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# The Terrestrial Isopods (Crustacea: Isopoda: Oniscidea) of Plummers Island, Maryland

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*Abstract.*—A survey of the terrestrial isopods of Plummers Island, Maryland and its immediate vicinity revealed the presence of ten species representing nine genera and seven families. All are believed to have been introduced into North America from Europe. Eight of the ten species occurred throughout the study area, while two generally were limited to the edge of the Chesapeake and Ohio Canal towpath and the clearing around the historic lock keeper's house at Lock 11.

*Key words.*—Potomac River, introduced species, Chesapeake and Ohio Canal National Historic Park, flooding.

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From 1996 through the summer of 2006 the author observed forest floor invertebrates at Plummers Island, Maryland. Effort was directed toward identifying the species present and determining if they were generally distributed or showed preferences for specific habitat types. This note presents data on the species of terrestrial isopods found. Plummers Island is located along the north bank of the Potomac River near Cabin John in Montgomery County, Maryland, approximately 14.5 km northwest of Washington, D.C. The study area was the 20.5 hectare property originally owned by the Washington Biologists' Field Club, and now part of the Chesapeake and Ohio (C&O) Canal National Historic Park. Observations were made both on the Island and that portion of the adjacent mainland bounded by the Capital Beltway (I-495) to the west, the C&O Canal to the north, and Rock Run to the east. In the early part of the 20<sup>th</sup> century much of the study area was cleared of forest. However, it has undergone succession generally back to mature woodland, and includes flood plains grading to uplands. The Potomac River floods on a regular basis, usually in late winter or spring.

Terrestrial isopods were sought beneath loose bark, fallen logs, and other forest floor litter. Series of each species present were collected. Identifications of terrestrial isopods were made using keys by Schultz (1982) and Muchmore (1990) and confirmed by comparison with Maryland isopods identified by Bill Rapp and George Schultz. Voucher specimens have been deposited with the U.S. National Park Service, C&O Canal National Historic Park.

Ten species of terrestrial isopods were found within the study area. All occurred under fallen logs and other ground litter, or the loose bark of dead, standing

trees. Two of the smallest species, *Hyloniscus riparius* (<5 mm in length) and *Haplophthalmus danicus* (up to 3.2 mm in length), also were found beneath the soil surface. Individuals of both species were sifted from porous sandy loam to a depth of several centimeters, especially where earthworm castings were abundant. While *H. danicus* occurred in soil only directly beneath logs, *H. riparius* could be sifted wherever the soil was loose and readily moved beneath the surface when disturbed.

## Species Accounts

### Family Armadillidiidae

#### *Armadillidium nasatum* Budde-Lund

This species was found regularly under stones around the lock keeper's residence building at Lock 11, and under bark and fallen logs along the edge of the adjacent woodland. Individuals also were observed under litter along the edge of the forest bordering the canal towpath between Locks 10 and 12. *Armadillidium nasatum* was rarely found in the interior of the study area.

#### *Armadillidium vulgare* (Latreille)

Less common than its congener, *A. vulgare* was found among the larger population of *A. nasatum* at Lock 11. *Armadillidium nasatum* outnumbered *A. vulgare* by about two to one.

### Family Cylisticidae

#### *Cylisticus convexus* (De Geer)

This large species occurred on both the Island and the mainland. On the Island and the mainland flood

plain it was rare to uncommon but was common on the mainland upland, particularly on the slope leading up from the flood plain. Individuals were found under logs with *Oniscus asellus* and *Trachelipus rathkei*.

#### Family Oniscidae

##### *Oniscus asellus* Linnaeus

*Oniscus asellus* generally was distributed throughout the study area, on both the Island and the mainland, but was notably more common at the eastern end of the mainland in the flood plain forest near Rock Run.

#### Family Philosciidae

##### *Philoscia muscorum* (Scopoli)

This fast moving isopod was quite difficult to collect undamaged. It was of spotty occurrence but occurred locally throughout the study area. It was typically present in small aggregations beneath logs.

#### Family Porcellionidae

##### *Porcellio scaber* Latreille

This was an uncommon species in the study area. It typically was found mixed with larger concentrations of *T. rathkei* and *O. asellus*. It occurred both on the Island and the mainland. Schultz (1982) noted the presence of several color phases in this species. All study area individuals were dark gray.

#### Family Trachelipodidae

##### *Trachelipus rathkei* (Brandt)

This was the most abundant large species in the study area. It was found in large numbers under logs and bark everywhere on the Island and the mainland. It was the dominant species on the mainland floodplain, except in the forest near Rock Run, and between Rock Run and the Lock 10 river access road, where it was replaced as the dominant species by *O. asellus*. The color of this species is also variable (Van Name 1936). At Plummers Island, both brown and gray individuals were observed, with brown being most common.

#### Family Trichoniscidae

##### *Haplophthalmus danicus* Budde-Lund

This very small (3 mm), unpigmented isopod was locally common in and under logs lying on the forest floor. The largest numbers were observed on floodplains, and they were more frequently found inside of rotting logs than beneath them. *Haplophthalmus danicus* were sifted from the soil beneath logs at depths of several centimeters. Schultz (1982) also

noted the presence of *H. danicus* in the soil beneath boards. Unlike most of the local terrestrial isopods, *H. danicus* was very slow moving and unable to escape when discovered. It was found both on the Island and the mainland. Lohmander (1927) previously reported *H. danicus* from Plummers Island based on specimens in National Museum of Natural History, Smithsonian Institution, collected on 4 November 1924 by H. S. Barber.

##### *Hyloniscus riparius* (Koch)

This small species was abundant under logs and other litter on the forest floor and was found on both the Island and the mainland. A fast moving species, it frequently evaded capture by moving beneath the soil surface. Individuals were sifted from the soil in areas where earthworm castings made the upper soil layer porous. It was very common, with densities in some areas estimated to exceed three hundred individuals per square meter. This small species was notably less abundant at higher elevations where the forest floor was less moist.

##### *Trichoniscus pusillus* Brandt

Another small species, *T. pusillus* was found with *H. riparius* although it was much less common. Schultz (1965) found those two species together in New Jersey and suggested that they might also co-exist in "leaf litter of wooded streams and river bottoms" elsewhere. During the summer of 2006 collections of *Hyloniscus-Trichoniscus* were made to assess the abundance of *T. pusillus* in the study area. Series of 50 individuals were captured on both the mainland and the Island. *Trichoniscus pusillus* made up 14% and 18% of those groups, respectively. Although *T. pusillus* and *H. riparius* are superficially very similar, they can be separated easily by the presence of three ocelli in each eye of *T. pusillus*, and only one in each eye of *H. riparius*.

#### Discussion

Although the state by state distribution of terrestrial isopods in North America is poorly known, at least 16 species have been found in Maryland (George Schultz, pers. comm., Hornung et al. 2001). The ten species found within the Plummers Island study area represent 62.5% of that total. Based on published distributional data (Van Name 1936, Schultz 1982) the presence in Maryland of all ten species found during this survey was expected. However, only *A. vulgare* (Schultz 1961) and *H. danicus* (Lohmander 1927) had been recorded from Montgomery County prior to this survey.

All ten species of terrestrial isopods found within the Plummers Island study area are believed to have

been introduced from Europe (Van Name 1936, Schultz 1982). Most are very typical of disturbed areas around human habitations, but, as their presence throughout the study area shows, they have adjusted successfully to existence in mature secondary-growth forest. Eight of the ten species present (*C. convexus*, *H. danicus*, *H. riparius*, *O. asellus*, *P. muscorum*, *P. scaber*, *T. pusillus*, and *T. rathkei*) were found both on the Island and the mainland property. However, *A. nasatum* and *A. vulgare* were observed only on the mainland, where they generally were limited to the open area around the lock keeper's house at Lock 11, and the forested fringe along the towpath. Since the C&O Canal would have provided an excellent avenue for the dispersal of these immigrant isopods westward from Washington, D.C., their introduction into the study area probably occurred early. Considering that, the restriction of both *Armadillidium* species to the immediate vicinity of the lock house and the edge of the towpath suggests that they are poorly suited to life in mature deciduous forest.

Within the study area terrestrial isopods were most abundant on the floodplain; in some areas they reached densities estimated to be more than three hundred per square meter. The Potomac River floods regularly, typically in late winter or spring, and inundates major portions of the floodplain and occasionally adjacent uplands. Tajovsky (1998) showed that in the Czech Republic the abundance and diversity of terrestrial isopods was reduced on floodplains. My observations reveal that while abundance was depressed after flood events, isopod populations quickly rebounded and by the season's end had returned to apparently normal levels of abundance. However, the data presented by Tajovsky (1998) showed that the isopod populations studied were depressed by flooding. Tajovsky studied isopod populations in areas that flooded with greater frequency and duration than Plummers Island, where significant flood events typically occur less than once a year and last a few days or occasionally a week. The areas studied by Tajovsky experienced as many as 60 days of flooding a year, a considerably more stressful environment than the Potomac River flood plain in the Plummers Island area. I believe that the depression of terrestrial isopod populations observed by Tajovsky was due to flooding of greater frequency and duration than that experienced at Plummers Island.

Taylor & Carefoot (1993) examined the ability of several terrestrial isopods, including *P. scaber* and *O. asellus*, to survive submergence in water. They found that both species could survive nearly 18 hours under water and noted that the species of isopods they studied "exhibit a behavioral inclination for upward

crawling." Assuming that to be typical of most species in the study area, it would provide sufficient time for many individuals to move into trees and shrubby vegetation to an elevation above flood level. Although the flood plain of the study area was not inspected during floods, numerous terrestrial isopods were observed on tree trunks following periods of heavy rain in October of 2006. That, combined with movement of isopods onto floodplains from adjacent uplands after flood waters recede, could ensure that their diversity and abundance would return to previous levels relatively quickly. The single exception would be *H. danicus*, which moves so slowly that I do not believe it could move into foliage quickly enough to avoid rising floodwater, or to re-colonize flood plains within a single season. That suggests that *H. danicus* may be able to withstand longer periods of submergence.

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