

TRACHELIPUS RATHKEI IN NORTH AMERICA

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INTRODUCTION

This paper is based primarily upon field work done by the author in United States and Canada during the last 20 years. Vandel (1962) stated that Trachelipus rathkei (Brandt) is widely distributed in the holarctic faunal region. However, based upon this statement, we can not assume that this species can be found in all the ecological regions which comprise the Holarctic Realm. When one compares the distribution in England (Harding & Sutton 1985; Hopkin 1987; Whitehead 1988) to North America, one finds major differences.

NORTH AMERICA

In North America, Trachelipus rathkei (often referred to as Tracheoniscus, but see discussion of priority of Trachelipus in Vandel, 1962) is widely distributed east of the grassland biome in eastern deciduous woodlands, but has not been found in the southeast (Carolinas, Georgia, Florida). It is found west of the grassland biome where it is limited to the wooded floodplains along major streams. To the north it is common in the oak woodland of southern Canada. In the interior United States, Trachelipus rathkei has been taken as far south as Louisiana. It also occurs in the Pacific Northwest.

Hatch (1947) stated that Trachelipus rathkei is the "commonest oniscoid in north-eastern North America". Hatchett (1947) described it as the "predominant terrestrial isopod in the lower peninsula of Michigan" and Eberly (1954) said that Trachelipus rathkei was "perhaps the commonest isopod of Indiana". However, the above statements must be considered to be very general as specimens can not be collected in every 10 km square!.

Fieldwork carried out by the author in Nebraska, Iowa, Illinois and Ontario, suggests that Trachelipus rathkei is a deciduous woodland species. However, it does not appear to be specific to any ecological niche within the woodland. Although Nebraska, Iowa and Illinois are considered to be in the grassland biome of North America, there are sufficient woodlands along the streams to support large populations of Trachelipus rathkei. However, it can not exist in the true grassland or prairie areas. In southern Ontario, Canada, where I have collected Trachelipus rathkei, it is common in the oak woodlands, but is not found in the coniferous areas. Yet, when logging has removed the coniferous trees and deciduous trees are

allowed to repopulate the cut-over areas, Trachelipus rathkei moves rapidly in to the area.

ECOLOGICAL FACTORS

There appear to be three ecological factors which control the distribution of Trachelipus rathkei in North America, temperature, moisture and soil type.

Temperature

It is questionable whether high and low temperatures (Table 1) have any major effect on Trachelipus rathkei although extreme minima may reduce the overwintering populations. Likewise, extreme high temperatures, together with a lack of moisture, may have an effect on the breeding population. What may be more important are the mean January and July temperatures. It should be noted that the Pacific NorthWest (Washington) population, which is isolated from the main North American population by the Rocky Mountains, lives under a different temperature regime compared to the populations east of the Great Plains.

Table 1 : Extreme maximum (Max) and minimum (Min) and mean January and July temperatures (degrees Celsius), and mean annual rainfall (R, cm) recorded from 1900 to 1940 in areas in which Trachelipus rathkei is found (from Hambridge 1941).

<u>Station</u>	<u>Max</u>	<u>Min</u>	<u>Jan</u>	<u>July</u>	<u>R</u>
Nebraska, Saline Co., Crete	42	-32	-4	26	67
Vermont, Caledonia Co., St. Johnsbury	38	-43	-14	28	83
Michigan, Iron Co., Stambaugh	40	-47	-11	28	100
Louisiana, Natchitoches Parish, Robeline	43	-20	10	28	120
Washington, King Co., Seattle	39	-15	4	18	80

Moisture

From the rainfall information in Table 1, it can be observed that Trachelipus rathkei has its largest population in areas which receive a fair amount of moisture. Field observations in eastern Nebraska have shown that during periods of drought, Trachelipus rathkei are very difficult to find. However, within 24 hours following rain, they are back in their normal habitats. McQueen (1976), working in southern Ontario,

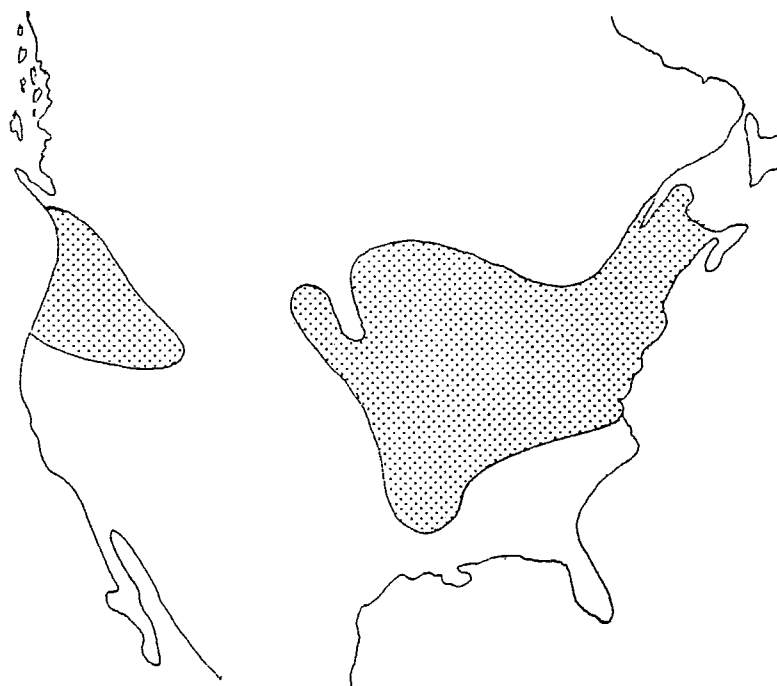


Fig. 1 : Distribution of Trachelipus rathkei in North America

found that Trachelipus rathkei required near 100% relative humidity and that if this condition was not met, mortality would occur. However, McQueen (1976) in his field work, used artificial field sites in which 30 cm x 30 cm boards were used as a surface ground cover. It is difficult to compare this habitat with the humus layer one finds in a typical deciduous forest.

Soil type

For the purpose of this discussion, we will include humus. There are a number of soil types where Trachelipus rathkei can not be found. For example, they are not found in acid soils such as one finds in coniferous woodlands. In areas with soils having a high clay content or sand content, one seldom finds this species. Humus appears to play a major role in the development of isopod populations. Different types of humus support different sized populations. For example, Oak (Quercus sp.) - Hickory (Carya) forests with up to 5 cm of humus support large populations of Trachelipus rathkei. Large populations are also found in beech (Fagus) - Maple (Acer) forests which have thick humus layers. On the other hand, under trees such as Willows (Salix) and Cottonwoods (Populus) which tend to grow on sandy soils where little or no humus develops, isopods are not found.

White (1968) studied the effect of Trachelipus rathkei on humus composition in a deciduous woodland in east-central Illinois. This woodland contained five major species of trees which were the important contributors to humus formation. These trees were Sugar Maple (Acer saccharum), Hackberry (Celtis occidentalis), Red Oak (Quercus rubra), and Bur Oak (Quercus macracarpa). Pawpaw (Asimina tribola) was predominant in the relatively dense understory in White's study. Based upon laboratory feeding tests, he concluded that Pawpaw leaves were the preferred food source. However, he states: "It should not be inferred that in nature woodlice seek Pawpaw (leaves) to the exclusion of other kinds, for these animals are omnivorous". This statement is very important because although Pawpaw is widely distributed in eastern United States, it is not abundant in many areas. Actually, Pawpaw distribution occupies only a small area of the total Trachelipus rathkei distribution.

ECOLOGICAL NICHES

If one is in a deciduous woodland, where does one find Trachelipus rathkei? Usually large aggregations can be found under partly rotten logs, under loose bark on dead trees, or under rocks. They prefer a moist area sheltered from the direct sun. As a rule, they seem to prefer woodlands where there is a good forest canopy which keeps the humus from drying. During the summer of 1987, the author collected a series of one square metre Oak humus samples from a large woodland near Garland, Seward County, Nebraska. These were extracted with a Tullgren

funnel and six of the samples contained immature specimens of Trachelipus rathkei. The mean density was 6.7 per square metre (variance = 4). This translates to a theoretical population of 66,000 per hectare.

DISCUSSION

In North America, Trachelipus rathkei is a deciduous woodland species. Vandell (1962) and Harding & Sutton (1985) state that this species is found in grasslands, wetlands and agricultural areas in England and Europe. This raises the question, are we dealing with sibling species? (Mayr 1942). There is no question that European and North American specimens are allopatric forms which are morphologically very similar. Perhaps by using biochemical techniques such as serology or paper chromatography, a physiological difference between the two populations can be established.

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