

## ***Hyloniscus riparius* (C. Koch, 1838); a pygmy woodlouse new for the UK from the Worcestershire Avon (Isopoda: Oniscidea: Trichoniscidae)**

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### **Abstract**

The woodlouse *Hyloniscus riparius* (C. Koch) is reported new for the UK from a river-side meadow in the Vale of Evesham, Worcestershire. A brief description with figures is provided to enable identification and information is given about habitats and microsites inhabited. This central European species is almost certainly an unintentional, probably recent, introduction into the Vale. Additional British and Irish sites for this ‘expansive species’ must await discovery.

**Key words:** Isopoda, Oniscidea, *Hyloniscus riparius*, new for UK, identification, habitats, distribution.

### **Introduction**

In Britain and Ireland the ‘pygmy woodlice’ of family Trichoniscidae ((Isopoda: Oniscidea: section Synocheta) are currently represented by 16 native or naturalised species (i.e. species capable of breeding outdoors) (Gregory, 2009). As the vernacular name suggests these are generally small species, many 4 mm or less in length. Their elusive, often soil dwelling, habits and difficulty of identification (often requiring dissection of male pleopods) mean they are relatively under recorded compared to the larger surface dwelling woodlice of section Crinocheta.

The genus *Hyloniscus* Verhoeff, 1908 (Isopoda: Trichoniscidae) contains 26 species mainly distributed across eastern and central Europe (Schmalfuss, 2003). Only one species, *Hyloniscus riparius* (C. Koch, 1838) has reached Western Europe, a species with a very widespread distribution across central and eastern Europe and which has been introduced into North America (Schmalfuss, 2003). In north-west Europe it has been expanding its range in recent decades (Wijnhoven, 1993; Berg *et al.*, 2008; De Smedt *et al.*, 2020). For example, in The Netherlands *H. riparius* was originally only known from inside glasshouses of the Botanic Gardens at Utrecht in 1942 (Holthuis, 1945) and was not recorded outdoors in the ‘wider countryside’ until 1991 (Wijnhoven, 1993), but within 17 years had become widespread across much of the country (Berg *et al.*, 2008). Following its discovery in The Netherlands Bilton (1993) suggested “a strong possibility that the species may be ‘hiding’ in the UK”. Despite a false alarm along the River North Esk in Scotland in 2010, which turned out to be an unexpected outlying population of *Oritoniscus flavus* (Budde-Lund) (Sivell & Gregory, 2015), there have been no reported sightings in Britain nor Ireland.

Here we report the first discovery of *Hyloniscus riparius* (C. Koch, 1838) in Britain; the first trichoniscid ‘pygmy woodlouse’ since the discovery of *Trichoniscoides helveticus* (Carl) over three decades earlier (Hopkin, 1990; Gregory, 2009).

### **The discovery**

On 12<sup>th</sup> April 2022 while searching under flood debris at Haines Meadows, Wick, Worcestershire, adjacent to the river Avon (SO968470, VC37), one of us (GF) noticed many small, fast-moving, deep purple woodlice. They were similar in appearance to *Trichoniscus pusillus* agg., but something about them wasn’t quite right. A few were captured for closer inspection. The following day additional

specimens were found on the river bank on the opposite side of the Avon at Lower Moor under scattered flood debris (Farmer, 2023).

Using the AIDGAP key (Hopkin, 1991) these were readily keyed by GF to *Oritoniscus flavus* (Budde-Lund), due to the eye comprising a single ommatidium, which ruled out the ubiquitous *Trichoniscus pusillus* agg. In Britain *O. flavus* (which is widely distributed across south-east Ireland) is only known as an introduction near Llanelli in south Wales and along the River Esk near Edinburgh (Gregory, 2009; Maguire, 2020). This species was obviously more widespread than originally thought, so could it have gone undetected in English river valleys?

Images were sent to SJG for confirmation who thought that despite the eye clearly comprising a single ommatidium they didn't look quite right for *O. flavus*. SJG forwarded the images to Warren Maguire who's familiar with this species in Scotland (Maguire, 2020) who agreed that they were not *O. flavus*, but possibly *Hyloniscus riparius*. Thus, a site visit was hastily organised with GF for the following week to correspond with the BMIG field meeting that was held in the adjacent county of Shropshire. Thus, on 22 April 2022 SJG, in the company of Warren Maguire, Thomas Hughes and Annie Northfield, were shown around Haines Meadows by GF (Fig. 1). Among the specimens collected by SJG were three males which proved to be *H. riparius*.

The following year a second population of *H. riparius* in the Vale of Evesham was discovered some 8 km upstream at The Valley (Evesham Country Park), north of Evesham (01.iv.2023, SP049471, VC 37) and also found at the same location by Paul Richards (16.iv.2023, SP049470) (record submitted to iRecord).

These are the first recorded occurrences of *Hyloniscus riparius* (C. Koch, 1838) in the UK.



**Figure 1: Searching among flood debris on Haines Meadows, 22 April 2022, where *Hyloniscus riparius* and *Trachelipus rathkii* were recorded.**

Recorders (from left to right) Warren Maguire, Annie Northfield, Gary Farmer and Thomas Hughes. Image by Steve Gregory



**Figure 2:** *Hyloniscus riparius*, live specimen observed at Haines Meadows, April 2022.  
A) Dorsal view; B) Lateral view, showing single ommatidium. Images © Gary Farmer

## Identification

### Diagnosis

*Hyloniscus riparius* is a well pigmented woodlouse with a smooth body surface, a strongly discontinuous (stepped) pereion-pleon body outline and the eye comprising a single ommatidium (Fig. 2). It is capable of rapid movement. The shape of the male 7<sup>th</sup> pereopod and the male 1<sup>st</sup> and 2<sup>nd</sup> pleopods are diagnostic.



**Figure 3: *Hyloniscus riparius*, preserved specimens from Haines Meadows, 22<sup>nd</sup> April 2022.**  
 A) Size comparison of male (above) and gravid female (below); B) Head of male showing single ommatidium; C) Antenna shown flagellum comprising ‘tapered cone’ of c. six indistinct articles and terminal clump of bristles; D) Pereiopod 7 of male showing hooked projection at base of merus (arrowed) (also see Fig. 5A); E) Merus of pereiopod 7 of a female showing feebly developed projection at base (arrowed). Images by Steve Gregory.

### Comparison with other species

More detailed information is given below, based on specimens (3♂♂, 15♀♀) collected by SJG from Haines Meadows on 22 April 2022 and freshly preserved in 75% ethanol. The specimens are currently retained in the personal collection of SJG. Comparison is made with two potential confusion species; *Trichoniscus pusillus* agg. and *Oritoniscus flavus*. All three species are included in the illustrated key, to the woodlice of northern France, which includes colour images (Noël & Séchet, 2021). Other detailed descriptions with figures are provided by Vandel (1960), Gruner (1966) and Wijnhoven (2000).

In the field confusion with the ubiquitous *Trichoniscus pusillus* agg. is highly likely, due to its similar appearance (i.e. size, shape and colour), but *H. riparius* is capable of more rapid movement. To add to the confusion, both species may be recorded together as observed at Haines Meadows. Using the standard British identifications guides (i.e. Hopkin, 1991 and Oliver & Meechan, 1993) both live animals and preserved material of *H. riparius* will readily key to *Oritoniscus flavus* due to the smooth body surface and the eye comprising a single ommatidium. However, the three ommatidia that are characteristic of *Trichoniscus* spp. are not always easy to discern in a photograph of a live specimen as they are ‘fused’ into a rounded triangle and surrounded by black pigment.

Live specimens of *H. riparius* are darkly pigmented reddish to purple-brown in life (Fig. 2) and covered with pattern of pale flecks (due to the absence of pigment corresponding to muscle insertions; Vandel, 1960). The eye and body pigments are retained upon preservation in alcohol (Fig. 3A-B). *Trichoniscus pusillus* agg. tends to be slightly paler in colour, whereas *O. flavus* tends to be a deeper, shinier purple with pale streaks bordering the epimera and has a more rounded ‘stouter’ appearance (Fig. 4). In the case of *T. pusillus* agg. body and eye pigments are also retained upon preservation, but in contrast all pigment rapidly fades (to straw-white) in preserved *Oritoniscus flavus*. The antennal flagellum of *H. riparius* is of a typical trichoniscid shape of a ‘tapered cone’ comprising five to seven very indistinct articles terminating in a group of bristles (Fig. 3C). In *T. pusillus* agg. the flagellum is typically composed of four indistinct articles.



**Figure 4: *Oritoniscus flavus*, live specimen observed at Inveresk, Midlothian.**

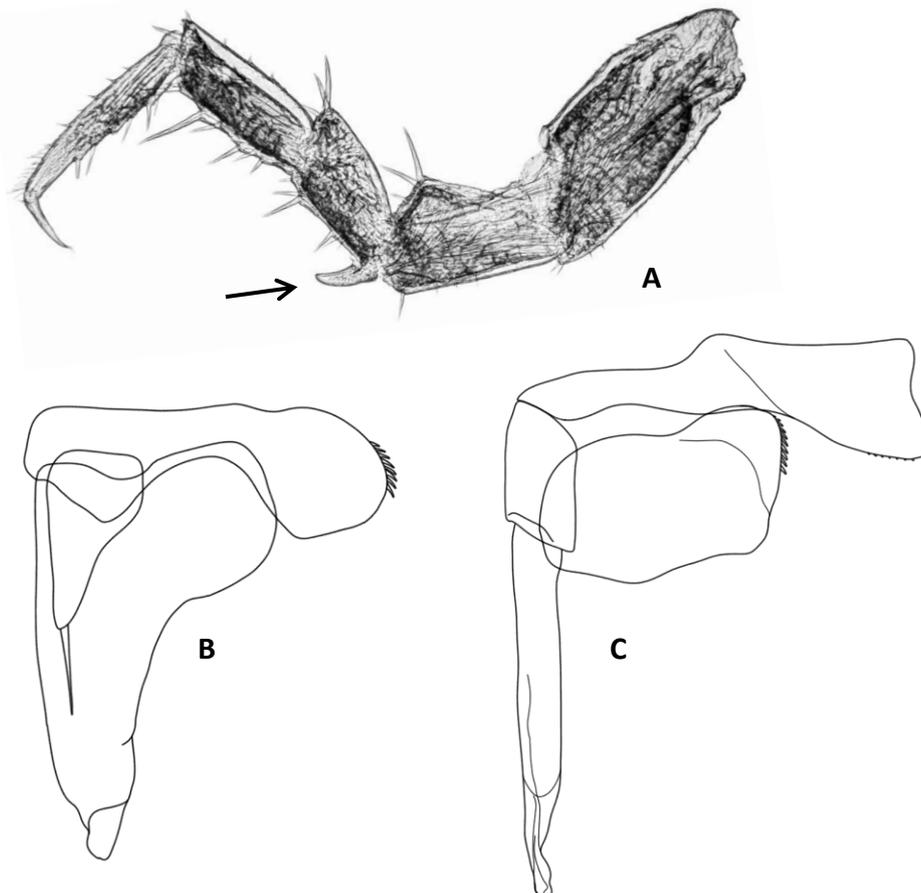
Note stouter appearance than *H. riparius* and broad pale markings bordering epimera (compare with Fig. 2A). Image from BMIG Website © Warren Maguire

Of the 18 specimens of *H. riparius* collected by SJG just three (17%) are male and these are conspicuously smaller and darker, noticeably so even in the field, than the larger paler females (Fig. 3A). The three male specimens are 2.9 mm, 3.0 mm and 3.1 mm in length (front of cephalon to tip of telson). Of the fifteen females collected eight are gravid (bearing ‘eggs’ and therefore fully grown) and these ranged in body length from 4.5 mm to 5.0 mm. This Worcestershire material is smaller than specimens recorded from continental Europe. In France Vandel (1960) gives up to 8 mm length for females (and comments that males are much smaller); in Germany Gruner (1966) gives 5 mm for males and females to 6.9 mm; and in The Netherlands Wijnhoven (1993) gives up to 4 mm for males and up to 6 mm for females.

### Male sexual characters

The male pereopod 7 bears a diagnostic hooked projection at the base of the merus which is directed ventrally (Fig. 3D, 5A)\*. Male pleopod 1 (Fig. 5B) has a large triangular exopodite, rather elongated and with a transparent lobe at its extremity. The much smaller triangular endopodite bears an elongated terminal spine. Male pleopod 2 (Fig. 5C) has a slender endopodite comprises two articles; the distal article, which terminates in a bluntly rounded tip, is about 2.5 times longer than the basal one.

\*Females may also bear a small bump/poorly defined hook on pereopod 7 (Wijnhoven, 2000) and this is seen to a greater or lesser extent in the female specimens examined from Haines Meadows (Fig. 3E).



**Figure 5:** *Hyloniscus riparius* male, from Haines Meadows, 22 April 2022 (Thomas Hughes, leg./det.). A) Pereopod 7, indicating diagnostic hooked spur at base of merus (arrowed); B) Pleopod 1, line drawing; C) Pleopod 2, line drawing. Images © Thomas Hughes.

## Habitats and Distribution

### Occurrence in Vale of Evesham

Haines Meadows lie in the flat, fertile lands known as the Vale of Evesham. The meadows are located on the south side of the river Avon at Wick, Worcestershire, and consist of a series of agriculturally improved grasslands purchased in separate plots between 2013 to 2017. They were bought as a restoration project by Vale Landscape Heritage Trust (<https://valetrust.weebly.com>), to return to traditional floodplain grazing pasture and hay meadows. The fields flood most years and earth bunds remain as a reminder of how the flood waters were managed to encourage grass growth in the past. The grasslands were species-rich but the diversity of plants has been lost over time due to early hay cutting and the use of herbicides and fertilizers. Since 2017 all chemical use has stopped and hay cutting in late summer has resumed. In the past all flood debris was removed from Haines Meadows but since about 2016 natural flood debris has been left to rot down adjacent to old flood-management banks as habitat. The 'Warwickshire' Avon rises in Naseby, Northamptonshire and flows for about 85 miles (137km) before entering the river Severn at Tewksbury.

*Hyloniscus riparius* is a surface dwelling species (Vandel, 1960) and at Haines Meadows specimens were found under flood debris, mainly comprising dead wood (Fig. 1), where it proved to be locally frequent. Searches were also made among the grassland sward beyond the accumulations of flood debris and under dead wood in a nearby small river-side copse, but additional specimens were not found. The habitat and micro-sites where *H. riparius* is recorded are very similar to those noted in The Netherlands and Belgium (see *In North-west Europe* below). Other woodlice recorded with *H. riparius* by SJG on 22 April 2022 are *Trichoniscus pusillus* agg. Brandt, *Philoscia muscorum* (Scopoli), *Oniscus asellus* Linné, *Porcellio scaber* Latreille, *Trachelipus rathkii* (Brandt) and, on higher ground, *Platyarthrus hoffmannseggii* Brandt. Millipedes recorded are *Polydesmus inconstans* Latzel, *Polydesmus coriaceus* Porat, *Proteroiulus fuscus* (Am Stein), *Ophiulus pilosus* (Newport), *Cylindroiulus britannicus* (Verhoeff), *C. punctatus* (Leach) and *Brachyiulus pusillus* (Leach). Three centipedes, *Geophilus flavus* (De Geer), *Lithobius melanops* Newport and *Cryptops hortensis* Donovan, are also recorded.

### Habitats in north-west Europe

In both The Netherlands and Belgium (Berg *et al.*, 2008; Smedt *et al.*, 2020) it is apparent that *H. riparius* is strongly associated with water courses, often riverine flood plains, but also smaller canals, streams and ditches, especially where these are contiguous with larger river systems. It is tolerant of seasonal inundation, as is *Trachelipus rathkii* (Brandt), and both species are typically found together (Berg *et al.*, 2008; Wijnhoven, 2000; Février, 2014) (as indeed observed in the Vale of Evesham). It seems to favour water courses with some tree cover, such as Poplar *Populus* spp. and Willow *Salix* spp., rather than open meadows, but it also occurs on the banks of streams and rivers bisecting villages and towns. It is frequently found in synanthropic habitats, such as botanical gardens, greenhouses and cemeteries (Berg *et al.*, 2008; Smedt *et al.*, 2020) suggesting it is readily dispersed by human activity.

When found, *H. riparius* is typically numerous. Microsites inhabited include among damp leaf litter, moss and flood debris, beneath dead wood and stones or within compost heaps (Vandel, 1960; Berg *et al.*, 2008; Wijnhoven, 2000; Smedt *et al.*, 2020). As with many trichoniscid woodlice it is most easily found when ground conditions are damp and it moves deeper into the soil during the drier summer months (Wijnhoven, 2000) and in Belgium it is more frequently found in late autumn and winter (Boeraeve, *et al.*, 2021). In parts of western Russia, where *H. riparius* has colonised since the 1990s, it may account for up to 99% of all woodlice specimens recorded and is reported to have caused a decline in abundance of native indigenous woodlouse species (Gongalsky *et al.*, 2013). Such species competition has not been documented in north-west Europe. However, Wijnhoven (2000) notes that

*H. riparius*, which is tolerant of long term submergence, tends to dominate the wettest areas, whereas *T. pusillus* agg. is more abundant in other areas.

### Distribution in north-west Europe

*Hyloniscus riparius* has a very widespread distribution across central and eastern Europe and has been introduced to North America (Schmalfuss, 2003), where it can be locally abundant and is still expanding its range (De Smedt, P, pers. comm.). Vandel (1960) considered *H. riparius* to be an ‘expansive species’, and in recent decades it has expanded its range into north-west Europe (Berg *et al.*, 2008; Séchet *et al.*, 2012; De Smedt *et al.*, 2020). In addition, it is also spreading eastwards into Russia (Gongalskya *et al.*, 2013).

Although long known from eastern France (Alpes, Vosges), and as an accidental introduction at a botanical garden in Paris (Vandel, 1960), it is only in recent years that *H. riparius* has been recorded as far west as Auvergne, Central France (Séchet *et al.*, 2012). In the Netherlands, *H. riparius* was recorded from inside glasshouses of the Botanic Gardens at Utrecht in 1942 (Holthuis, 1945), but it was not recorded outdoors in the ‘wider countryside’ until 1991 when it was discovered at Ooijpolder close to the border with Germany, from where it is believed to have colonised (Wijnhoven, 1993). When the Atlas of The Netherlands was published seventeen years later (Berg *et al.*, 2008) it was reported to be widespread across much of the country. Similarly in Belgium *H. riparius* was first recorded in 1998 (Lock & Vanacker, 1999) and is now considered common across central and eastern parts of the country and thought to be dispersing via both river catchments and human activity (De Smedt *et al.*, 2020), but at the edges of its current range seems to be colonising new territory primarily through human activity (De Smedt, P, pers. comm.). Supporting the idea of *H. riparius* being a recent colonist in Belgium all specimens of *Trichoniscus pusillus* agg. (the most likely confusion species) held by the Royal Belgian Institute of Natural Sciences (RBINS) were re-identified and no historical records of *H. riparius* were discovered (De Smedt *et al.*, 2018).

Thus, in both The Netherlands and Belgium there is evidence of initial establishment and a subsequent progressive colonisation along river catchments and through human activity.

### Discussion

It is unexpected that the first recorded occurrence of the central European *Hyloniscus riparius* is in central England, beside the Avon in the Vale of Evesham. More obvious colonisation routes would be via the southern and eastern coasts of England and penetrating inland via major river systems such as the Thames Valley. However, *H. riparius* has often been initially recorded from inside glasshouses at the edge of its range (e.g. Holthuis, 1945; Vandel, 1960; Berg *et al.*, 2008). The Vale of Evesham and surrounding area is known for its market gardening heritage ([www.explorethepast.co.uk/project/market-gardening-heritage](http://www.explorethepast.co.uk/project/market-gardening-heritage)) and more recently large areas have been covered by glasshouses to grow produce through the year (including both areas from which *H. riparius* has been recorded). There is a large movement of crops and associated materials in and out of the Vale, moving across many countries. So there is ample opportunity for species to enter the area through imported goods and then spread along the river valley. Therefore, given the isolated nature of the Vale of Evesham observations, we consider that the population of *H. riparius* here is not a relict native population, but an unintentional introduction.

In the Vale of Evesham *H. riparius* appears to be well established locally, at least at Haines Meadows and Lower Moor on opposite sides of the Avon. The presence of gravid females in the samples indicates that breeding is occurring. Evidence in The Netherlands and Belgium suggests that if conditions are suitable then *H. riparius* is able to rapidly increase in abundance and readily disperse to colonise new sites (Berg *et al.*, 2008; Smedt *et al.*, 2020). Thus, it is quite possible that *H. riparius* will also be found at other sites in the Vale of Evesham. Given its frequent association with *Trachelipus rathkii* perhaps in

the first instance the few known floodplain meadow sites for this latter species should be targeted (these are listed in Farmer, 2021). *Hyloniscus riparius* is known to be dispersed with flood debris during flood events and it will be interesting to see whether this woodlouse turns up elsewhere. However, given its synanthropic tendencies, ideally surveys should also include nearby garden centres, glasshouses, gardens, churchyards, etc.

It is also of great interest that all of the known sites for *H. riparius* discovered so far, and several additional nearby sites along the Avon, support an isolated cluster of localities for *Trachelipus rathkii* (Farmer, 2021), a species previously known as far north and west from the catchments of the upper Thames and the Gloucestershire Severn (Gregory, 2009). Both *H. riparius* and *T. rathkii* are often found together in flood plain habitats across Europe and both species have been spread globally far beyond their respective native European ranges (Schmalfuss, 2003). In North America these two species also frequently co-exist (De Smedt, P., pers. comm.). It is possible that both *H. riparius* and *T. rathkii* share the same source of colonisation into the Vale of Evesham.

It is perhaps just a matter of time before *H. riparius* is discovered along other river systems in England, such as the Severn, the Thames or the Great Ouse, where its frequent associate *Trachelipus rathkii* is known to be present. It could be easily over-looked since its most likely confusion species, the ubiquitous *Trichoniscus pusillus* agg., is rarely given a second look by most woodlouse recorders. An intensive ‘tetrad’ survey of Oxfordshire in the 1990s, which is bisected by the Thames Valley, did not record *H. riparius* (Gregory & Campbell, 1995). However, there have been few surveys of the Thames flood plain in recent decades and it is possible that *H. riparius* may be awaiting discovery as an ‘overlooked’ recent colonist? There is no obvious reason why *H. riparius* should not occur at other sites in Britain or Ireland, not just on riverside meadows, but perhaps more likely (if Belgium and The Netherlands are a guide) in synanthropic sites, such as glasshouses or gardens.

We encourage all to keep a look out for this easily over-looked woodlouse, which based on evidence in north-west Europe, could be expected to rapidly colonise new sites along the Worcestershire Avon and potentially spread into other river catchments, such as the Severn and the Thames.

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