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OniscidBase: A call for contributions to a global database to advance terrestrial isopod research

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Abstract

Terrestrial isopods (Isopoda: Oniscidea), commonly known as woodlice, are among the most recognisable soil-dwelling invertebrates and are crucial for soil functioning. They are widely distributed from temperate to equatorial ecosystems, and their distribution is strongly influenced by environmental factors, such as soil type, temperature and humidity. Terrestrial isopods have fascinated taxonomists for centuries, with over 4,100 described species across 568 genera and 38 or 39 families. These animals contribute significantly to key ecosystem processes, such as litter decomposition, nutrient cycling, and carbon sequestration. However, data on patterns of their diversity, abundance, or biomass, which are crucial for assessing their importance in ecosystem functioning worldwide, are lacking. This is partly due to the incomplete taxonomy in regions such as the tropics and the scattered nature of local georeferenced datasets. To better understand the global taxonomic patterns, species distributions, and functional roles of terrestrial isopods, we call for the compilation of a comprehensive global database that integrates taxonomy, georeferenced species records, and trait data. This database would help answer fundamental questions about the response of terrestrial isopods to environmental changes and their role in ecosystem functioning and soil health. OniscidBase, a recently launched initiative, aims to consolidate such data, facilitating the analysis of taxonomic gaps and assessing the distribution and functional importance of terrestrial isopods. The database aims to include georeferenced data on the distribution, abundance and biomass of terrestrial isopod species, and metadata on environmental parameters. Our main goals are to strengthen the taxonomic backbone for terrestrial isopods, make distribution data available for macroecological studies, and collect trait data to understand species responses to environmental changes and effects on soils. Using these data leads to a deeper understanding of the importance of terrestrial isopods as components of terrestrial ecosystems and, at the same time, highlights future research directions.

Keywords Functional trait | Georeferenced data | Macroecology | Soil Fauna | Species distribution | Taxonomy | Woodlice | Crustacean

1 Introduction

Terrestrial isopods (Isopoda: Oniscidea), commonly known as woodlice, are among the most visible and recognisable soil-dwelling animals. People frequently encounter them in cellars and gardens, making them one of the most well-known soil animal groups, alongside earthworms. They have attracted the attention of biologists since ancient times (Schmalfuss, 2008). Currently, taxonomy keeps on advancing with over 4,100 described species worldwide.

Terrestrial isopods often represent a significant portion of soil macrofauna in various ecosystems, with their abundance averaging up to 600 individuals per square meter in forests and up to 30 % of the total macrofauna abundance (Dias et al., 2005; Potapov et al., 2022). Terrestrial isopods play a crucial role in the decomposition of organic matter and soil formation by breaking down leaf litter into smaller fragments, thereby maintaining the circulation of matter and energy in ecosystems. Given their importance in ecosystems, they can be used to assess soil quality (Paoletti & Hassall, 1999). Additionally, an array of more or less specialised predators depend on isopods for prey (Sutton et al., 1980).

Despite their vital role in ecosystem functioning, many basic research questions remain unanswered. How is their abundance distributed across ecosystems? What limits their distribution? What is their absolute contribution to leaf litter decomposition? Crucial in answering these questions is a vast amount of georeferenced presence/absence, abundance and biomass data currently scattered across various sources, as well as trait data that can be used to understand and/or predict responses of terrestrial isopods to environmental changes.

Therefore, we call for a global initiative to compile taxonomic knowledge and georeferenced data on terrestrial isopods and their traits. Our goal is to aggregate available literature (from published papers to field reports and raw data), existing records in museums and private collections, and citizen science data on terrestrial isopods. To achieve this, we propose a worldwide consortium called OniscidBase, which will gather and analyse such records and make the results publicly available.

This paper aims to 1) showcase the progress made by generations of isopodologists, 2) indicate how individual researchers and amateur scientists can contribute to the database, and 3) invite you, the reader, to join the consortium. We present the state-of-the-art on terrestrial isopod taxonomic and functional diversity and review important fields of research to which the study of terrestrial isopods, as model organisms for soil fauna in general, can contribute once the extensive data on their diversity, abundance and distribution is brought together.

2 Taxonomic diversity

2.1 Systematics of terrestrial isopods

Terrestrial isopods belonging to the suborder Oniscidea Latreille, 1802, the largest and the only fully terrestrial one among the 12 Isopoda suborders and constitute a highly diversified taxon (Fig. 1). They are one of the most remarkable lineages of Crustacea that managed to conquer land, being the only taxonomic unit below Class with almost all evolutionary stages leading from marine to fully terrestrial life represented in modern species (Sfenthourakis et al., 2020). The unique evolutionary history of this group has resulted in an exceptional diversity of evolutionary lineages and forms, each exhibiting distinct morphological, physiological, ecological, and behavioral adaptations to terrestrial life (for a review: Hornung, 2024; Sfenthourakis et al., 2020). Due to these characteristics, terrestrial isopods offer valuable insights into the arthropod transition to land and serve as a key model group for comparative studies in evolution, ecology, and ecophysiology (Hornung, 2011, 2024; Warburg, 1993).

The suborder Oniscidea is traditionally considered monophyletic, supported by numerous morphological synapomorphies (shared derived characters that mark monophyly in cladistics) (Erhard, 1998; Schmalfuss, 1989; Schmidt, 2003). The suborder is divided into five major sections: Diplocheta, Tylida, Microcheta, Synocheta, and Crinocheta (from the most ancestral to the most derived). However, the monophyly of Oniscidea has been questioned or confirmed by several phylogenetic studies based on molecular data (Dimitriou et al., 2019; Lins et al., 2017; Thorpe, 2024).

To date, over 4,100 species of Oniscidea have been described globally, included in 568 genera and 38 or 39 families (Fig. 2). This number is likely underestimated and is expected to grow with further research (Sfenthourakis & Taiti, 2015; WoRMS, 2025). Oniscidea distribution extends across all zoogeographic regions, with the highest species richness found in subtropical areas and Mediterranean-type ecosystems (Sfenthourakis & Taiti, 2015). Over time, they have successfully colonised nearly all terrestrial habitats, ranging from coastal zones to deserts, tropical and temperate forests, and grasslands, from caves to mountain tops, only being absent from high latitudes and elevations above 4,800 m a.s.l. (Sfenthourakis et al., 2020; Sfenthourakis & Hornung, 2018).

The section Crinocheta is the most diverse, comprising 30 families and ca. 80 % of all known species. The families included in this section with the highest genera and species richness are Armadillidae Brandt, 1831, with 84 genera and >700 species (with 120 of uncertain generic assignment); Philosciidae Kinahan, 1857 (probably polyphyletic, see Schmidt, 2008 and Thorpe, 2024), with 116 genera and >570 species; Eubelidae Budde-Lund, 1899, with 50 genera and 241 species; Porcellionidae Brandt, 1831 (probably polyphyletic, see Dimitriou et al., 2018), with 18 genera and >350 species; and Armadillidiidae Brandt, 1833, with 18 genera and 289 species (Schmalfuss, 2003; Sfenthourakis & Taiti, 2015; WoRMS, 2025). Other numerically significant families within Crinocheta, each with more than 100 species, include Scleropactidae Verhoeff, 1938 (28 genera, 118 species), Agnaridae Schmidt, 2003 (15 genera, 203 species), Platyarthridae (nine genera, 157 species), and Trachelipodidae (seven genera, 129 species). The most species-rich families are primarily of Gondwanan distribution, such as Eubelidae in the Afrotropical and Oriental regions, Armadillidae in the Neotropical, Afrotropical, Oriental and Australian regions

Figure 1. Diversity of life forms and species of terrestrial isopods.

(**A**) *Philoscia muscorum* (Scopoli, 1763) (Philosciidae), (**B**) *Merulana translucida* (Budde-Lund, 1885) (Armadillidae), (**C**) *Levantoniscus makrisi* Cardoso, Taiti & Sfenthourakis, 2015 (Trachelipodidae), (**D**) *Armadillidium germanicum* Verhoeff, 1901 (Armadillidiidae), (**E**) *Porcellio scaber* Latreille, 1804 (Porcellionidae), (**F**) *Deto echinata* Guérin-Méneville, 1836 (Detonidae), (**G**) *Ligidium hypnorum* (Cuvier, 1792) (Ligidiidae), (**H**) *Helleria brevicornis* Ebner, 1868 (Tylidae), (**I**) *Armadillo karametae* Campos-Filho, Taiti & Sfenthourakis, 2023 (Armadillidae), (**J**) *Mesoniscus graniger* (Frivaldszky, 1865) (Mesoniscidae), (**K**) *Cristarmadillidium muricatum* (Budde-Lund, 1885) (Armadillidiidae), (**L**) *Agabiformius orientalis* (Dollfus, 1905) (Porcellionidae), (**M**) *Platyarthrus schoblii* Budde-Lund, 1885 (Platyarthridae), (**N**) *Calmanesia erinaceus* Barnard, 1958 (Armadillidae), (**O**) *Haplophthalmus montivagus* Verhoeff, 1941 (Trichoniscidae), (**P**) *Cylisticus esterelanus* Verhoeff, 1917 (Cylisticidae).

(except for the genus *Armadillo* Latreille, 1802 distributed in the Near East and the Mediterranean region), and Scleropactidae in the Neotropical and Oriental regions. In contrast, Porcellionidae and Armadillidiidae, which together account for approximately 16 % of all Oniscidea, are mainly distributed in the Palaearctic region, with their probable centre of origin in the Mediterranean Basin (Taiti, 2018). The family Philosciidae is one of the few Oniscidea families with a global distribution, though most of its genera and species occur in subtropical and tropical areas.

The second most species-rich section is Synocheta, which is much smaller than Crinocheta in terms of families, containing only five: Schoebliidae Verhoeff, 1938, Styloniscidae Vandel 1952, Titanidae Verhoeff, 1938, Trichoniscidae G. O. Sars, 1899, and Turanoniscidae Borutzky, 1969 (Schmalfuss, 2003; WoRMS, 2025). Most of its diversity is present in the family Trichoniscidae, which currently includes 88 genera (or 85 if Buddelundiellidae Verhoeff 1930 is considered to be a separate family; see Gardini & Taiti (2023)) and 533 (or 518) species, making it the second-richest family in terms of genera and the third-richest in terms of species within the Oniscidea (Sfenthourakis & Taiti, 2015; WoRMS, 2025). Most of the diversity within this family derives from the subfamilies Haplophthalminae Verhoeff, 1908 (33 genera, 117 species) and Trichoniscinae G. O. Sars, 1899 (51 genera, 391 species). The second-largest family within the Synocheta is Styloniscidae, which currently accounts for 18 genera and 137 species (WoRMS, 2025). These two families have an almost complementary distribution, with Trichoniscidae occurring in the Holarctic region and Styloniscidae having a primarily Gondwanan distribution. The other three families are

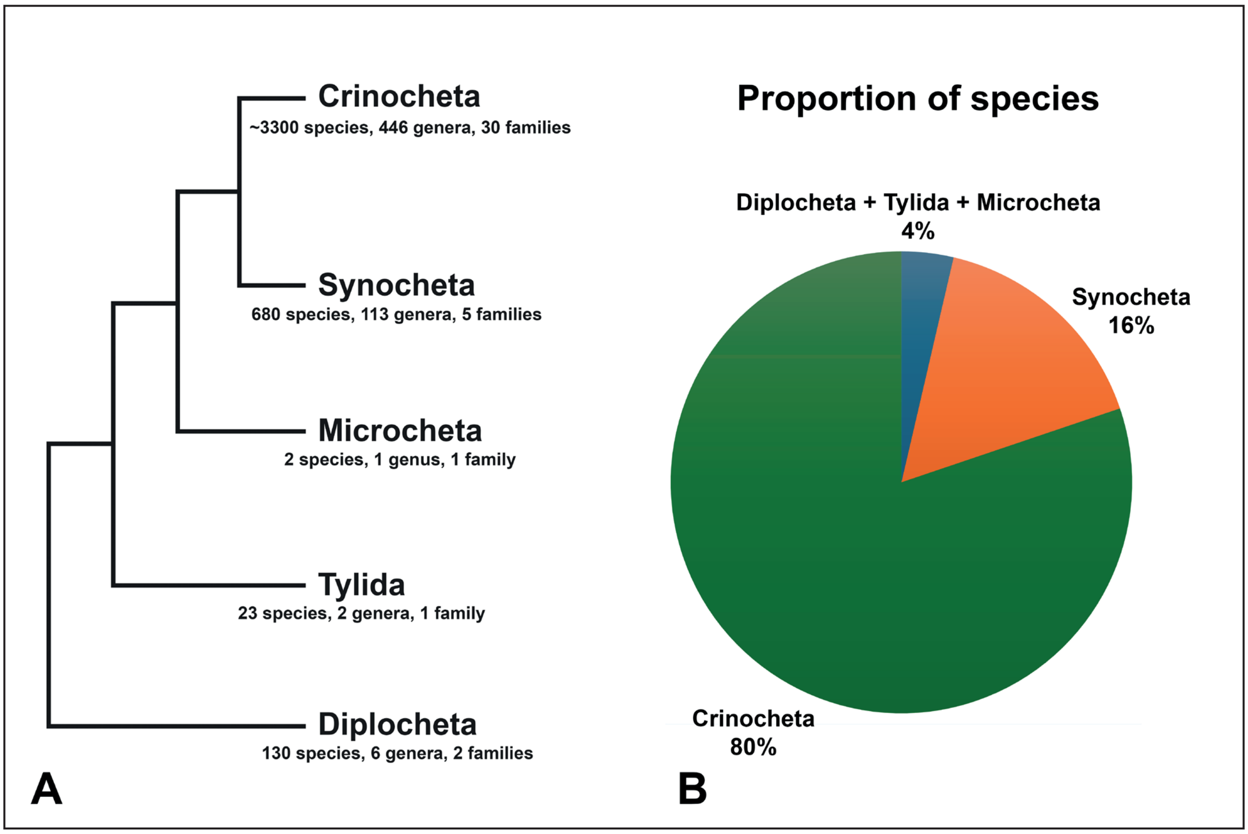


Figure 2. (**A**) Cladogram of the five sections of Oniscidea (modified from Erhard, 1998). (**B**) Pie chart showing the proportion of species in each section. For clarity, the sections Diplocheta, Tylida, and Microcheta were grouped together, as they are poorly represented in terms of species richness compared to Synocheta and Crinocheta**.**

very small, with Titanidae being the largest, including five genera and six species (four genera are monotypic), followed by Schoebliidae (one genus, two species) and Turanoniscidae (one monotypic genus).

The species in the section Synocheta are almost always associated with very wet environments, with many adopting a troglobiotic or endogean lifestyle (Taiti, 2004). Among the more than 300 known troglobiotic terrestrial isopod species, approximately 70 %, spanning over 50 genera, belong to the family Trichoniscidae, with some having become amphibious or secondarily returning to an aquatic lifestyle (Taiti, 2004; Taiti et al., 2018). This latter condition has also been observed in other subterranean species from various families, both within and outside Synocheta, such as several genera of Styloniscidae (Cardoso et al., 2021; Taiti & Xue, 2012; Taiti & Montesanto, 2020), the genus *Paradoniscus* Taiti & Ferrara, 2004 (Crinocheta, Olibrinidae) (Taiti & Ferrara, 2004), and *Haloniscus* Chilton, 1920 (Crinocheta, Philosciidae) (Taiti & Humphreys, 2001).

The three remaining sections, Microcheta, Tylida, and Diplocheta, collectively account for approximately 4 % of all Oniscidea species. Microcheta includes a single family, Mesoniscidae Verhoeff, 1908 and a single genus, *Mesoniscus* Carl, 1906, with two species, both inhabiting cave systems or endogean habitats. Tylida includes a single family as well, Tylidae Dana, 1852, with two genera, *Tylos* Audouin, 1826 (22 species) and *Helleria* Ebner, 1868 (one species). The ecology of the two genera differs significantly, with *Tylos* species inhabiting coastal environments around the world, whereas *Helleria* is found in forest litter, ranging from sea level to above 1,000 meters (Hurtado et al., 2014; Gentile et al., 2020). Finally, the section Diplocheta, the basal group within Oniscidea, comprises two families, Ligiidae Leach, 1814 and Ligidiidae Borutzky, 1950. The former family comprises the genera *Ligia* Fabricius, 1798, *Ligidioides* Wahrberg, 1922, and the fossil *Eoligiiscus* Sanchez-Garcia, Penalver, Delclos & Engel, 2021, the latter comprises all other genera. The question of whether *Ligia* belongs to the suborder Oniscidea is still debated (Dimitriou et al., 2019; Thomas Thorpe, 2024). Within this section, the genera *Ligia* and *Ligidium* Brandt, 1833 are the most species-rich, with 51 and 71 species, respectively. All the species included in the Diplocheta require very wet environments to survive. Among all, most species of the genus *Ligia* are still closely related to the marine environment, mainly inhabiting intertidal areas with hard substrates and

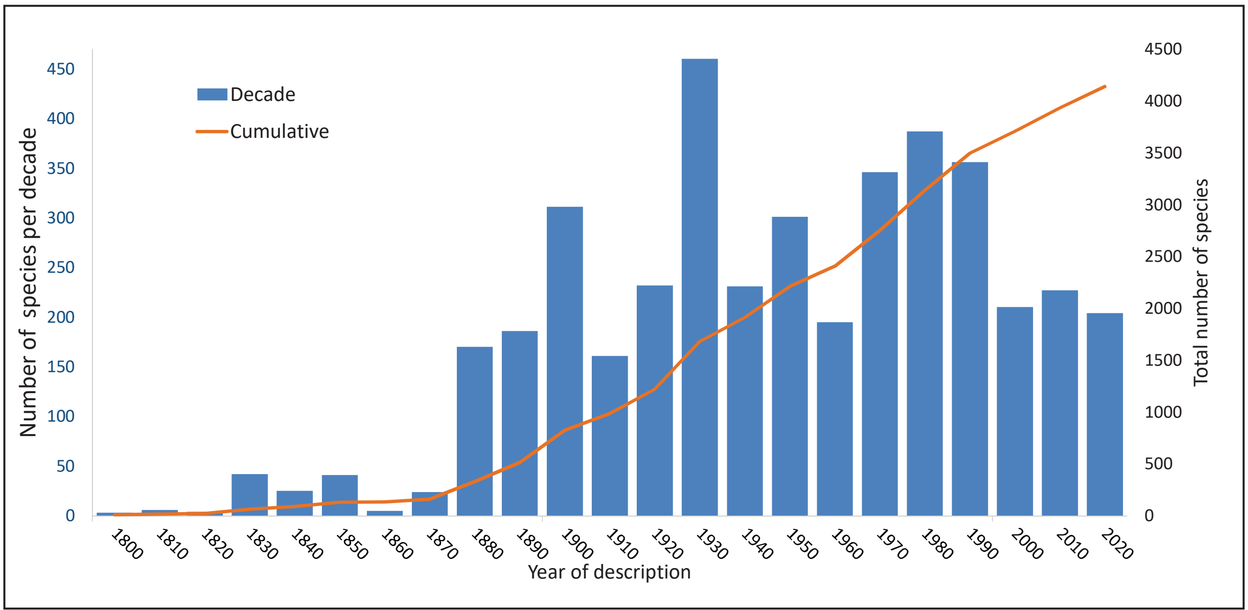


Figure 3. Number of new terrestrial isopod species per decade (left Y axis, bars) and cumulatively since 1800 (right Y axis, line) Data source: WoRMS, 2025.

sometimes leading an almost amphibious life, being able to tolerate submersion and to move underwater. Together with *Tylos*, this is one of the few terrestrial isopod genera with a global distribution.

In conclusion, the development of a comprehensive database that consolidates all taxonomic information in one place is crucial for facilitating further research and ensuring a more unified approach to the study of terrestrial isopods.

2.2 Taxonomic catalogs of terrestrial isopods

The first attempt to compile a global taxonomic catalog of terrestrial isopods was undertaken by Budde-Lund in 1885 with his work *Crustacea Isopoda Terrestria per Familias et Genera et Species Descripta* (Budde-Lund, 1885). This comprehensive treatise of more than 300 pages documents all 385 Oniscidea species known at the time, incorporating both new descriptions and previously existing references. Throughout the 20th century, other exhaustive catalogs at a more continental scale have been published, for example by Van Name (Van Name, 1936, 1940, 1942) and Leistikow & Wägele (Leistikow & Wägele, 1999) (America), Jackson (Jackson, 1941) (Oceania), Schmölzer (Schmölzer, 1965) (Europe), Vandel (Vandel, 1973) (Australia), and Ferrara & Taiti (Ferrara & Taiti, 1979) (Sub-Saharan Africa).

The most significant work for the global knowledge of terrestrial isopods is the *World Catalog of Terrestrial Isopods* (Schmalfuss, 2003). It compiles and organises data indexed by the author over more than twenty years and provides a list of 3,527 valid species. For each species, a complete list of synonyms is provided, along with a comprehensive bibliography (listed in Schmalfuss & Wolf-Schwenninger, 2002) that also indicates which publications include drawings or distribution maps of the species. Moreover, for each species, the distribution at the country level or, in some cases, at a regional or local level is given. Today, this catalog serves as the fundamental reference for engaging in the study of terrestrial isopods, whether it is taxonomy, systematics, biogeography, ecology, or physiology. The world catalog and its associated bibliography have been updated in the following years, incorporating all species described up to 2004, which brought a total of 3,637 known species. Over the past two decades, this catalog has been continuously updated by Stefano Taiti, who has been patiently incorporating all taxonomic, distributional and bibliographic changes that have occurred over time, as well as correcting errors in the original version of the catalog. Twenty years later, the number of valid Oniscidea species recorded in the catalog has increased to 4,139 (Fig. 3). Unfortunately, an updated version of the catalog has never been published; thus, changes that have occurred since 2004 are not accessible to everyone. Therefore, its primary limitation is the necessity for one or more individuals to periodically update and publish the catalog. Additionally, it can quickly become outdated due to frequent changes in taxonomy.

A second, valuable source of taxonomic and distributional data on terrestrial isopods is the *World Register of Marine Species* (WoRMS, 2025). The database aims to ‘provide an authoritative and comprehensive list of names of marine organisms, including information on synonymy’ (WoRMS, 2025). Terrestrial isopods, although not marine organisms, have been included in the database since 2005, alongside marine and freshwater isopods. Since then, the database has been continuously updated, keeping track of all taxonomic and nomenclatural changes within the group. For every single species, genus, or family, including those synonymised or not accepted as valid names for various reasons, one can trace the changes made, thereby facilitating the interpretation of the taxonomic literature. In addition, the database provides a country-level distribution map for each species, indicating whether the species is native or introduced. Unlike Schmalfuss’s catalog, the WoRMS database does not include the complete list of literature for each species, limiting itself to citing the work with the original description. Updates on the WoRMS website sometimes complicate navigation, as well as the lack of specialisation in terrestrial isopods, given that it is fundamentally a catalog of marine species.

The creation of an updated global catalog that includes all available literature references is crucial. Although there is a debate about the declining rate of crustacean species description, including terrestrial isopods (Hartebrodt et al., 2023; Sfenthourakis & Taiti, 2015), this may be due to the declining number of experts. Regardless, there is a need for an open, online, and accessible catalog that will compile existing information (i. e., valid species, synonym lists, figures, photographs, references, and resources) and centralise this knowledge by eventually highlighting distribution or geographic biases and identifying areas where species remain to be discovered and studied. It will open up resources for both terrestrial isopod experts as well as non-experts, increasing the use of isopod data in other research projects (Rodrigues et al., 2006). We believe that by providing an accessible foundational resource, the database (catalog) will motivate new generations of zoologists to continue studying the taxonomy of terrestrial isopods.

3 Trait diversity and the role of terrestrial isopods in ecosystem functioning

The role of terrestrial isopods in ecosystems is multifold. They facilitate dispersal of less mobile soil invertebrates, such as nematodes (Archer et al., 2020; Eng et al., 2005) and of various kinds of propagules like fungal spores, seeds, and bacteria (Saska, 2008; Vašutová et al., 2019). They act as prey for several large invertebrate predators, such as spiders and carabid beetles (Nentwig, 2013; Řezáč et al., 2007; Šerić Jelaska et al., 2014) and for small insectivore mammals (Sutton et al., 1980). Their saprophagous activity affects and improves soil physico-chemical characteristics. In deserts, isopods in the genus *Hemilepistus* build deep burrows to care for their young. By doing so, they mix soil layers and redistribute nutrients, significantly contributing to soil turnover (Shachak et al., 1976) through bioturbation, a function similar to earthworm activities in more mesic environments (Lee, 1985). Terrestrial isopods are also known to bioaccumulate heavy metals without showing much adverse physiological effects (Ardestani et al., 2014; Gongalsky et al., 2023), highlighting their role in bioremediation and ecotoxicological testing (Kampe & Schlechtriem, 2016; Morgado et al., 2016; Vink & Van Straalen, 1999). In particular, they can accumulate high amounts of cadmium and zinc due to the ability of the hepatopancreas and exoskeleton to store these metals (Hopkin, 1989).

However, their most important function is as primary detritivores, consuming dead organic material. As fragmenters, they play a crucial role in the initial breakdown of larger particles of dead organic matter. Terrestrial isopods live mainly on soil surfaces and are generally considered non-specialised detritivores. As shredders, terrestrial isopods use chewing mouthparts to fragment dead organic material, which they then transport and assimilate, thereby playing a vital role an important function in ecosystem functioning (Bonfanti et al., 2024; David, 2014; Zimmer, 2002). Across temperate, Mediterranean, arid, and tropical ecosystems, terrestrial isopods and other detritivores typically consume 40–50 % of the annual litter material (Pokarzhevskii, 1976; Sagi et al., 2019; Schaefer, 1990). By reducing the size of dead organic material (Anderson, 1988; Grelle et al., 2000), they increase the accessible surface area for further decomposition by microbes (Harper et al., 2005) and through physical leaching (Joly et al., 2020).

The protein-poor diet is a major constraint on all saprophagous macroarthropods, which prefer leaf litter comparatively rich in nitrogen (N), with a low carbon (C) to nitrogen ratio (usually expressed as ‘C:N’) and low concentrations of lignin and secondary metabolites (David et al., 2001; Zimmer, 2002). The initial decrease in C:N ratio during decomposition may partly explain why leaves of many plant species become progressively more palatable when ageing (Pobozsny, 1978; Szlavecz, 1985). Litter palatability is further enhanced by physical and microbial agents during decomposition, decreasing litter toughness, transforming chemical deterrents, and increasing nutrient concentration over time (Brousseau et al., 2018; Danger et al., 2012; David, 2014; Marchand et al., 2024). In general, terrestrial isopods prefer decaying over freshly fallen leaf litter (Zimmer, 2002), and they were found to further improve the nutritional quality of the litter via digestion and their feces (Ganault et al., 2022). The food preferences of terrestrial isopods are directly related to the biochemical composition of plants. The most deficient elements are calcium and copper, which are engulfed by terrestrial isopods from their food by almost 100 % (Hassall & Rushton, 1982). Higher consumption rates have been reported on litter mixtures compared to single food sources (Ashwini & Sridhar, 2005; De Smedt et al., 2018a). Food quality improves reproductive output in terrestrial isopods. For example, under conditions of higher food quality, *Armadillidium vulgare* enhances individual growth rates and increases the reproductive allocation of females by 21 % (Hassall & Rushton, 1982; Hassall, 2002). The reduction in litter quality (switching to low-quality food) negatively affects demographic parameters (Paris, 1963).

Apart from dead organic material, terrestrial isopods are known to opportunistically feed on a variety of other resources to complement their diet. Terrestrial isopods are known grazers of microbial biofilms, and some species feed directly on fungi and bacteria, thereby regulating microbial communities (A'Bear et al., 2014; Bluhm et al., 2021). Some species even predominantly consume microorganisms, acting as secondary decomposers (Scheu & Falca, 2000). Even at low densities, terrestrial isopods may reduce the biomass of mycelia and alter competitive interactions between fungal species (Crowther et al., 2013) Extensive mycelial ingestion by *Oniscus asellus* has been shown to reduce soil extracellular enzyme activities and increase Collembola abundance by releasing the more easily ingested microfungi from competitive suppression (Crowther et al., 2013). The higher nutrient status (low C:N ratio) of fungal mycelium, relative to organic matter, makes it an attractive source of nutrition to soil invertebrates. In desert species, phytophagy represents an adaptation to moisture deficit in the arid climate (Shachak et al., 1976). Feeding on green plants and fruit occasionally may also occur in agricultural ecosystems (Den Boer, 1962), terrestrial isopods even becoming pests by feeding on plant seedlings (Faberi et al., 2011; Fusaro et al., 2024; Paoletti et al., 2008).

However, the diet preferences of most terrestrial isopod species are still poorly studied (Demin et al., 2025; Lebedev et al., 2020; Pey et al., 2019) and remain a critical knowledge gap to assess the importance of terrestrial isopods for ecosystem functioning. A trait-based approach has been increasingly used to understand how different species assemblages respond to environmental changes and how these assemblages affect ecosystem processes (Ang et al., 2024). Compared to a taxonomic approach, a trait-based approach can help to predict how community composition changes and what is the impact of shifts in species composition in soils by decoupling the context dependency of species and their individual traits.

Functional traits determine the relationship between species identity, and ecosystem functioning, such as community productivity, resilience and resistance. Using indices similar to species diversity, functional diversity is measurable and quantifiable (Mason et al., 2013, 2005; Petchey & Gaston, 2002). A good example are ecomorphological types of terrestrial isopods influencing functional diversity described by Schmalfuss (1984) which catalogued terrestrial isopods as runners (e. g., Fig. 1A), clingers (e. g., Fig. 1E), rollers (e. g., Fig. 1H), spiny (e. g., Fig. 1N), creepers (e. g., Fig. 1O), and non-conformists (e. g., Fig. 1M). The ecomorphological composition of terrestrial isopods can be very informative of the habitat conditions (Hornung, 2018). Functional traits are integrated into functional response and effect groups (Bonfanti et al., 2024; Moretti et al., 2017), but can also have an impact on soil ecosystems and soil quality, via effect traits as described below (Hedde et al., 2022).

Land-use changes, climatic fluctuations and extreme events, and urbanisation-associated environmental modifications all affect species distribution and ecosystem, energy, and nutrient fluxes among others. In this rapidly changing world, the trait-based approach is a powerful tool to predict responses of species and species assemblages, and potential shifts in ecosystem functions due to these environmental drivers. Moretti et al. (2017) suggested a set of key morphological, physiological, life history, and behavioural traits sensitive to environmental changes and/or potential impact on ecosystem processes. A subset of these are effect traits, directly related to the most important role of soil fauna, including terrestrial isopods: their contribution to detritus decay and soil organic matter formation (Bonfanti et al., 2024). These include feeding and feces production rates and burrowing behavior, among others. Because some of these are difficult to measure, proxies can be used. For instance, body size can be used to assess detritus feeding rates, or the difference between detritus and feces C:N ratios can inform us about feces decomposability. Publicly accessible databases, such as the French initiative, *Biological and Ecological Traits for Soil Invertebrates*, BETSI (Joimel et al., 2021), provide a valuable source for trait information when direct measurement is not possible, or as a starting point to build hypotheses to be tested locally or to conduct global-scale analyses. Trait data for terrestrial isopods are scattered in scientific literature, and we aim to compile these data in one central database.

4 Local georeferenced datasets on terrestrial isopods

One of the most crucial aspects of biodiversity research is having precise georeferenced data on species occurrences. These data allows tracking species distributions over time and modelling these distributions across large spatial scales. Such information is invaluable for understanding how environmental changes influence species distribution both now and in the future, and it aids in setting conservation priorities. A global platform that includes oniscids is GBIF (*Global Biodiversity Information Facility*; https://www.gbif.org), an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth. It enables all the participating data-holding institutions to upload simple and efficient information on the website. This knowledge derives from many sources, from 18th–19th century museum specimens to recent DNA barcodes and uploaded photographs. The taxonomic backbone is mainly derived from WoRMS, with additional information from other databases. The primary issue with this database lies in the large amount of data sourced from various scientific projects and especially from citizen science platforms (e. g., *iNaturalist*, www.inaturalist.org), consisting of observations made by researchers as well as people with little or no expertise in terrestrial isopods. Although there are examples of countries where iNaturalist's observations are carefully reviewed by taxon specialists before being uploaded to GBIF, this is not the case in most instances, resulting in potentially incorrect or highly questionable records being included. Moreover, in regions with high biodiversity, such as the Mediterranean or the tropics, accurate identification based on photographs — and subsequent record validation — is often nearly impossible, even for experts. A positive aspect of GBIF is that the distribution of each species is based on georeferenced data points, offering much more precise and detailed results compared to the country-level polygons provided by WoRMS. However, this distribution data often rely on the aforementioned external databases, which can lead to errors and challenges in accurately defining a species' true range. Such issues can be significant obstacles when utilising these data for biogeographical or conservation studies.

However, the quality of georeferenced data can vary significantly. Older museum records, sometimes dating back hundreds of years, often have only vague locality descriptions, such as islands or towns, and are frequently not georeferenced (De Smedt et al., 2018a; Marcer et al., 2021). In contrast, modern devices with built-in GPS systems provide an opportunity to obtain georeferenced records accurate within a few meters. There is a significant global effort to digitise natural history collections (Hedrick et al., 2020) and make these data publicly available through natural history museums or platforms like the GBIF. Additionally, a growing amount of data is collected by citizen scientists through specialised platforms such as iNaturalist.org and Observation.org, but precautions must be taken when using these data for biodiversity research (Johnston et al., 2023). However, we cannot overlook its immense potential for understanding biodiversity patterns of terrestrial isopods, especially for easily identifiable and common species (Boeraeve et al., 2022). Compiling comprehensive local terrestrial isopod datasets, therefore, often involves combining historical data from museum collections, literature, scientific reports, field notes, and citizen science data.

Around the end of the 19th century and early to mid-20th century, data collection depended on individual researchers who published species in monographs, often with only states, regions or municipalities as geographical locations. Some examples of such pioneering work include France (Dollfus, 1899a, 1899b; Vandel, 1960, 1962), North America (Richardson, 1905), the Netherlands (Holthuis, 1956) or Germany (Gruner, 1965). The collection of more detailed georeferenced data, focusing on good geographical coverage, started in the second half of the 20th Century and was often accompanied by the formation of a local terrestrial isopod working group. This was landmarked by the efforts in Great Britain and Ireland with the formation of the British Isopod Study Group in 1968 (now part of the British Myriapod and Isopod Group, BMIG). Their main focus was to collect new distribution data and associated habitat data in as many 10 × 10 km squares as possible, resulting in distribution atlases with countrywide coverage (Gregory, 2024; Harding & Sutton, 1985; Harding, 2018). The importance of establishing a working group appears to be crucial to achieve quick data collection, similarly demonstrated in the Netherlands (Berg et al., 2008) and Belgium (see Box 1). Although non-academics have been involved in the creation of many georeferenced data sets, the involvement of academic institutions is crucial to maintain data quality and data publication.

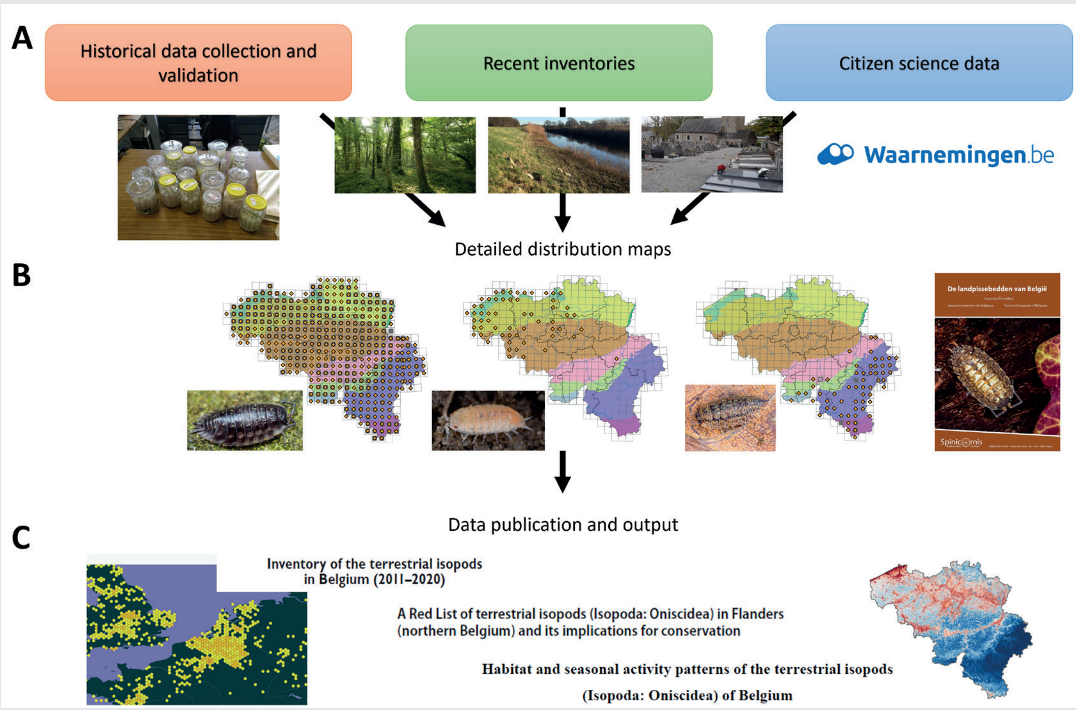
The most complete country-scale georeferenced datasets are from countries at northern latitudes in Europe, since there is a high density of researchers, the number of species is relatively limited and taxonomy in these regions is relatively well known (Table 1). However, the regional knowledge of the terrestrial isopod fauna and the density of distribution records, even within the relatively well-studied region of Europe, varies (see Box 1). As an example, the large country of Poland still relies on work done in the 1960s (Dominiak, 1970) and no recent

Table 1. Examples of local (country/region-level) georeferenced datasets and their data format ('Format'), data source ('Type') ("X" means that the data type is incorporated), time period ('Period'), number of species ('S'), number of records ('R'), number of Locations ('L') and key reference.

Country/ Region	Format	Type Historical (museum/ literature)	Type Recent field studies	Type Citizen science	Period	S	R	L	Key reference
Belgium	Darwin Core Archive		X	X	2011–2020	35	19,406	1,078	(Boeraeve, Arijs, et al., 2022; Boeraeve, De Smedt, et al., 2021b)
Brazil	Catalog	X	X		2015–2025	~300	In prep.	In prep.	http://fauna.jbrj.gov.br/fauna
Britain and Ireland	Darwin Core Archive	X	X	X	1858–1996	43	59,016	17,683	Biological Records Centre (2023)
China	Spreadsheet	X	X		1901–now	183	in prep.	in prep.	Li & Jiang, unpublished
France (including overseas)	SINP	X	X	X	1800–now	320	57,974	56,875	(F. Noël & Séchet, 2021)
Hungary	Spreadsheet	X	X		1975–2005	57	785	758	(Forró & Farkas, 1998; Hornung et al., 2008)
Poland	Spreadsheet	X	X	X	1860–now	38	In prep.	In prep.	(Dominiak, 1970), unpublshed
Spain	Spreadsheet	X	X	X	2020–now	~300	In prep.	In prep.	Unpublished
The Netherlands	Spreadsheet	X	X	X	1880–2025	41	>43.000	>15.000	Berg et al. unpublished
Former USSR	Spreadsheet	X	X		1862–2013	192	870	379	(Kuznetsova & Gongalsky, 2012)
USA, – Maryland	Spreadsheet		X		2022–2023	26	1,572	376	De Smedt & Szlavecz unpublished
New Zealand	Database		X		2010	?	125	1	NZ Arthropod Collection

Box 1. The terrestrial isopods of Belgium: A model case for efficient georeferenced data collection and output

Georeferenced datasets can be compiled in various ways, and examples of good practice can guide future projects. In Belgium (30,688 km²), a recent state-of-the-art example, a comprehensive and up-to-date dataset covering the entire territory was created in less than five years through citizen science, with support from academic institutions. The study of terrestrial isopods in Belgium was limited until the formation of a terrestrial isopod interest group called 'Spinicornis' (https://spinicornis.be). This group, founded by four motivated citizen scientists, aimed to inventory every 10 × 10 km square of Belgian territory by 2020. They aimed to visit at least three habitat types in every square: old forests, open areas such as river valleys, and anthropogenic sites like graveyards. Coastal habitats were also surveyed if present. These habitat types cover potential habitats of all known or expected species in Belgium. A total of 373 squares were visited during field excursions, held at least once a month and widely advertised via social media and nature organisation websites to encourage other citizen scientists to join. On excursion days, isopods were searched for by hand through litter sieving and turning stones and dead wood. The Forest & Nature Lab of Ghent University supported the methodology and materials. Additionally, Spinicornis members re-identified museum specimens with the help of the Royal Belgian Institute for Natural Sciences to digitise and correct historical data (De Smedt et al., 2018a). A large amount of citizen science data was also added via the citizen science platform (www.waarnemingen.be). By 2020, Spinicornis published an ecological distribution atlas (De Smedt et al., 2020a). They also published detailed habitat data in separate papers (De Smedt et al., 2020b, Boeraeve et al., 2021a) and made all georeferenced data freely available on GBIF (Boeraeve et al., 2021b, 2022). Their data also resulted in the first Red List of terrestrial isopods in Flanders (northern Belgium) (De Smedt et al., 2022), with proposed actions for isopod conservation. Their work frequently featured in national newspapers and on radio stations. People often see terrestrial isopods in their gardens, which naturally piques their interest. This public fascination is crucial for using isopods as model organisms to emphasise the importance of soil biodiversity for ecosystem health and human benefits. Belgium's small size made it feasible to gather comprehensive data quickly, serving as a model for similar projects in other small regions worldwide.



Data collection, georeferenced data set and output by the Belgian terrestrial isopod group 'Spinicornis'. (**A**) Data sources from re-identifying museum collections and literature, over structured field samplings in every corner of the country to the incorporation of citizen science data from the website https://www.waarnemingen.be. (**B**) Publication of the distribution data in book format for a broad audience (De Smedt et al., 2020a). (**C**) Publication and other output based on the collected georeferenced data. From left to right: publication of georeferenced data on GBIF (Boeraeve et al., 2022), Regional Red List assessment (De Smedt et al., 2022), Publication of habitat and phenology data (Boeraeve et al., 2021a), Production of species distribution models (unpublished).

effort integrates the available georeferenced records from more recent decades. In contrast, countries with a longer tradition of (academic) terrestrial isopod research have countrywide distribution atlases (e. g., Hungary (Forró & Farkas, 1998) or the Czech Republic (Orsavová & Tuf, 2018)) that are continuously updated. In the extremely rich fauna of the Mediterranean region with high rates of endemism, taxonomic issues such as poorly described species and the lack of illustrations impede the creation of checklists. The total number of species in Spain, for example, is currently estimated at 260–281 (unpublished data) (excluding overseas territories), and 45 new species were added after 2000. The same applies to tropical regions, where taxonomic problems cause georeferenced records to be of limited taxonomic detail, when only family or genus are known or when species are only assigned to morphospecies. For example, despite Brazil being the biggest country in the Southern Hemisphere with a wide variety of biomes and global biodiversity hotspots (Gallão & Bichuette, 2018), terrestrial isopod research is mostly concentrated in the Atlantic rainforest, which covers only 15 % of the country's area. The 'taxonomic impediment' is well recognised as one of the main barriers to advancing biodiversity knowledge in this megadiverse country (Campos-Filho et al., 2022). Although collections are continuously going on and material is stored in different museums, much of the material remains to be identified. This discrepancy between temperate regions and other regions is well illustrated by comparing the number of georeferenced observations between mainland France (Séchet & Noël, 2015) and its overseas territories. The current open database on terrestrial isopods in France (https://openobs.mnhn.fr/) contains almost 60,000 records, while there are only 242 records from its overseas territories. However, certain islands have been inventoried quite well, but this mainly depends on the availability of an active field researcher, aided by the relatively small size of the islands. We advocate for the establishment of local distribution databases that include both historical and recent records, as well as citizen science data. These databases should be verified by local experts and then integrated into the proposed global database.

5 Examples of research questions to tackle

Here, we provide two examples of research questions that could be tackled with a unified database on terrestrial isopods. The proposed questions aim to improve our understanding of soil fauna distribution, a crucial step in understanding the effects of current and future distribution shifts on ecosystem functioning.

5.1 Biogeography and the limits to terrestrial isopod distribution

Biodiversity patterns of soil fauna at the global scale have been poorly documented (Decaëns, 2010). The first large-scale distribution maps on terrestrial isopods were compiled in the 1960s (see e. g., Vandel (1960, 1962), forming the basis of current biogeography research (Alexiou & Sfenthourakis, 2013; Andreev, 2000; Araujo & Leistikow, 1999; Kwon & Taiti, 1993). Several studies have been published dealing with the distribution of terrestrial isopods of different families at the global scale, e. g., for Armadillidae (Taiti et al., 1998). These studies revealed the origin of certain families, e. g., Mediterranean or Central Asian (Borutzky, 1959; Broly et al., 2013; Sfenthourakis & Taiti, 2015). Such biogeographical data, based on the presence/absence of species, provide the opportunity to study the limits of terrestrial isopod distribution. Similar to most soil fauna taxa, terrestrial isopods are limited by a combination of temperature and moisture. For example, the northernmost limit of terrestrial isopod distribution in the northern Palaearctic was shown to be determined by the imaginary line where daily temperatures rise above 10 °C for at least 120 days (Kuznetsova & Gongalsky, 2012). There are also clear elevational boundaries, e. g., from 2,900 m in Europe (Steinwandter & Seeber, 2023) to over 4,000 m in Africa (Atlas, Morocco) and Asia (Himalayas, Ladakh) (Beron, 1997).

The strong diversification of terrestrial isopods in the Mediterranean forms the basis for studying their island biogeography, a topic poorly covered for soil fauna. Small islands in the Mediterranean Sea have a highly structured fauna, with major and minor geographical patterns in terrestrial isopod distribution being identifiable (Gentile & Argano, 2005). While the biogeographical complexity cannot be entirely explained, interpreting the different shapes of species–area curves provide some insights. The level of endemism is about 20 %, and similarities in fauna between islands can largely be explained by the known palaeogeography of the area (Dimitriou et al., 2023; Sfenthourakis, 1996).

Terrestrial isopods are good models to study biogeography at small (e. g., islands) and large spatial scales (e. g., Mediterranean basin). Compiling data at a global level could help us understand biogeographical patterns by linking georeferenced records with phylogenomics (Thorpe, 2024) to uncover the factors driving current and historical biogeography patterns of soil fauna.

5.2 Biotic homogenisation in urban areas and alien species

Biotic homogenisation is a key feature of the Anthropocene, involving the replacement of local species with non-native ones introduced by humans (Lewis & Maslin, 2015) and leading to a decline in native biodiversity (McKinney & Lockwood, 1999). Synanthropic species adapt to human-made microhabitats and spread into urban and suburban areas worldwide (Hornung et al., 2008). However, not all species near humans are synanthropic. Of the 111 terrestrial isopod species reported from 50 cities by Szlavecz et al. (Szlavecz et al., 2018), only 10 were common across a third or more of them. These synanthropic species can become invasive, causing ecological or socio-economic impacts (Keller et al., 2011) and can displace native species (Arndt & Mattern, 2005; Szlavecz et al., 2018).

Synanthropic species often share traits such as being habitat and resource generalists (Hornung et al., 2015; McKinney, 2006) and tolerant to disturbed environments (Souty-Grosset et al., 1998). Communities near human settlements typically consist of a few cosmopolitan species, including disturbance-tolerant native and non-native species (Szlavecz et al., 2018). The Terrestrial Isopod Naturalness Index (TINI) was developed to assess species' tolerance to disturbance (Hornung et al., 2018). TINI classifies species based on their global, regional, and local distribution, tolerance to disturbance, and habitat affinity. Species are categorised as introduced, well-established, synanthropic, disturbance-tolerant, or native fauna (Hornung, 2024; Hornung et al., 2018). There is variation in the introduction capacity of synanthropic species, influenced by environmental and biological factors. Higher latitudes, with fewer native species, often have a higher proportion of non-native or synanthropic species (Hornung, 2024). Synanthropic species are useful indicators of disturbance, indicating local environmental quality (Szlavecz et al., 2018). Terrestrial isopods have proven well-suited for human-aided dispersal through various pathways, including soil and plant transport (Cochard et al., 2010; Garthwaite et al., 1995; Noël et al., 2022), the pet trade (Robla et al., 2025; Szlavecz et al., 2025), educational purposes, and coastal spreading via fouling, successfully colonising distant regions (Hurtado et al., 2018)

Certain regions serve as significant donor areas for synanthropic species (Fig. 3). A first analysis based on the records of introduced species collected in Schmalfuss (Schmalfuss, 2003), WoRMS (2025), and iNaturalist (2025) was carried out taking into account the origin of the species and where they have been introduced, finding at least 53 species with records of anthropogenic introduction (Fig. 4). This may be an underestimation. Most cosmopolitan synanthropic species originate from Europe, particularly from the Mediterranean region, supporting the 'imperialist dogma' hypothesis (Crosby, 2004; Di Castri et al., 1990), which suggests that these species have historically spread more widely due to European colonisation. Another trend, 'pantropicalisation' describes how tropical species tend to become more widespread even in other climatic regions. Such species are frequently found in temperate greenhouses, which serve as reservoirs and points of introduction (Carpio-Díaz et al., 2018; De Smedt et al., 2017; Korsós et al., 2002). Climate change may exacerbate these processes by shifting species' distribution boundaries (Sfenthourakis & Hornung, 2018). This shift, coupled with the exotic isopod trade, could form a growing threat to native fauna by overcoming biogeographical barriers and increasing the risk of accidental or intentional releases into new regions (Robla et al., 2024).

A global database containing georeferenced records will enable us to investigate the biotic homogenisation of soil communities in urban landscapes and examine the pathways of urban soil fauna dispersion. By incorporating species traits into the database, we can evaluate invasion success and the invasion potential of new introductions.

6 Structure of the proposed dataset

Depending on the research question asked, precise species identification is crucial, while for other questions, it is sufficient to have data only on the presence or biomass of terrestrial isopods. For example, when studying the distribution limits of the taxon as a whole, the locality of terrestrial isopods found in extreme conditions is important, while species identification is not necessary. We aim to work with various types of data, ranging from qualitative hand collections to detailed community studies, including population size, biomass, and environmental parameters. The final database is intended to contain data on occurrences, as well as abundance and biomass information, where available. We also aim to add traits of terrestrial isopods whenever it is possible. It is worth noting that while even the most basic data are valuable to incorporate into the OniscidBase, the more detailed the information about the observation, the more potential studies it can contribute to, and the more publications it may help to generate.

For the database template, we used the Global Soil Macrofauna Project's experience (https://www.globalsoilmacrofauna.com/, Mathieu et al., 2022). We also adopted data structures from GBIF (www.gbif.org)

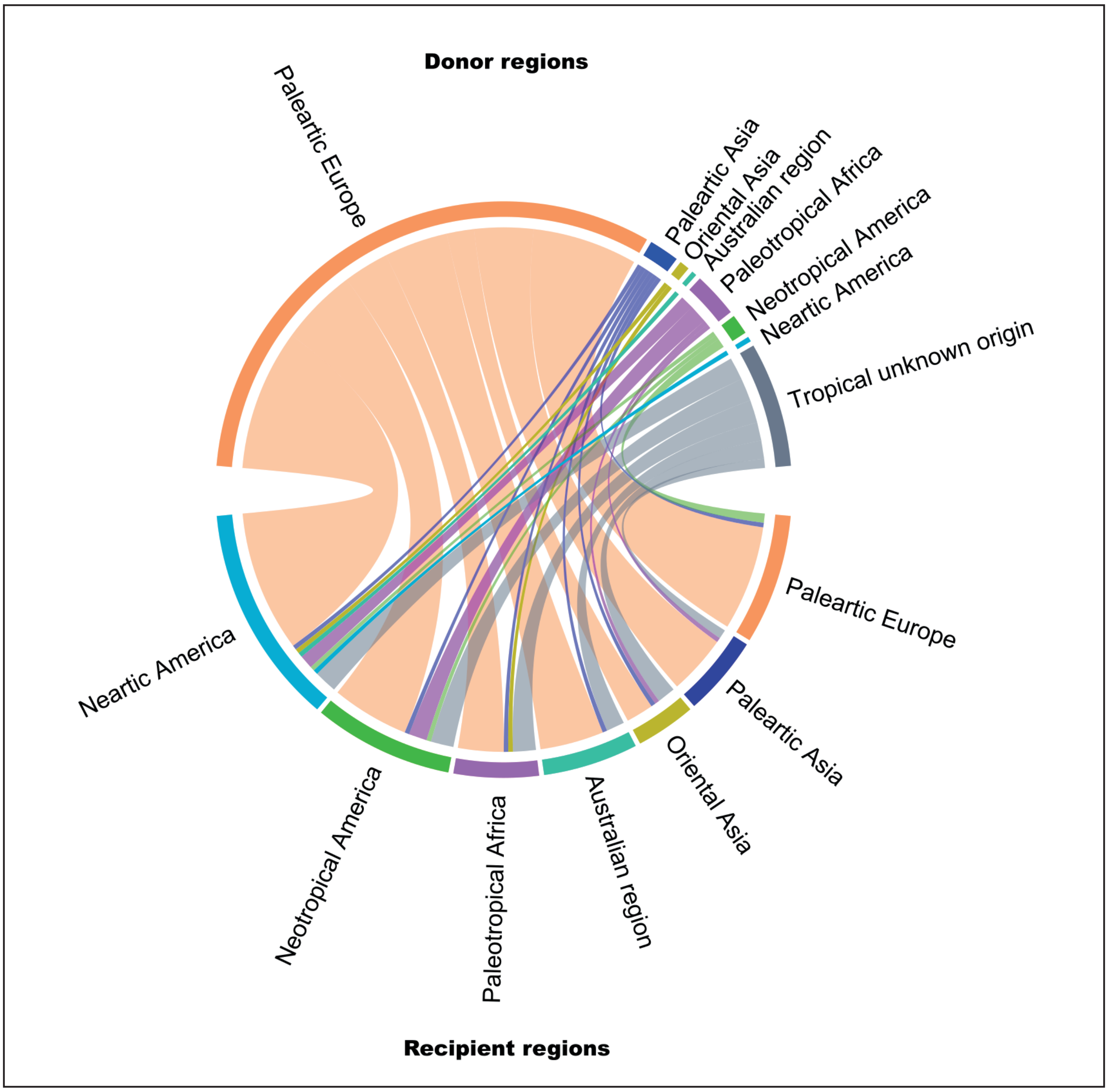


Figure 4. The connections between the donor and recipient regions of introduced terrestrial isopod species. Species and distribution types are taken from Schmalfuss (2003), iNaturalist (2025), and WoRMS (2025) (Number of species: 53).

and Edaphobase (www.eudaphobase.eu). Edaphobase's flexible data import tool saves time by automatically reformatting data to global standards (Russell et al., 2024). This also keeps the option open to further integrate the data into the Edaphobase project's database at a later stage.

The minimum requirements for data submission of a record include geographic coordinates, the record date and the taxonomic classification of the specimen(s) (e. g., species, genus, family, etc.). Ideally, but not mandatory, a dataset should also include information on population size, biomass, exact species identification, sex, habitat and microhabitat descriptions (e. g., whether the specimen was found under bark, stones, in the litter, etc.) (Table 2). The habitat types on a global scale will also be listed in a fixed set of categories, based on the IUCN Habitats Classification Scheme (https://www.iucnredlist.org/resources/habitat-classification-scheme). The local habitat (e. g., a type of vegetation, river edge or sandy beach) and the microhabitat (e. g., an anthill, termite mound or under the stone) should be described in another column. Specifying the habitat is particularly important, as certain species of terrestrial isopods are restricted to specific habitat conditions, such as obligate myrmecophiles in ant nests or troglobiont species.

Table 2. Fields of the database template. Mandatory fields are marked with an asterisk (*).

Field	Value	example
Data Provider (name, surname)	Text	John Smith
dataset_ID*	Text	Brereton_UK_Wytham_Wood
data owner(s)	Text	Brereton J. L.G
reference	Text	Brereton, 1957
transect_ID	Text	Wytham_Wood_Winter_litter
sample_ID	Text	Wytham_Wood_Winter_litter_oak
Day*	DD	
Month*	MM	
Year*	YYYY	1953
Country	Text	UK
Region	Text	Wytham Great Wood
Latitude*	decimal degree	51.78521
Longitude*	decimal degree	-1.3365
Coordinates accuracy (m)	Number	1000
Family	Text	Philosciidae
Genus	Text	Philoscia
Species	Text	*Philoscia muscorum*
Author	Text	Scopoli
Year	YYYY	1763
Sex	text (M, F, Unknown, Other)	Unknown
Number	Number	2
Abundance	Number	2
Units	Units	2* 10 ten-minutes surveys
Biomass	Number	
Units	Units	
Habitat Type Main (see the list in the cell)	dropping list: Unknown; Urban; Forest; Savanna; Shrubland; Grassland; Wetlands; Rocky area; Caves; Desert; Marine Coastal; Artificial; Intorduced vegetation; Other (specify in comments).	Forest
Habitat	Text	Oak-ash-sycamore wood
Microhabitat (anthill, under the stone, on the bark, etc)	Text	Oak litter
GenBank number	Text	
Collector(s)	Text	Brereton J. L.G
Identificator(s)	Text	Brereton J. L.G

A template for data entry will be provided in a Microsoft Excel format (or an open format (.ods), although other spreadsheet formats may also be accepted depending on the data contributor's preference), consisting of three spreadsheets: a title spreadsheet containing metadata, a raw data entry spreadsheet, and a spreadsheet with the data field explanations and guidelines. A data entry template will be available for download from the OniscidBase website. One record in the database corresponds to one record of a species (of a certain sex, if known) at a specific locality on a specific date.

On the title spreadsheet, contributors need to provide contact details of the dataset authors, the dataset characteristics and the desired data privacy level. It is important to note that the data can be extracted from published articles: the person entering the data will be listed as the dataset provider, the article authors as dataset owners, and the source link will serve as a reference. At this stage, contributors can also indicate whether the dataset includes additional ecological information, such as soil type, chemical and physical characteristics of the soil, vegetation type, and other environmental parameters. If necessary, this additional data can be requested during the hypothesis testing. The data entry sheet contains several columns corresponding to the parameters mentioned above (Table 2). The explanations sheet describes each column and row, specifying the type and format of data (numeric, text, etc.) that should be entered.

Contributors are requested to contact the OniscidBase Team (email: contact@oniscidbase.com) or the corresponding authors of this call paper to aid in submitting data. As mentioned above, we also aim to collect species-specific trait data.

7 Further perspectives

The assessment of worldwide patterns of biodiversity, and soil biodiversity in particular (see Phillips et al., 2019; Van Den Hoogen et al., 2019), helps us in understanding the drivers of distribution and the role of soil fauna for ecosystem functioning. Terrestrial isopods, as important representatives of soil macrofauna, are a crucial factor in detritus food webs. Compiling taxonomic and distribution data on terrestrial isopods at a global scale is therefore a key to understanding current and future biogeography, soil functioning and health.

Taxonomic collaboration. Reliable species knowledge is the first step in studying global biodiversity patterns. One of the main goals of OniscidBase is to bring together taxonomic data with its associated literature to provide a backbone for terrestrial isopod research. Identifying and involving consultation of regional or family-level experts should aid communication between leading experts in this field, stimulating further species descriptions and solving taxonomic problems via the platform. In addition, OniscidBase offers a platform for cooperation and shared learning, allowing beginners to interact with professionals while contributing their insights.

Ecological insights. The worldwide distribution set compiled of local georeferenced distribution data will enable us to answer pressing questions in soil fauna ecology. We provided examples when the proposed database helps answer fundamental questions about soil fauna distribution; i. e., assessing the main drivers of soil fauna distribution and biogeography, but also the role of urbanisation in soil fauna distribution. We are confident that numerous other questions, in the fields of invasion ecology, evolutionary ecology, systems ecology, and conservation ecology, could be addressed using the database.

Ecosystem change. Land-use change, climatic fluctuations and extremes, and urbanisation-associated environmental modifications all affect species distribution and abundances. In this rapidly changing world, the trait-based approach can be a powerful tool to predict responses of species and species assemblages, and potential shifts in ecosystem functions due to these environmental drivers (Joimel et al., 2021). Publicly accessible databases provide a valuable source for trait information when direct measurements are not possible, or as a starting point to build hypotheses to be tested locally or to conduct global-scale analyses (Crowther et al., 2019). OniscidBase aims to compile species-specific trait data on terrestrial isopods to aid in understanding functional consequences of terrestrial isopod distribution by mapping functional biogeography, including the geographical patterns of functional traits or trait syndromes.

Conservation. Currently, very few terrestrial isopods are incorporated in regional or national conservation programs to protect species or their habitats, despite their potential as indicators of habitat quality (De Smedt et al., 2022; Reboleira et al., 2022). At the international level, terrestrial isopods are hardly assessed, as indicated by the low number (only 11) of species appearing in the IUCN Red Lists, and with only two species for which a trend could be calculated (IUCN, 2023). Combining local datasets in a worldwide database with an accompanying taxonomic backbone and regional experts will open up possibilities to assess isopod conservation and can provide the necessary data to the IUCN SSC Woodlice

Specialist Group (De Smedt et al., 2025a) to carry out species assessments and to get isopods formally protected. Additionally, the collated database will allow us to identify global hotspots for terrestrial isopod conservation and identify key ecosystems supporting high diversity. Furthermore, we can evaluate real ongoing new threats to terrestrial isopods like unregulated trade (Robla et al., 2025; De Smedt et al., 2025b). This can consolidate these functionally important detritivores into national and international legislation for nature conservation.

Community engagement. Finally, OniscidBase can be a powerful tool not only to bring professional and amateur scientists together but also to communicate about soil fauna to the general public. People can relate to terrestrial isopods since they are familiar with them and encounter them frequently in their gardens, cellars, etc. (see also BOX 1). In this way, terrestrial isopods can function as flagship species to raise awareness about the importance of soil biodiversity for healthy soils and ecosystems.

The perspectives to implement this plan are now to (1) finalise the taxonomic backbone and make it available online via https://oniscidbase.com; (2) make all relevant scientific literature available under their current copyright statements linked to the relevant species names; (3) combine as much local georeferenced databases as possible; (4) work on a joint data publication with all data contributors; and (5) incorporate trait data of various sources to support functional research. Once these steps are taken, the database should be up and running for answering soil fauna related research questions across the globe. We hope that this call paper will motivate readers to share their data and contribute information to OniscidBase.

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