, the leaf litter was passed through a series of 250 μm , 125 μm , and 42 μm sieves. We sorted through the residue using a dissecting microscope and mounted all tardigrades and eggs

in modified Hoyer's medium (5). After the slides had dried at 65°C for several hours (6), we sealed the coverslips with clear fingernail polish. Microscopical observations were made with phase contrast under oil immersion.

Tardigrades were identified using keys and descriptions in Nelson and McInnes (7) and Ramazzotti and Maucci (8), and by reference to the primary literature. Taxonomic nomenclature accords with Guidetti and Bertolani (9) and Degma and Guidetti (10). Comments on the global biogeography of tardigrade species are based primarily on McInnes (11).

We found a total of 83 specimens and 16 eggs in our samples, representing nine species of tardigrade. Six species were present in the leaf litter: *Diphascon (Diphascon) pingue* (Marcus, 1936); *Macrobiotus harmsworthi* Murray, 1907; *Macrobiotus coronatus* de Barros, 1942; *Macrobiotus richtersi* Murray 1911; *Minibiotus furcatus* (Ehrenberg, 1859); and *Isohypsibius nodosus* (Murray, 1907). Two species were found in a liverwort sample – *Milnesium tardigradum* Doyère, 1840; and *Macrobiotus hibiscus* de Barros, 1942. A foliose lichen sample yielded four species: *Macrobiotus hibiscus*, *Macrobiotus richtersi*, *Minibiotus furcatus*, and *Minibiotus intermedius* (Plate, 1888). Eggs were found of all four *Macrobiotus* species. The number of species in a sample ranged from one to four, typical of samples in the southern United States (2).

Our study brings to twelve the number of tardigrade species known to occur in Georgia. Pilato and Binda (12) categorized terrestrial tardigrade species as cosmopolitan if they occur in five or more biogeographical realms. Eight Georgia species are both cosmopolitan and widespread in North America: *Milnesium tardigradum*, *Macrobiotus harmsworthi*, *Macrobiotus richtersi*, *Minibiotus intermedius*, and *Diphascon (Diphascon) pingue*. Three species, though cosmopolitan, have not been widely reported in North America: *Macrobiotus coronatus* was previously known only from California and Tennessee and *Isohypsibius nodosus* only from Illinois and Virginia, while *Minibiotus furcatus* has never before been found in the southeastern United States. *Macrobiotus hibiscus*, though not cosmopolitan *sensu* Pilato and Binda (12), is widespread both in North America and several other continents. The recorded distributions of *Echiniscus virginicus* and *E. cavagnaroi* are restricted to the southeastern United States, the Dominican Republic, Venezuela, and the Galapagos Islands. *Parhexapodibius pilato* is known only from Michigan and Georgia.

This study should be considered a preliminary survey of tardigrade diversity in northeastern Georgia. No doubt additional species remain to be found. Tardigrade distributions are extremely patchy at fine spatial scales (13), and only the rigorous sampling programs employed by All Taxa Biological Inventories (14) can estimate their true diversity.

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REFERENCES

1. Meyer HA and JG Hinton: Limno-terrestrial Tardigrada of the Nearctic Realm. *J Limnol* 66 (Suppl. 1): 97-103, 2007.
2. Hinton JG and HA Meyer: Distribution of tardigrades in the Gulf Coast States of the United States of America with ecological remarks. *J Limnol* 66 (Suppl. 1): 72-76, 2007.
3. Bernard EC: A new species of *Hexapodibius* from North America, with a redescription of *Diphascoen belgicae* (Tardigrada). *Trans Amer Microsc Soc* 96: 476-482, 1977.
4. Christenberry D: On the distribution of *Echiniscus kofordi* and *E. cavagnaroi* (Tardigrada): *Trans Amer Microsc Soc* 98: 469-471, 1979.
5. Christenberry D and WH Mason: Redescription of *Echiniscus virginicus* Riggan (Tardigrada) with notes on life history, range, and variation. *J Al Acad Sc* 50: 47-61, 1979.
6. Hohl AM, WR Miller, and DR Nelson: The distribution of tardigrades upwind and downwind of a Missouri coal-burning power plant. *Zool Anz* 240: 395-401, 2001.
7. Nelson DR and SJ McInnes: Tardigrada. In *Freshwater Meiofauna: Biology and Ecology* (Rundle, Robertson, and Schmid-Araya, Eds) Leiden: Backhuys Publishers, pp177-215, 2002.
8. Ramazzotti G and W Maucci: Il Philum Tardigrada. *Memorie dell'Istituto Italiano di Idrobiologia* 41:1-1011, 1983.
9. Guidetti R and R Bertolani: Tardigrade taxonomy: an updated check list of the taxa and a list of characters for their identification. *Zootaxa* 845:1-46, 2005.
10. Degma P and R Guidetti: Notes to the current checklist of Tardigrada. *Zootaxa* 1579:47-53, 2007.
11. McInnes SJ: Zoogeographic distributioun of terrestrial/freshwater tardigrades from current literature. *J Nat Hist* 28:257-352,1994.
12. Pilato G and MG Binda: Biogeography and limno-terrestrial tardigrades: are they truly incompatible binomials? *Zool Anz* 240: 511-516, 2001.
13. Meyer HA: Small-scale spatial distribution variability in terrestrial tardigrade populations. *Hydrobiologia* 558:133-139, 2006.
14. Nelson DR and PJ Bartels: "Smoky Bears" – Tardigrades of Great Smoky Mountains National Park. *Southeast Nat Special Issue* 1: 229-238, 2007.