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THE DUTCH MILLIPEDE FAUNA, AS COMPARED WITH THE BRITISH.

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INTRODUCTION

Contrary to other West European countries the Netherlands in the 18th and 19th centuries never had a naturalist who cared about millipedes or centipedes. In general one can say even that the Dutch at that time never cared much for the diversity of the animal kingdom. Looking at the authorship of the common European insects and other arthropods it is a remarkable fact that none of these animals were described and named by Dutch authors. Apparently the Dutch at that time were more engaged in earning money than in caring for the nature around them.

It is therefore no wonder that faunistic interest in millipedes and centipedes in Holland during the 19th century was minimal: there simply were no Leach's or Newport's, no Latreille's or Gervais's, no Koch's in the Netherlands. The very few published faunistic contributions were simple lists of species based on the work of the great naturalists of other countries, written as a sideline by entomologists who were specialists in other groups. This situation existed up to about the middle of the 20th century.

At that time surely millipedes were in a much better position than centipedes. In the twenties the well-known German specialist Dr. Otto Schubart, who at that time was collecting information on the occurrence and distribution of millipedes in the countries around Germany, made a short trip to Holland and briefly collected at several ecologically and geographically different sites. He published an interesting extensive report on his results in 1929. Shortly afterwards he identified the material in the Amsterdam museum and wrote a small second paper on Dutch millipedes in 1931.

Unfortunately the papers by Schubart did not excite any interest among Dutch naturalists and when around 1942 in the troublesome war years I started collecting myriapods I had to puzzle it out all by myself. At that time I had to manage with a pocket lens and with Latzel's books of 1880 and 1884 as antiquated and hopelessly inadequate guides. Only after the war I was lucky to obtain copies of the books by Schubart (1934) and Brolemann (1930, 1935) that served as a solid basis for further work.

In 1953 a simple key for the identification of the millipedes of the Netherlands was published. It was largely based on the work of Schubart with some additional records taken from the available material in the Zoological Museum of Amsterdam and my own collections. But, as usual, the recorded distribution of unpopular animals is more or less identical with the distribution of their collectors. And exactly that was the case with millipedes in Holland: most of the available material came from in and around the big

cities, and from some favourite Dutch holiday resorts, in short, not the ideal basis for a faunistic study.

During the seventies my wife and I made several short trips to undercollected areas in the Netherlands to obtain a better insight in the occurrence of chilopods and diplopods. The results were published in a series of small papers, which cumulated in the appearance in 1978 of an atlas of the distribution of Dutch millipedes in which I commented on the distributional ecology of the species. As these publications were written in Dutch they were hardly accessible to British colleagues. An updated atlas published by Berg (1995) in the English language gave additional records but no information at all on the nature of the distribution or the ecology of the species.

To remedy the situation the present essay tries to give a comparison of the British and Dutch faunal lists and emphasize some obvious similarities and differences.

DUTCH MILLIPEDES

The distributional picture of Dutch millipedes is somewhat confusing. Probably the fauna of the lowlands in the western and northern provinces originally was quite poor in species. This seems to be contradicted by the great number of species recorded from the heavily urbanized western provinces, which seems to suggest a rich fauna in that part of the country. Actually, however, a relatively large percentage of the species found in the west are introductions from elsewhere. The part of the Netherlands that is really richest in autochthonous species is the southeastern part of the country, i.e. the hilly extreme south of the province Limburg that geologically (and faunistically) is part of the Belgian Ardennes.

In my atlas (Jeekel, 1978) I tried to make a practical ecological division and came to a rough classification:

A. Species occurring only under natural conditions, i.e. in biotopes with a minimum of human influence. Such an occurrence is more or less imaginary, because of the absence of really undisturbed nature in this country.
B. Species living partly under the same conditions as A, and partly in biotopes under regular but moderate human influence.
C. Species occurring only in synanthrope biotopes, and on account of their general distribution not belonging to the natural fauna of the country.

A. To category A1 belong species occurring in their particular habitat throughout the country: *Polyxenus lagurus, Craspedosoma raulinsii, Nemasoma varicorne, Proteroiulus fuscus, Ommatoiulus sabulosus, Cylindroiulus punctatus, Julus scandinavius.*

To category A2 belongs a species strictly confined to lowland peat marshes: *Xestoiulus laeticollis.*

To category A3 belongs a species just crossing the border from the east and confined to two eastern provinces of the Netherlands: *Megaphyllum projectum.*

To category A4 are referred the species that are confined to the very south of the province Limburg, the hilly limestone country: *Glomeris intermedia, Chordeuma sylvestre, Melogona gallica, Ommatoiulus rutilans, Leptoiulus belgicus, Leptoiulus kervillei, Polydesmus testaceus.* Some of them stand out in having a few, probably natural outposts northward: *Glomeris marginata, Tachypodoiulus niger, Enantiulus nanus, Polydesmus angustus.*

B. To category B1 belong species occurring in natural habitats throughout the country as well as in biotopes under more or less strong human influence: *Cylindroiulus latestriatus, Brachyiulus pusillus, Brachydesmus superus, Polydesmus inconstans, Polydesmus denticulatus.*

To category B2 belong species which are probably indigenous only in the south of Limburg, and some perhaps also near to the German border in the provinces Overijssel and Gelderland, but otherwise distributed in the rest of the country through human agency: *Melogona voigti, Brachychaeteuma bradeae, Choneiulus palmatus, Nopoiulus kochii, Blaniulus guttulatus, Boreoiulus tenuis, Cylindroiulus coeruleocinctus, Allajulus nitidus, Ophiodesmus albonanus, Macrosternodesmus palicola.*

C. To category C1 belong six European species that, judging from the general pattern of their distribution do not belong to the Dutch fauna: *Cylindroiulus apenninorum, Cylindroiulus britannicus, Cylindroiulus parisiorum, Cylindroiulus truncorum, Cylindroiulus vulnerarius, Ophyiulus pilosus.* To these I must add two species uncertainly recorded from the Netherlands *Unciger foetidus* and *Stosatea italica.*

To category C2 belong the species introduced in greenhouses from tropical regions, like *Oxidus gracilis*, etc., which will not be discussed here.

It goes without saying that this classification is open to discussion and details may have to be reconsidered when our knowledge of the occurrences in the Netherlands and elsewhere is improved.

THE DUTCH AND BRITISH LISTS COMPARED

In the following discussion the species names preceded by an * have not been recorded from the U.K. For reasons of convenience to British readers I have arranged the species in the sequence used by Blower (1985).

Family POLYXENIDAE.

Polyxenus lagurus (L.)

In the Netherlands the known distribution of this species is erratic. It may be remembered that one of the classic studies on the geographical variation in the sex ratio of this species was partly based on 301 specimens collected during the twenties in a forest near Alkmaar in the province Noord-Holland, not far from the North Sea coast (Vandel, 1926). The record of such a large number of specimens is quite amazing because since that time the species has hardly been seen in any quantity. Most of the records from the Netherlands are not far from the North Sea coast and concern apparently the bisexual form.

Personally I met with *Polyxenus* only a few times during many years of collecting in the Netherlands. This contrasts with the experience of others in Europe. For instance, Dr. K.

Schömann (1956) in his study on *Polyxenus* in Germany says: "... dürfte Polyxenus lagurus als individuenreichste Diplopodenart Mitteleuropas zu bezeichnen sein" (... could *P. l.* be characterized as diplopod species with the highest number of individuals in Central Europe) and he gives examples of finds of 250 to 400 specimens on a single tree trunk. Unfortunately no exact data on place or time of the year were given.

The little success I had in collecting *Polyxenus* may be because I did not pay enough attention to the habitat of the species and perhaps while collecting myriapods I was simply "looking too big", and missed the small specimens. But that cannot be the only explanation. May be air pollution in this heavily industrialized country, and the ongoing fragmentation and destruction of natural and seminatural habitats have played a role in the relative rareness of this species nowadays.

Perhaps the occurrence of *Polyxenus* in the U.K. is also somewhat erratic, at least that is the impression one gets from the comment by Blower, but surely the situation must be more favourable than in the Netherlands.

Family GLOMERIDAE

The British fauna of pill millipedes is a little more varied than that of the Netherlands, which has two species of *Glomeris* but lacks representatives of *Stygioglomeris* and the Trachysphaerid *Adenomeris.* Perhaps *Stygioglomeris crinata* Brolemann will turn up someday in the south of the Province Limburg as it has been recorded from nearby Belgium.

Glomeris marginata (Villers)

In the UK this is apparently a common species everywhere, except in Scottland, but in the Netherlands it is common only in the limestone area of Limburg. Outside this area it is met with only here and there in more or less isolated populations on sandy soils, mostly in the province Gelderland. Surely these must be regarded as isolated outposts of a continuous area in the adjacent countries. *Glomeris* has no synanthropic tendencies and it is evident that too much human influence on the habitat is destructive for this species, which means that in this country it will become rare in the future. Although the Dutch coastal sand dunes might seem a suitable habitat, no *Glomeris* is to be seen there.

* ***Glomeris intermedia*** Latzel

Our second *Glomeris* has not been recorded from the UK. It is a typical limestone bound west-European species, occurring in the Netherlands exclusively in the extreme south of the province Limburg often in company with *G. marginata.* It certainly does not occur in our diluvial areas. Since it is a West European species occurring in most of France I think it may be expected to be found in the U.K. sooner or later.

Family POLYZONIIDAE

The British representative of this family, *Polyzonium germanicum* Brandt, has not been recorded from the Netherlands. Probably this country falls outside the remarkable split range of the species in Europe. The interesting British record from Southeast England in itself might suggest the possibility of an occurrence along the eastern border of the Netherlands, but the general picture of the distribution in Germany hardly supports this.

Family CRASPEDOSOMATIDAE
Only a single species has been recorded from both countries, but the occurrence in the Netherlands of a second *Craspedosoma*: *C. alemannicum,* known from Luxemburg, might be possible, although not very probable.

The other British craspedosomatid, *Nanogona polydesmoides* (Leach), apparently quite common in the U.K., is not found in the Netherlands. According to its distribution pattern it is an atlantic-sub-westmediterranean species.

Possibly the recent record of *Anthogona britannica* Mauriès from Southwest England concerns an atlantic species.

Craspedosoma raulinsii Leach
It is strange to realize that in the U.K. this is a rather rare species. Although *Craspedosoma* is not really common in the Netherlands, it is one of the species that may be found almost everywhere in wooded areas provided the place is not too dry and not too much disturbed by human activities. It is not fastidious with regard to soil type, occurring in marshes as well as in deciduous woods on sandy or clayey soils. Schubart (1967) calls it a cold-resistant species.

Family BRACHYCHAETEUMATIDAE
The U.K. may be ironically labelled as the cradle of this family, all the recognized species of *Brachychaeteuma* having been first described from English soil. This is one of those millipede types, which is found almost exclusively in the localities where the collectors live. The animals apparently have a subterranean habit and are found mostly by a collector who is on the right place at the right time or by specialized mechanical methods.

Of the three British species only one has been recorded from the Netherlands. Possibly the other two, *B. bagnalli* and *B. melanops,* may be discovered here sooner or later. The known distribution of the genus in Europe is fragmentary anyway.

Brachychaeteuma bradeae (Brölemann & Brade Birks)
I found this species first in my garden in Haarlem many years ago and in similar places in the Zoo at Amsterdam. Later it proved to be not rare in the nests of *Talpa* in meadows on peaty soils near Amsterdam. Besides these localities in Noord-Holland a female specimen was found in the limestone area of Limburg. Probably the distribution of *Brachychaeteuma* in the Netherlands is mostly due to human influence, except in the south of the province Limburg where its occurrence may be natural.

Family CHORDEUMATIDAE
Of four species recorded in the U.K. two are known to occur in the Netherlands. *Chordeuma proximum* Ribaut found here and there in the southern part of Britain seems to have an atlantic distribution, and is not likely to occur in the Netherlands.

In the U.K. *Melogona scutellaris* (Ribaut) appears to be rather common, according to Blower even the most common chordeumatid. Apparently this is an Atlanto-Mediterranean species unlikely to be discovered in the Netherlands.

Chordeuma sylvestre C.L. Koch
Strangely enough, this species, which has a wide distribution in the central part of Europe down to central Italy, was found only in a few localities in Cornwall, the warmest part of England. If it were introduced in the U.K. one would rather expect it in the cooler regions. In the Netherlands it has been recorded only from the province Limburg, being not rare in wooded areas on alkaline clayey soil.

Melogona gallica (Latzel)
A species with a west European distribution. In the Netherlands it occurs in almost the same area as the preceding species: only the south of the province Limburg. It seems less common there than *C. sylvestre*. Neither of the two appears to have a synanthrope tendency. In contrast *M. gallica* has a much wider distribution in the U.K. than *C. sylvestre*.

Melogona voigtii (Verhoeff)
Contrary to the other *Melogona* this appears to be a synanthrope species in the Netherlands, however, with the same preference as to soil type. Up to now it is rather rare and has been collected here and there in the country. I suppose it is a primarily Central European species, which is gradually spreading through horticultural trade; this may also explain the recent discovery in Scotland.

The only other central European chordeumatid that, with some luck, might be found in the southernmost part of the province Limburg is *Mycogona germanica* (Verhoeff). It is, however, not to be expected in the U.K.

Family NEMASOMATIDAE
Of the two members of the family recorded from Great Britain only one has been recorded from the Netherlands. Since *Thalassisobates littoralis* (Silvestri) has been found in a number of localities on the British coast, the possibility of its occurrence on the Atlantic coasts of the European mainland cannot be excluded. The sandy beaches of the Netherlands are not particularly the place where one should look for it, but there are of course dikes and other stony fortifications where the species might have become settled. After all, the chilopod *Strigamia maritima* is known to occur at several places along the Dutch coast.

Nemasoma varicorne C.L. Koch
Although this species probably occurs throughout the Netherlands it is not really common, and surely much less common than the other bark-living millipede *Proteroiulus fuscus*. Owing to its particular habitat little can be said about the nature of its occurrence. According to Enghoff (1976) the Dutch material belongs to the parthenogenetic form, although incidentally males may be found. It seems that the occurrence in the U.K. has a similar pattern as in the Netherlands.

Family BLANIULIDAE

All but one of the British Blaniulidae has been found in the Netherlands too, probably in similar relative quantities. Only *Archiboreoiulus pallidus* (Brade-Birks) is not yet recorded from the Netherlands, although I have always borne in mind the possibility of its presence while identifying *Blaniulus*. In Belgium it seems to be occurring frequently together with *Blaniulus guttulatus* and it has been found not far from the Dutch border in Limburg, so it seems only a matter of time until it is located either in a synanthrope or in a more natural biotope, in the Netherlands.

Proteroiulus fuscus (Am Stein)

A species with a wide distribution in northern Europe, which is one of the most common millipedes in the Netherlands. It occurs, often in large populations, anywhere in and under pieces of rotten wood, tree trunks, etc., but also in the leaf litter of wooded biotopes on dry sandy soils as well as in the shrub vegetation of marshes. The species is parthenogenetic, although incidentally males have been found. The distributional data in the U.K. and the Netherlands appear similar.

Choneiulus palmatus (Nemec)

The distribution of this species in Europe is rather erratic and difficult to assess. In the Netherlands it may be autochthonous in the south and east of the province Limburg, but elsewhere it is almost surely introduced, occurring only in synanthrope localities. The frequent occurrence in greenhouses might suggest a certain thermophily, indicative of a southern origin. The situation in the UK may be similar: possibly indigenous in the south and synanthrope elsewhere.

Nopoiulus kochii (Gervais)

Owing to uncertainty about the characters of this species, its previously recorded distribution in the Netherlands should be reconsidered. May be it is more or less similar to that of the preceding species, but less rare.

Blaniulus guttulatus (Fabricius)

This is of course a well-known synanthrope species in the U.K. as well as in the Netherlands. It is here also known as an agricultural pest causing damages to germinating cultivated plants. In the south of Limburg its occurrence may be natural; but such is almost impossible to ascertain because of the ease with which it may be distributed through horticultural activities. In the rest of the Netherlands it is found especially in alluvial biotopes on humus rich soil types.

Boreoiulus tenuis (Bigler)

The general picture of the distribution in Europe of this species is difficult to evaluate. Rather rare in the Netherlands, and found usually on heavy soils together with other small synanthrope species. Maybe the occurrence in the south of Limburg is natural, but other records concern certainly synanthrope localities.

Family JULIDAE

Although the U.K. and the Netherlands share the bulk of species of this family there are some interesting differences. The U.K. has *C. londinensis,* probably an atlantic species not to be expected in the lowlands; *Enantiulus armatus* (Ribaut), a tiny species probably also with an atlantic type of distribution, *Haplopodoiulus spathifer* (Brolemann), probably introduced, and *Metaiulus pratensis* Blower & Rolfe also Atlantic.

Metaiulus pratensis has been recorded from the extreme southeast of England. It is a small species that is easily overlooked by hand collecting. Although not likely to be found in the Netherlands, the possibility cannot be altogether excluded.

The single species of *Enantiulus* occurring in England, *E. armatus,* was described from Southwestern France and occurs only in Cornwall. Apparently it is a typical western species, possibly to be found also in northern Spain and Portugal. It is not likely to occur in the Netherlands.

Ommatoiulus sabulosus (Linnaeus)
Although this species is usually characterized as common the occurrence in the Netherlands in general is rather erratic. It may be found locally throughout the country in open woody sites on sandy soil but never in great quantities. Actually, it is seen in the Netherlands most frequently in the coastal dunes, and occasional mass migrations have been recorded especially near the beaches where the lost erring specimens sometimes caused a little panic among bathers who feared these little "snakes". I remember having observed hundreds of adult specimens in the dunes near The Hague at night, climbing small poplar trees apparently to eat leaves. The extreme variation in number of individuals during their period of activity in three consecutive years has been recorded by Barlow (1957).

The species has, for a millipede, an extremely large distribution in Europe considering it does not have any preference for synanthropic habitats. Blower mentioned the colour variation occurring in certain populations in England. In this connection it may be useful to refer to a survey of the named colour variations, which at least partly are geographically determined, by Attems (1927).

* ***Ommatoiulus rutilans*** (C.L. Koch)
The distributional range of this species touches the Dutch territory in the South of Limburg where it was found a few times on warm limestone hill slopes. Like its congener it is active only in the summer months. Discovery in southwestern England seems not impossible considering the distribution in west-central Europe

Tachypodoiulus niger (Leach)
This is obviously one of the most common species throughout the UK. In the Netherlands it is similarly ubiquitous only in the southern half of the province Limburg, and particularly in the calcareous part. In the limestone quarries in this province it was the second commonest millipede, which was met with hibernating there, sometimes in enormous clusters (Jeekel & Van der Hammen, 1983). Elsewhere in the country it is rare and the few isolated localities are probably outposts of the distributional area in Belgium and Germany. Its distribution over here is quite similar to that of *Polydesmus angustus.*

Cylindroiulus coeruleocinctus (Wood)
This species is common in gardens in this country and it is probably almost everywhere introduced by transport with plants. It is not found on acid sandy soils in the eastern, central and southern parts. Its occurrence in this country is therefore probably natural only in the provinces Noord Brabant and Limburg where it is quite common. As far as I am aware *C. coeruleocinctus* does not occur in wooded areas but it is essentially a species of open terrain.

In the U.K. it seems to be not very common which is remarkable for a species that has such an evident synanthropic tendency and has obtained such a wide synanthropic distribution in Europe and North America.

Cylindroiulus vulnerarius (Berlese)
This may be an intruder from Italy, which in northwestern Europe was first discovered in the Netherlands as early as around 1910. Verhoeff described in 1912 Dutch material received from an amateur entomologist who investigated the fauna of *Talpa* nests. Verhoeff was apparently so impressed by the isolated find of this blind julid in the Netherlands that he described the material under the name of *Cylindroiulus ellingseni*. He compared it with *vulnerarius* and realized that the two were closely related. However, we now assume that the material from the Netherlands had dried out and that the gonopods as illustrated by Verhoeff were thereby misformed.

Later I found material of *vulnerarius* in Amsterdam and discovered the error by Verhoeff. Nowadays the species has been recorded from many countries, mostly from distinctly synanthrope localities. Still, one may wonder whether it is indeed an introduced species throughout Western Europe or that it was just overlooked earlier.

* ***Cylindroiulus apenninorum*** (Brolemann)
I have always wondered why this Italian species, which was reported from the Netherlands already in 19th century, has never been collected in other West European countries like the U.K. It was recorded by the coleopterist Everts in 1889 as *Julus dicentrus*, the name of a central European *Cylindroiulus* used before the name by Brolemann was proposed. It must have arrived here with plant material imported directly from Italy and seems perfectly adapted to the Dutch climate. At least I remember having collected it in substantial numbers in the "Haagse Bos", an old park in the centre of The Hague, possibly a remnant of the old coastal deciduous woods behind the dunes.

Schubart (1929) who collected this species in the Netherlands was so excited by the discovery that he proposed the subspecific name *batavus* Schubart for the Dutch population. Possibly a more careful comparison of material from the Netherlands with material of this variable species from the natural range in Italy may lead to a more exact identification of the part of that country from where the Dutch population originated. Considering the enormous development of trade of plant material in recent decennia we may expect the discovery of this species in other west European countries at any time. By the pointed produced anal scale and tail the species is easily recognized, and it certainly is not rare on the sites where it has settled.

Cylindroiulus punctatus (Leach)
Supposedly this Northwest European species is as common in the Netherlands as it is in the U.K., and I guess it is hard to find a square kilometer or a piece of rotten wood where it is missing. It is particularly common in the humus layer of deciduous woods on the acid soils of the eastern and southern provinces and along the dune coast.

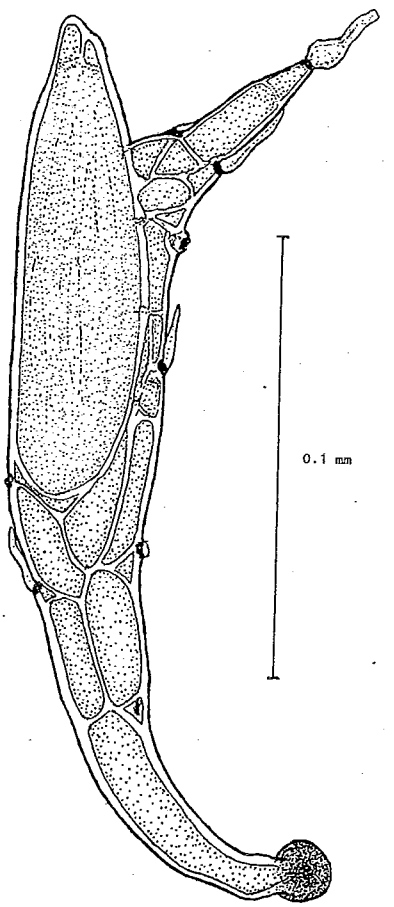
However, in spite of its being the most common Dutch millipede it is certainly not a typical synanthrope species as e.g. *Cylindroiulus latestriatus*. This may be the reason

why it has not been introduced outside its natural European area, except in Newfoundland.

Cylindroiulus latestriatus (Curtis)
This is a very common species in the Netherlands, where in the coastal dunes during springtime at times it may be extremely abundant. In Europe it has the same general distribution as the preceding species, but the pattern is obviously influenced by a distinctly synanthropic tendency. More inland in the Netherlands it is met with anywhere in gardens, as well as other biotopes under strong human influence, but also in more natural biotopes, for instance in peat marshes, always in more open terrain.

Referring to the remark by Blower (1985:36) it may be interesting to mention here the discovery of a parasitic fungus on Dutch material of *C. latestriatus*. Already many years ago I noticed in collected material specimens showing small black spots on a number of anterior legs and mouthparts. On closer inspection I found that these black spots were the basal cells of specimens of a parasitic ascomycetous fungus of the order Laboulbeniales. The species belongs to the genus *Rickia* Cavara that occurs usually on mites. Many species have been described but only recently species of *Rickia* were reported from millipedes (Scheloske, 1969; Rossi & Balazuc, 1977). The species of *Rickia* occurring on Dutch millipedes is close to these described forms, but seems sufficiently distinct to be regarded as a separate species, which I intend to describe under the name of *Rickia cylindroiuli* spec. ined. A small picture of this fungus is given in Figure 1. I am pretty sure that it will turn up in the U.K. before long.

Figure 1.



Cylindroiulus britannicus (Verhoeff)
Found only a few times in synanthropic biotopes in the Netherlands and almost certainly not belonging to the autochthonous Dutch fauna. The distributional picture in the U.K. and Ireland seems totally different, records being much more numerous. Blower (1985) calls this and the following "dead-wood species". Like the foregoing this is probably a species with an Atlantic distribution, which will prove to be widespread also in Western France, Northwest Spain and Portugal. Misidentification as *C. latestriatus* may account for the lack of records from these countries.

Cylindroiulus parisiorum (Brolemann & Verhoeff)
Like the foregoing and the following species this is more or less an enigma with regard to the natural distributional area. In the Netherlands it has been found only a few times as a synanthrope species, which may indicate import from elsewhere. It seems that in

the U.K. it is also rare although records are more numerous. Possibly it is an Atlantic species, which will be found also in the undercollected parts of the Atlantic coastal countries: western France, northwestern Spain and northern Portugal.

Cylindroiulus truncorum (Silvestri)
This is certainly an introduced species although its exact origin is not yet clarified. Silvestri described it from Tunisia, and it has been reported from Algeria, but of course that does not necessarily guarantee a North African origin. It has been recorded also from Iran by Attems. So much seems certain: it originated from a country with a warmer climate than Western Europe. In the Netherlands it is not common, but it has obtained a strong foothold, and is apparently much less rare than in the U.K. I found it in particular in compost heaps or places with dense accumulation of leaf litter in parks on humus rich soils. This, and its occasional occurrence in hothouses, indicates a definite thermophily, corroborating a southern origin.

Perhaps the seeming rarity in the U.K. is due rather to lack of sampling on the proper sites. Like so many cylindroiulines it is more or less gregarious on the sites where it occurs. Blower mentions the occurrence in England of males with "female" striation instead of the deeply furrowed appearance of "normal" males. It may be worthwhile to remind that the weakly striated males were described as var. *striatulus* by Schubart (1931: 163). According to his observations the variety is found particularly in males with a lower mean number of somites (38 (-5) – 43 (-3) against 40 (-5) – 47 (-3).

Allajulus nitidus (Verhoeff)
I understand this is not one of the commonest julids in the U.K. and I have had a more or less similar experience with it in the Netherlands. In the wooded areas on limestone in Limburg it is quite common and at places even gregarious. A similar situation occurs in some localities in the eastern part of Overijssel close to the German border. Elsewhere, however, a find of *C. nitidus* is always noteworthy, and strangely enough these collections always concerned few specimens. Although sites may be more or less strongly influenced by human activities, such an influence is not always immediately evident. Probably the species requires more heavy soil and a certain amount of humidity, as it certainly does not occur in biotopes with dry, acid sandy soils.

* ***Enantiulus nanus*** (Latzel)
Most of the collected material of this Central European species comes from the South of Limburg. Here it is found together with *Allajulus nitidus*, of which it looks like a minor edition. Discrimination of females and juveniles of the two species is not easy, and should be done by taking measurements and comparing the density of the striation of the metazonites, which is distinctly denser in *E. nanus.*

Elsewhere *E. nanus* is rare in the Netherlands and its occurrence there may be caused by human transport. For that reason the species might sooner or later be found in more or less synanthrope sites also in the U.K.

Julus scandinavius Latzel
With *Cylindroiulus punctatus* this is one of the most common millipedes in the Netherlands except on heavy, clayey soils. In the dunes it is common and I remember that in the spring adults may become very active and I observed many individual specimens moving with great speed on open sandy areas at night, obviously migrating

from one site to an other. Since that time I realize that this is essentially a woodland species, which at times actively migrates to colonize new biotopes where patches of shrubs are developing. This activity is obviously the reason why one may find occasionally specimens in the open fields far away from trees or shrubs.

Apparently this west central European species is less dominantly present in the U.K., a condition possibly due to its soil preference.

Xestoiulus laeticollis (Porat)
This looks like a diminutive form of *Julus scandinavius* with which it may occur in the same swampy locality. The present distribution of the species suggests that once it occupied the marshes of the northern plains of Europe. In the Netherlands it is found in some peat marshes in Holland, which may be regarded as remnants of a once continuous area stretching from Holland to Poland, Western Russia, the Baltic states and southern Sweden

It has not been reported from the U.K. although I have wondered if a thorough exploration of the suitable biotopes along the east coast could not yield this species.

Ophyiulus pilosus (Newport)
This species has been found in a few widely separated localities in the Netherlands: old woods in the provinces North Holland and Utrecht. It probably settled there many years ago with plant material.
Its rarity in the Netherlands I find hard to explain. Having personally experienced its commonness in the eastern U.S.A. and in the U.K. I came to the same conclusion as Kime (1999): just as in the U.S. *O. pilosus* must have been introduced in the U.K and Ireland. The fact that it has become so extremely common in these countries might be an indication of such a development: introduced species may multiply in enormous quantities when they arrive in the proper surroundings without competition of autochthonous species or without their natural enemies.

The genus *Ophyiulus* centers in the Central Mediterranean area, and *O. pilosus* appears to be a what may be called expansion-species of the genus: a species which has attained a much wider distribution than the area of its congeners. With regard to its massive, probably natural occurrence in southern Scandinavia one may seek the explanation in a coherent Central European distribution pattern during colder climatic periods and a secondary division into the two main areas of today: Scandinavia Northern Germany versus Switzerland, Austria, Northern Italy, Slovenia and Croatia.

Schubart (1934: 271) in his discussion on the discontinuous area cites Bigler (1929) as the author of two subspecies: the northern typical subspecies *O. pilosus s.str.* and the Central European form *O. pilosus major.* The matter of nomenclature is complicated because Attems and Verhoeff also distinguished similar forms.
Personally I think that the Scandinavian (small) form (according to Bigler males of 16 to 10 mm length) is the one that was introduced into the U.K. and the U.S. The drawing of the gonopod given by Blower (1985: 173, fig. 54F) shows much agreement with the illustration by Bigler (1929: 31, fig. 10). The central European form *major* (according to Bigler with males 25 to 28 mm long) may also have become displaced by anthropochorous dispersal and I guess that some, if not all, of the Dutch records may concern this subspecies, a question which has to be sorted out yet. Of course, the U.K.

also may have populations of the large form, introduced from Central Europe: a matter to be kept in mind.

All this is still much speculation and it is clear that the taxonomy of this species is in need of a thorough study of samples from all over its distributional range.

Leptoiulus belgicus (Latzel)
In the Netherlands this species has been found only in the extreme southern, mountainous part of Limburg, a marginal piece of the main area in western Europe. Although a west European species it has been recorded as far eastward as Austria. Recently, it has been recorded in the Netherlands also from the urbanized part of the province Noord-Holland. I have not seen the material upon which these records are based and cannot confirm the identification. If correct, such an occurrence can only be explained by assuming anthropochorous dispersal.

The known distributional range in England, only the southwest, is remarkable considering the pattern in continental Europe. It reminds a little of the occurrence of *Chordeuma sylvestre.*

Leptoiulus kervillei (Brolemann)
This is also a western species known only from a small part of the south of the province Limburg. This area seems to be an outpost of the more or less continuous range in Belgium and France. The records from the south of England fit very well in a certain distributional picture: obviously a range existing before the breakthrough of the Street of Dover.

Brachyiulus pusillus (Leach)
This species is locally quite common both in the U.K. and in the Netherlands, but the picture of its natural distribution is undoubtedly blurred by its strong synanthrope tendency. It is found everywhere in gardens on humid non-acid soil types. In the more natural habitats it occurs particularly on humid clayey soils behind the calcareous dune coast. However, it is easily transported and was obtained for instance in considerable quantities on localities in the middle of the reclaimed Zuiderzee polders on clay soil (Jeekel, 2000). Not found in wooded areas but more in open shrub vegetation and even quite abundantly near the borders of rivers, or in open reed lands with a high water table (Jeekel & Brugge, 2001). Considering the localities where it is found I suppose it can survive periodical inundations of its habitat.

Unciger foetidus (C.L. Koch)
The single record of this species from the Netherlands is based solely upon a communication received from Brolemann by Schubart (1929) according to whom it was found near Leiden, a somewhat puzzling record. However, *U. foetidus* is known to have synanthropic tendencies and the possibility of an occurrence in the Netherlands under such conditions cannot be excluded. Its main area of dispersal is Central Europe, but the nearest record from Germany is in East Frisia not very far from the northeastern Dutch border, so there is still a slight chance that *U. foetidus* will be found somewhere in the east of the province of Overijssel. After all it has been discovered only recently in East Anglia. The discovery in a synanthrope site in the Netherlands is an other possibility. Unfortunately my search for it has failed up to now.

* ***Megaphyllum projectum*** Verhoeff
I do not have much experience with this species, which is mainly Central European in distribution, the occurrence in the Netherlands being confined to two eastern provinces close to the German border. It is noteworthy that it apparently does not occur in the south of Limburg, neither in the Belgian Ardennes. Probably we are dealing here with an eastern-central European millipede, which touches on the Dutch eastern border. Occurrence in the U.K. seems quite unlikely.

I found it in the leaf litter of small wooded patches, but in the spring, when I collected only subadults were found. Adults seem to be active only in the summer. It does not seem to have synanthropic tendencies.

Family POLYDESMIDAE
All Polydesmidae of the Netherlands occur in the U.K. But Britain has some interesting additional species, like *Polydesmus gallicus* or, better, *P. coriaceus* Porat, which has not been recorded and probably, as an atlantic species, does not occur in the region of the low countries. A remarkable recent record of *Polydesmus barberii* Latzel from Southeast England concerns possibly a case of recent anthropochorous dispersal. The other species recorded once in England is *Eumastigonodesmus boncii* (Brolemann), a species that seems to have an Atlantic distribution and is not to be expected to occur in the Netherlands.

Brachydesmus superus Latzel
Like in the U.K. this is one of our commonest polydesmids, which is found mostly in humid situations in gardens. As a consequence of the synanthrope tendency of the species the natural distribution has become difficult to ascertain. Probably its occurrence in the shrubby vegetation of wet valleys in the dunes and directly behind, often in company of the julid *Brachyiulus pusillus* (Leach), must be regarded as natural. Seems to prefer humus rich sandy or clayey soils provided the habitat is not too dry.

Polydesmus angustus Latzel
I understand that in Britain this west European species is the most widely distributed polydesmid. Over here it is common only in the limestone area of Limburg, where it was found to be the most common millipede in limestone quarries (Jeekel & Van der Hammen, 1983), and in forests on clayey soils east of the river Meuse down to around Nijmegen. Elsewhere there are a few isolated localities, mostly sites with old wood, but I think that part if not all of these populations might as well have been introduced with plant material. Maybe the localities in Noord-Brabant are northern outposts of the more continuous area in Belgium.

Polydesmus testaceus C.L. Koch
In the Netherlands this central European species is strictly confined to the limestone area of Limburg where it is common, though not as common as *P. angustus.* In the limestone quarries of the southern-most part of Limburg it is the third most common species (Jeekel & Van der Hammen, 1983).

Although distinctly more selective in its choice of habitat and more eastern in general distribution than *P. angustus* it seems strange that the range of *P. testaceus* in the U.K. is so restricted and includes isolated localities in Cornwall. This reminds of the distribution of *Chordeuma sylvestre* and *Leptoiulus belgicus.*

Polydesmus denticulatus C.L. Koch
Except on limestone or heavy clayey soils this is the most common polydesmid in the Netherlands, which is found in dry woodland on poor acid soils as well as in shrub vegetation of peat marshes. Moreover it has rather strong synanthrope tendencies, which accounts for the occurrence practically everywhere in the country. Apparently the animal is less common in the U.K., where the synanthrope tendency is not so obvious as over here.

Polydesmus inconstans Latzel
This might seem a fairly recent arrival in a large part of the Netherlands because it was not reported upon in papers before the '70s. It now appears to be fairly common in Limburg. There, as in the U.K., it has been found a few times in limestone quarries, but it is decidedly less common in this habitat than *P. angustus* or *P. testaceus.* Elsewhere in the Netherlands *P. inconstans* is rare, having been collected in some isolated localities. However, it was found to be the dominant polydesmid in the Flevoland polder (reclaimed from the former Zuiderzee) on clayey soil, which indicates distribution through human transport.

Family MACROSTERNODESMIDAE
The two species found in the Netherlands occur also in the U.K.

Ophiodesmus albonanus (Latzel)
This seems to be a rare species in the Netherlands, meaning that it is found only when one happens to look for it at the right place at the right time. It seems to prefer a heavy soil type that does not dry out in summer. Its occurrence in this country is probably natural only in the province Limburg and in some small areas along the German border. Elsewhere I guess occurrence is entirely due to human transport. May be the period of appearance at soil level is very short, and this may be the cause of its rareness.

Macrosternodesmus palicola Brolemann
The known distribution of this species, like the foregoing, largely coincides with the place of residence of its collectors. It lives probably most of the year under the surface of fat humus-rich or humid clayey soil. The picture of its erratic occurrence in the Netherlands is similar to that of the UK. Personally I have not seen it for many years now.

Family PARADOXOSOMATIDAE
While the well-known hothouse millipede, *Oxidus gracilis* (C.L.Koch) is just as common in its particular habitat in the Netherlands as in the U.K., the occurrence of the other British paradoxosomatid in the Netherlands is dubious.

Stosatea italica (Latzel)
This essentially Mediterranean species was recorded from the Netherlands only once, collected by an amateur entomologist studying the arthropod fauna of *Talpa* nests in the southern part of the province Limburg. Unfortunately we have no knowledge of the exact locality and the circumstances under which it was found. If this species really belongs to the Dutch fauna it almost certainly must have been introduced with plants from the Mediterranean region.

SUMMARY

Below is a summary comparison of the species occurring in the Netherlands and not (yet) in the U.K. The two expected to be found sooner or later in Britain are marked by a *

Glomeris intermedia Latzel
* *Cylindroiulus apenninorum* (Brolemann)
Enantiulus nanus (Latzel)
Xestoiulus laeticollis (Porat)
Megaphyllum projectum Verhoeff
**Ommatoiulus rutilans* (C.L. Koch)

Species occurring in the U.K. but not recorded from the Netherlands are listed below. Those marked by a * might be found (or found again) some day in the Netherlands.

**Stygioglomeris crinata*
Adenomeris gibbosa
Polyzonium germanicum
Nanogona polydesmoides
Anthogona britannica
Brachychaeteuma melanops
**Brachychaeteuma bagnalli*
Chordeuma proximum
**Melogona scutellare*
**Thalassisobates littoralis*
**Archiboreoiulus pallidus*
Cylindroiulus londinensis
Enantiulus armatus
Haplopodoiulus spathifer
Metaiulus pratensis
**Unciger foetidus*
Polydesmus gallicus
Polydesmus barberii
Eumastigonodesmus boncii
**Stosatea italica*

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