

New data on Tipulidae (Diptera) from The Netherlands

PJOTR OOSTERBROEK & HERMAN DE JONG

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Abstract: This paper presents an overview of 38 species of Tipulidae that are, or were once considered to be, rare in The Netherlands. Several species are still known from a few or even single captures only, e.g., *Nephrotoma croceiventris lindneri*, *N. lamellata*, *Tipula (Lumatipula) laetabilis*, *T. (L.) peliostigma*, *T. (L.) selene*, *Tipula (Platytipula) autumnalis*, *Tipula (Pterelachisus) pauli*, *T. (P.) winthemi*, *Tipula (Vestiplex) excisa*, *Tipula (Yamatotipula) caesia*, and *T. (Y.) coerulea*. Others that had a reputation of being scarce turn up quite frequently at several sites in Malaise-traps: *Nephrotoma aculeata*, *Tanyptera nigricornis*. The apparent scarcity, especially of species of the subgenus *Tipula (Savtshenkia)*, is probably partly the result of undercollecting during their late flight period. A single male of the Nearctic *Nephrotoma ferruginea* was captured near 's Gravenhage; it represents the first record of this species from Europe. The specimen was possibly imported by man. A single male of the western Mediterranean *Tipula (Tipula) mediterranea* was captured on the lightship Noord Hinder in the North Sea about 70 km west of the coast of Zeeland. A number of intersexes of *Nephrotoma guestfalica guestfalica* were collected on the artificial sandplate Hompelvoet in the Grevelingenmeer; this finding represents the first documented occurrence of intersexes of the species.

P. Oosterbroek & H. de Jong, Sectie Entomologie, Zoölogisch Museum, Plantage Middenlaan 64, 1018 DH Amsterdam, The Netherlands.

Introduction

In the first checklist of the Diptera occurring in The Netherlands, published by Van der Wulp & Snellen van Vollenhoven (1852), 33 species were listed of what we nowadays consider the family Tipulidae. Since this first checklist, the number of species has steadily increased, adding up to 81 in the detailed account of the Dutch species presented by Theowald (1957a), and up to 86 by the end of the former century (unpublished).

Although the Tipulidae in The Netherlands were never the subject of particularly intensive collecting, large quantities of data have become available since Theowald's 1957 review. This includes records for species which had not been collected for many years, e.g., *Tipula (Pterelachisus) pauli* Mannheims, which was captured in 1900 and again in 1999. Besides information on truly rare species this paper also provides information on Tipulidae that probably are less scarce than collecting data suggest. Several species, especially of the subgenus *Tipula (Savtshenkia)* Alexander) are apparently undercollected because of the less agreeable weather condi-

tions during their flight period in the autumn.

As a precursor to the publication of keys to all species of Tipulidae from The Netherlands and North-west Europe, the most interesting new data are documented below. The information given covers a total of 38 species and subspecies, including a review of all the rare species known from The Netherlands. This study is based on material present in the collections of the Zoological Museum, University of Amsterdam (ZMAN), National Natural History Museum Leiden (RMNH), the Wageningen University (WU), and the private collection of J. T. Smit (Nijmegen).

Ctenophora (Cnemoncosis) ornata Meigen

In the literature known after three specimens only, from the southern part of the Veluwe, a large forest area in the province of Gelderland (1 ♀, Arnhem, 19th century; 1 ♂, Laag Soeren, 19th century, vi; 1 ♀, Roosendaal, 8.vii.1900; De Meijere, 1907; Theowald, 1957a, 1971; all three ZMAN). Since 1940 known from 10 localities, again from Gelderland: Arnhem, Bennekom, Renkum, Rheden, Schaarsbergen, Wageningen (all south of the Veluwe) and

Barneveld (de Schaffelaar), Vragender Veen ? (locality labeled with a question mark); Limburg: Annendaal, Vlodrop.

The sex ratios of this and the next species are remarkable. *Ctenophora (Cnemoncosis) ornata* is known from two females and 13 males, whereas the examined material of *Ct. (Ct.) elegans* consists of four males and 13 females.

The species is considered an unmistakable hornet mimic by Falk (1991). Habitat requirement is ancient broad-leaved forest with dead wood and old or decaying trees. The larvae live in soft wood-mould and the species has been reared from a variety of trees: apple (*Malus*), beech (*Fagus*), horse chestnut (*Aesculus*), elm (*Ulmus*), maple (*Acer*), plane (*Platanus*), and sweet chestnut (*Castanea*) (Mannheims, 1951; Theowald, 1957a, 1957b; Kirchberg, 1958; Scherf, 1958; Menier, 1973). The flight period is from June to the end of August.

Ctenophora (Ctenophora) elegans Meigen

During the last decades this species has apparently become very rare. From the second half of the 19th century until 1942 it was known from eleven localities: Drenthe: Dwingelo (1♂, ZMAN); Gelderland: Arnhem (1♀, RMNH), Eerbeek (1♂, 1♀, ZMAN), Velp (1♀, ZMAN), Voorst (1♀, RMNH); Zuid-Holland: Rotterdam (1♀, ZMAN); Limburg: Sittard (1♂, 1♀; Theowald, 1957a & in litteris, Museum Maastricht), Venlo (4♀, ZMAN). Additional records from the literature are Gelderland: Apeldoorn, Laag Soeren, Oosterbeek (Van der Wulp, 1877). More recently it was collected four times only: Overijssel: Ommen (1♂, 31.v.1997, Smit), 3.2 km E Ommen (1♀, 2.vi.1997, ZMAN); Gelderland: Renkum (1♀, 19-26.v.1996, ZMAN), Wageningen (1♀, 2.vi.1985, WU).

Although obviously more widespread than *Ctenophora (Cnemoncosis) ornata*, six of the 12 localities are from the southern part of the Veluwe again, indicating that this forest area is quite important in maintaining these two species of *Ctenophora*. The larvae of *Ct. (Ct.)*

elegans also live in soft wood-mould and have been recorded from apple, ash (*Fraxinus*), plane, and willow (*Salix*) (Mannheims, 1951; Mannheims & Pechlaner, 1963; Theowald, 1952c; Menier, 1973). The flight period is from April to the end of July.

Ctenophora (Ctenophora) guttata Meigen

Of this species only two older records are known, namely Zuid-Holland: Delft (Jaffa cemetery, 1♀, v.1866; Theowald, 1971; ZMAN; listed by Van der Wulp, 1877, Van der Wulp & De Meijere, 1898, and Theowald, 1952c, 1957a, as from Rotterdam), and Noord-Brabant: Breda (1♀, 2.v, about 1900; Theowald, 1952c, 1957a, 1971; material not seen by us).

The immature stages were found in wood-mould of willow and horse chestnut (Martynovskiy, 1968; Savchenko, 1973). The flight period is from early April to the end of July.

Nephrotoma aculeata (Loew)

Listed as new for The Netherlands by Theowald (1952b) from three localities in the province of Limburg and thereafter recorded only once more, from Overijssel: Denekamp (1♂, 27.vii.1917; Theowald, 1953; ZMAN; identified as *lunulicornis* by De Meijere).

In spite of the scarcity of published records, *Nephrotoma aculeata* has been collected since 1950 quite frequently in Limburg (Bemelen, Cannerbos, Caumerdal, Eyselshoven, Heerlen, Simpelveld, St. Pietersberg, Stein, Terwinselen; ZMAN; St. Pietersberg also RMNH). Outside Limburg it is known from Overijssel (see above), Gelderland: Zevenaar (1♀, 17-20.vi.1992, captured in a Malaise-trap) and Zuid-Holland: Hompelvoet. The material from the artificial sandplate Hompelvoet in the Grevelingenmeer was collected in Malaise-traps from 1998 till 2000 (De Kraker & Derks, 2000; ZMAN).

Adults are to be found in a variety of habitats, including well-lit coniferous, mixed, or deciduous forests with a dense undergrowth, shrubby or forested river- and lake-

sides, shrub-covered meadows, brook valleys (Oosterbroek, 1978; Dufour, 1986; Falk, 1991; Podenas, 1995); among the Swiss habitats there is a clear preference for gravelly or sandy soils, pervious to water (Dufour, 1986). The flight period is end of May to the end of September.

***Nephrotoma croceiventris lindneri*
(Mannheims)**

Known from four localities only and not collected since 1960: Gelderland: Laag Soeren (1♂, v.1898); Zuid-Holland: Oostvoorne (1♀, 16.v.1953; 1♂, 15.v.1960); Noord-Brabant: Chaam (1 specimen, 22.vi-3.vii.1936), Zeeland: Koudekerke (2♂, 1♀, 1 specimen, 19th century, 3.v) (all ZMAN).

In The Netherlands *Nephrotoma c. lindneri* is restricted to sandy areas; elsewhere it is found at inundated meadows, along small lakes, rivers, or marshy edges of small streams in meadows (Mannheims & Pechlaner, 1963; Savchenko, 1973; Oosterbroek, 1979a; Dufour, 1986). The flight period is from April to the end of June.

***Nephrotoma ferruginea* (Fabricius)**

One male from 's Gravenhage (Zuid-Holland) collected by E. A. M. Speijer on 27 September 1980 (RMNH).

Nephrotoma ferruginea is a very common species in Canada, the USA, and Mexico (Oosterbroek, 1984). As far as known it has never been reported from outside its New World range, and its finding in The Netherlands is most probably due to some kind of accidental transport. Further information about the collecting circumstances are not available but it seems unlikely that the specimen is wrongly labeled.

***Nephrotoma guestfalica guestfalica*
(Westhoff)**

Intersexes of this species, which is well distributed throughout The Netherlands, were collected by P. J. T. Derks en C. de Kraker in

a Malaise-trap on the artificial sandplate Hompelvoet in the Grevelingenmeer. During the periods 1-4, 10-13, en 16-19 July 1998 three intersexes were collected, i.e. individuals which show male as well as female structures in their genitalia. Intersexes are relatively rare among Tipulidae and until now this aberration was not observed in *Nephrotoma guestfalica* (De Jong, 1997).

The occurrence of intersexuality often is attributed to such diverse stress factors as pollution, parasitism or high temperatures. These should disturb the normal balance between the male and female determining genes. In addition to intersexuality other anomalous forms of sexual differentiation are gynandromorphy and hermaphroditism. Gynandromorphs are individuals in which certain parts of the body show fully developed male characters, while other parts are entirely female. Hermaphrodites are individuals that externally show either male or female features, but are capable of producing both spermatozoa and eggs.

***Nephrotoma lamellata lamellata* (Riedel)**

This species has been recorded from The Netherlands only once: Gelderland: Nijmegen (1♂ 1♀, 7.vi.1952, N. van der Vliet; Oosterbroek, 1976; ZMAN).

Very little is known about the biology; according to Savchenko (1973), Dufour (1986), and Podenas (1995), it is predominantly a species inhabiting coniferous, mixed, or deciduous forests. The flight period is from May to the end of August.

***Nephrotoma quadristriata* (Schummel)**

Theowald (1957a) mentioned five localities only, but in recent years this number has increased to about 20. The majority of these are situated in the coastal, sandy areas in the western part of the country (from the islands Rottumeroog, Terschelling and Texel in the north to Valkenisse, Zeeland, in the south) and throughout the Utrechtse Heuvelrug, a large forest covered sandy region. The few

localities outside these regions are Friesland: Nijetrijne; Drenthe: Bargerveen; Flevoland: Emmeloord, Lelystad, Marknesse; Noord-Holland: Sloten, Nederhorst den Berg (fietspad naar Ankeveen).

The species has been recorded from a large variety of habitats, ranging from fairly dry pine forests to meadows, springs, mountain streams, and swampy river beds (Mannheims & Pechlaner, 1963; Oosterbroek, 1979b; Tangelder, 1984; Podenas, 1995). It apparently has a strong preference for sandy or gravelly soils in combination with a vicinity of moist places (Dufour, 1986). In Great Britain the species is confined completely to the major sand dunes systems on the west coast of England and Wales (Falk, 1991; Stubbs, 1992, 1999). The flight period is from mid May until the end of September.

Prionocera pubescens (Loew)

This species was recorded as new for the Dutch fauna by Theowald (1954) and is still known from four post-1950 localities only: Drenthe: Hooerveen (1 ♂, 24.iv.1992), Weiteveen (14 ♂, 7 ♀, 11.v.2001); Gelderland: Wooldse Veen (1 ♂, 4.vii.1952; 5 ♂ 2 ♀, 25-27.v.1958), Tongerense Heide (9 ♂, 1 ♀, 14.v.1972) (ZMAN; Wooldse Veen also RMNH).

Prionocera pubescens is an inhabitant of *Sphagnum* zones as can be present in a variety of habitats (lowland and valley fens, raised bogs, schwingmoors, heathlands, swampy lake shores in humid forests, boggy river banks; Bertrand, 1950; Peus, 1952; Dufour, 1986; Falk, 1991; Podenas, 1995, Denton & Fry, 1998). The flight period is from the end of April until early July.

Prionocera subserricornis (Zetterstedt)

Theowald (1957a) listed only a few localities and *Prionocera subserricornis* presently is known from only 14 sites in The Netherlands. Most are in the peat districts of the provinces Noord- and Zuid-Holland: Ankeveense plassen, Bussum, 's Graveland, Heiloo, Kort-

hoef, Naardermeer, Nieuwkoopse plassen, Volendam (Heitje van Katham). The other localities are Drenthe: Bargerveen, Borger, Diever (Kreuzveen), Weiteveen; Gelderland: Nunspeet (de Mythstee); Utrecht: Leersum (Kasteel Broekhuizen), Leusden (den Treek) (ZMAN; Nieuwkoopse plassen RMNH).

The species is associated with ditches, brooks, and pools as can be found at alder groves, spruce forests, peat bogs, fenlands, and along lake shores and rivers. The larvae have been described after material found at a peaty site by Höchstetter (1963). They have also been found in saturated organic debris in alder groves and in boggy ground under a moss cover in alder groves (Stubbs, 1992; Podenas, 1995). Emergence-catches also show a strong preference for aquatic and semi-aquatic habitats (Brinkman, 1991). Adults have been observed visiting the flowers of *Angelica sylvestris* L. in the midday sun (Falk, 1991). Oviposition at the water surface of a small brook was noticed by Brinkman (1991). The flight period is from the end of April until the first half of September with, according to Brinkman (1991), two generations a year.

Tanyptera (Tanyptera) nigricornis nigricornis (Meigen)

Since its first account by Theowald (1952a) based on specimens captured in 1920 and 1950, this species apparently has become much less rare. Since 1950 it is known from 31 localities, especially from the eastern half of the country: Drenthe: Bargerveen, Papenvoort; Overijssel: six localities; Gelderland: 11 localities; Utrecht: Soestduinen, Leusden (den Treek); Noord-Holland: Naardermeer; Noord-Brabant: three localities; Limburg: six localities. At no less than 14 of these localities it was collected by Malaise-traps, usually in considerable numbers. This means of collecting might in part explain why numbers increased in recent times, but not entirely so: there are no 19th century records and only two pre-1950 findings from Gelderland: Leuvenum (1 ♀, 14.v.1911, RMNH), and Putten (1 ♂, 15.v.1920, ZMAN).

The larvae develop in dead wood of broad-leaved trees; there are only a few breeding records, from birch (*Betula*; Theowald, 1957b), cherry (*Prunus*; Cramer, 1968), oak (*Quercus*; Hoskin, 2000), and alder (*Alnus*; Stubbs in litteris, 2001); adults have been collected from dead ash and oak trees (Falk, 1991; Stubbs, 1992). The flight period is from early April to mid June.

Tipula (Lunatipula) helvola Loew

This rather small species of *Lunatipula* is known from 17 localities, nine of which are in the province of Noord-Holland, four in Limburg, two in Overijssel (Fortmond and Ootmarsum), and one each in Utrecht (Grebbeberg), Zuid-Holland (Wassenaar), and Zeeland (Valkenisse); 25 of the 30 collecting dates are post-1980.

The biology of the species is largely unknown; various authors mention dry woodland as the most preferred habitat (Pierre, 1924; Mannheims, 1967; Dufour, 1986; Falk, 1991; Stubbs, 1992). On the basis of several findings in Kent, Clemons (1994) pointed out that the adults tend to occur within the damper regions of such woods. The flight period is from June to September.

Tipula (Lunatipula) laetabilis Zetterstedt

This species, formerly known as *dilatata* Schummel, and recorded as new for the Dutch fauna by Theowald (1954), is presently known from three post-1950 localities only: Overijssel: Fortmond (1 ♀, 6.viii.1981); Gelderland: Kotten (Bekendelle) (1 ♂, 2.vii.1952; 2 ♀, 29.vii.1958); Limburg: Bemelen (1 ♀, 18.vii.1954) (all ZMAN).

As in the former species, the biology is largely unknown, but various authors mention as preferred habitats humid woodlands and wood or shrub covered riversides and lake shores (Dufour, 1986; Falk, 1991; Stubbs, 1992; Podenas, 1995); Brauns (1954b) mentioned as larval habitat areas infested by the moth Black Arches (*Lymantria monacha* L.). The flight period is in July and August.

Tipula (Lunatipula) livida livida Van der Wulp

This species, described from The Netherlands by Van der Wulp in 1858, is predominantly distributed in the dunes of the provinces Noord-Holland (nine localities) and Zuid-Holland (five localities). Localities outside this region are Drenthe: Havelterberg; Flevoland: Oostvaardersplassen; Gelderland: Tongeren (Welna), Twello (de Hartelaar); Noord-Holland: Amsterdam (Amstelpark), Heiloo, Hilversum; Utrecht: Leersum (Kasteel Broekhuizen); Limburg: Sibbe. Theowald (1953) mentioned that since 1900 the species has become very rare. There are indeed only four collecting dates between 1900 and 1950; however, from 1950 onwards the species was collected on more than 30 different occasions.

Tipula (Lunatipula) livida is a species of heath and woodlands, ranging from dry thermophilous broad-leaved forest to humid pine forests and alder groves (Dufour, 1986; Falk, 1991; Podenas, 1995). The immature stages have been found in woodlands, frequently of beech, under leaf-litter, under mosses, in damp soils, and in detritus, and also in very soft dead wood of beech (Beling, 1879, as *selene* Meigen; Chiswell, 1955, 1956; Theowald, 1957b). The flight period is from the end of May until early August.

Tipula (Lunatipula) peliostigma peliostigma Schummel

Of this species we have examined two specimens, respectively from Zuid-Holland: Meijendel (1 ♀, 17.vi.1923, RMNH) and from Limburg: Venlo (1 ♂, 19th century, 10.vi, ZMAN). Earlier records from Breda: Mastbosch (Van der Wulp, 1877), and Wageningen (Van der Wulp & De Meijere, 1898) have been dismissed by De Meijere (1920) and Theowald (1957a).

The generalized habitat description is woods and hedgerows; according to Dufour (1986) it is most abundant in very warm localities. The larvae and pupae have been found in leaf-litter and under mosses in broad-

leaved forests (Beling, 1879; Brauns, 1954b: oakforest; Erhan & Theowald, 1959), and in Great Britain the species has been bred from the nests of robin, blackbird, song thrush (Falk, 1991; Stubbs, 1992) and from dead wood (Stubbs in litteris, 2001). The flight period is from May to August.

Tipula (Lunatipula) selene Meigen

Examined from only four Dutch localities, three of which are post-1950: Noord-Holland: Heemstede (Oosterveld) (1 ♀, 3.v.1954, reared from larvae collected on 3 April), Hilversum (1 ♂, vi.1902), Overveen (Midden-duin) (1 ♂, 4.vi.1993); Noord-Brabant: Heeze (1 ♀, 5-7 June 1959) (all ZMAN). The records from 's Gravenhage, Utrecht, and Venlo (Van der Wulp, 1859; Van der Wulp & De Meijere, 1898) could not be confirmed.

Tipula (Lunatipula) selene is a woodland species. Larvae have been reared from the wood-mould of rotting broad-leaved trees, most frequently from beech, but also from alder, birch, oak, and willow (Chiswell, 1956; Mannheims, 1965; Theowald, 1957b; Falk, 1991; Podenas, 1995; Harvey, 1998). The flight period is from April to the end of August.

Tipula (Platytipula) autumnalis Loew

Known in The Netherlands from three localities and larval material only: Gelderland: Apeldoorn (De Kar) (2 larvae, 22.v.1979); Noord-Brabant: Strijper Aa south of Valkenswaard (2 larvae, vi.1982); Limburg: Cannerdal (1 larva, 17.v.1954; 2 larva, 3.vi.1954) (all ZMAN). Identification is based on Theowald (1957b, 1967) and comparison with the larvae of *Tipula (Platytipula) luteipennis* Meigen and *T. (P.) melanoceros* Schummel, the only other species of the subgenus *Platytipula* occurring in North-west Europe.

As the name clearly indicates, this is an autumn species; the females are short-winged and flightless but the males are on the wing in September and October. It can be locally common and is found in spring-brooks and other swampy woody habitats, such as birch,

spruce, or alder groves (Riedel, 1913; Savchenko, 1954; Brinkman, 1991; Podenas, 1995). The larvae at the Dutch site near Apeldoorn were found in abundance among the moss *Calliergon cordifolium* (Hedw.) in a reed (*Phragmites*) vegetation covering a temporary dry railroad ditch (H. Cuppen, in litteris). According to the labels, the Strijper Aa material was also collected in a reed vegetation.

Tipula (Pterelachisus) pauli Mannheims

This and the next species have been listed for The Netherlands under the name *hortensis* Meigen by De Meijere and Theowald (for details see Theowald, 1980: 448, 451). It is known from two localities only, with collecting dates lying almost 100 years apart: Noord-Holland: Hilversum (1 ♂ 1 ♀, vii.1900) and Overijssel: Ootmarsum, Springendal (1 ♂, 13-20.v.1999; 1 ♂, 27.v-1.vi.1999) (all four ZMAN).

According to Savchenko (1964, 1966), this is a species of broad-leaved and mixed forests; his description of the larva and larval habitat is based on Beling (1873), Girschner (1883), and Gerbig (1913), all three doubtful with respect to species assignment (for Beling see Theowald & Mannheims, 1956). Podenas (1995) stated that the two females seen by him were flying in meadows and shrubs on river banks. The Dutch 1999 material was collected at the German-Netherlands border in a moist terrain along a low-lying brook bordered by tall oak trees. The flight period is May until July. On the basis of material examined, Theowald (1980: 456) presumed that during the past century the species has become much rarer in Europe.

Tipula (Pterelachisus) winthemi Lackschewitz

The only Dutch material of this species is a pin with two wings only (ZMAN), remnants of the specimen mentioned by Van der Wulp (1877) under the name *hortensis* Meigen from "den Haag, in Juli" [= 's Gravenhage (Zuid-Holland), July]. According to Theowald (1980:

451, 456), these remnants certainly belong to *winthemi*, with the description of *hortensis* Meigen in Van der Wulp (1877) most probably referring to *winthemi* as well.

Almost nothing is known about the biology. The species was collected by Schummel around 1830 near Breslau in some of the gardens (see Theowald, 1980: 456). According to Savchenko (1964, 1966) it is a species of broad-leaved forests. Theowald (1980) remarked that recent findings are very rare and that during the past century the species has become much rarer in the Palaearctic.

Tipula (Savtshenkia) alpium Bergroth

Theowald (1957a) mentioned two Dutch localities; during this study the number has increased to 11, all post-1940: Friesland: Bakkeveen (Duurswoude); Drenthe: Borger; Gelderland: Barneveld (de Schaffelaar), Epe (de Dellen), Nunspeet (de Mythstee), Staverden; Utrecht: Leersum (Kasteel Broekhuizen), Leusden (Trekermeer), Leusden (den Treek), Maarsbergen (Hoogstraat) (ZMAN; Staverden RMNH).

Tipula (Savtshenkia) alpium is a species to be found in a wide variety of habitats, in all kinds of forests but also in more open environments such as marshes, mountainsides, or alpine meadows (Coulson, 1959; Dufour, 1986, 1992; Stubbs, 1992). The Dutch material from Leusden (den Treek) and Maarsbergen (Hoogstraat) was taken from moist wheel tracks on paths in deciduous forests. Larvae can be found in mosses on stones, walls and trees, moss-pillows in forests, moors, mountains and lowland fields, and under leaf-litter in for example oak forests (Coulson, 1959; Theowald, 1957b, 1967; Brindle, 1960). The flight period is from April to November.

Tipula (Savtshenkia) obsoleta Meigen

This species has been examined from a few 19th century localities: Utrecht: Vreeland; Noord-Holland: Amsterdam; Zuid-Holland: 's Gravenhage; Noord-Brabant: Breda; one 1902

record ('s Gravenhage), and eight post-1950 localities: Gelderland: Wageningen; Noord-Holland: Amsterdam (Amstelrust), Heemstede, Overveen; Zuid-Holland: Hompelvoet, Rotterdam; Noord-Brabant: Udenhout (de Brand); Limburg: St. Pietersberg (ZMAN; Breda and 's Gravenhage RMNH; Wageningen WU; de Brand J. W. van Zuijlen in litteris, 1991). The records from Groningen and Venlo (Van der Wulp, 1859; Van der Wulp & De Meijere, 1898) could not be confirmed.

Tipula (Savtshenkia) obsoleta prefers more open habitats, such as rough grasslands, margins of fields, peat bogs, woodland edges or hedgerows where it often occurs near open drainage systems or small brooks (Dufour, 1986; Stubbs, 1992; Podenas, 1995). The larvae can be found in mosses on stones and walls, and beneath mosses in forests (Theowald, 1957b; Brindle, 1960). The flight period is from September to November.

Tipula (Savtshenkia) pagana Meigen

Known from 16 localities, two from the 19th century: Empe and Brederie near Empe (Gelderland), and the others post-1950: Overijssel: Lattrop, Voltherbroek; Gelderland: Apeldoorn (de Kar), Heerde, Nijkerk (Ehrental), Wageningen; Noord-Holland: Heemstede; Zuid-Holland: Oostvoorne; Limburg: Cadier en Keer, Caumerdal, Elsloo, Heerlen (ZMAN; Voltherbroek RMNH; Wageningen WU). The males from Driebergsche bosch and Winterswijk (Van der Wulp, 1877; Theowald, 1952c, 1954) were not examined but the identifications are most probably correct.

This species occurs in a wide range of situations, predominantly in open habitats such as gardens, grasslands, drier parts of marshlands, along the borders of peat bogs and lakes, hillsides, but also in damp woodland (Lindner, 1968; Dufour, 1986; Stubbs, 1992). It breeds in or beneath mosses on soil (Beling, 1879; Theowald, 1957b; Brindle, 1958, 1960). The flight period is from September to half November; in Great Britain it is also known from a few records in May and July (Stubbs, 1992).

Tipula (Savtshenkia) signata Staeger

Older Dutch records of this species all refer to the next species, *staegeri* Nielsen (for details see Van der Wulp, 1883, and Theowald, 1973). *Tipula (Savtshenkia) signata* Staeger itself is known from a few localities only, all post-1950: Friesland: Heerenveen (ZMAN); Flevoland: Lelystad ('t Zand), Oostvaardersplassen (Keersluisplas) (ZMAN); Noord-Holland: Amsterdam (Amstelpark), Amsterdam (Vliegenbos) (ZMAN); Noord-Brabant: Udenhout (de Brand) (J. W. van Zuijlen in litteris, 1991); Limburg: Noorbeek (Theowald, 1957a).

Tipula (Savtshenkia) signata is a species of humid and wet habitats, either forests, meadows, marshes, or heathland (Dufour, 1986; Stubbs, 1992; Podenas, 1995). The larvae develop in wet mosses on soil, trees or stones, above and near water, etc. (Theowald, 1957b; Brindle, 1960). They were also collected or bred from the soft wood-mould of alder by Cramer (1968) and Brinkman (1991) (a preference to habitats with alder is also given by Stubbs, 1992), and from rotting wood lying in water (Dittmar, 1955). The flight period is from September to half November; there are two early records from Amsterdam (Amstelpark): 25 May 1990 and 22 May 1993.

Tipula (Savtshenkia) staegeri Nielsen

Examined from 21 localities in the provinces Flevoland: Oostvaardersplassen (Keersluisplas); Gelderland: Gerven (Landgoed Gerven), Nijkerk (Blarinckhorst, Ehrental, and Marishof), Wageningen; Utrecht: Baarn, Leersum (Kasteel Broekhuizen), Leusden (den Treek), Leusden (St Louis); Noord-Holland: Amsterdam (Amstelpark), Bussum, Heemstede (Vinkenduin), Hilversum, Naardermeer; Zuid-Holland: 's Gravenhage; Zeeland: Haamstede; Limburg: Eyselshoven, Heerlen, Kerkrade, Venlo. Additional records from the literature are Leiden, Noordwijk, Rotterdam (Zuid-Holland), de Bilt and Driebergen (Utrecht) (Van der Wulp, 1859, 1877, as *signata* Staeger).

The larval and adult habitats are more or less as in *Tipula (Savtshenkia) signata* Staeger and the two species often occur together; on two occasions adults of both species were obtained from larvae bred from wood-mould of the same piece of alder (Brinkman, 1991). On 9 October 1952 Theowald found a larva under *Pellia* liverwort which pupated two days later and emerged on 30 October (Theowald in litteris). The flight period is from September to half November.

Tipula (Savtshenkia) subnodicornis Zetterstedt

Listed for The Netherlands by Oosterbroek & Theowald (1992) on the basis of a male collected by Mr Bob van Aartsen at Meinweg (Limburg) on 26 May 1973 (ZMAN).

Tipula (Savtshenkia) subnodicornis is found in wet open habitats such as lowland and valley fens, moorlands, river banks, marshes on slopes, along plant-filled ponds, subalpine and alpine meadows, etc. (Mannheims & Pechlaner, 1963; Hofsvang, 1974; Dufour, 1986; Stubbs, 1992; Podenas, 1995). The biology has been worked out in detail by Coulson (1962). The flight period is from April to September.

Tipula (Savtshenkia) subvafra Lackschewitz

The number of localities has increased from two in Theowald (1957a) to ten, all post-1950 and all except one in the central part of The Netherlands: Drenthe: Borger (boswachterij Exloo); Gelderland: Hoge Veluwe, Kootwijkerveen, Nunspeet, Planken Wambuis; Utrecht: Bilthoven, Leusden (den Treek), Leusden (Treekermeer), Leusden (Hazenwater); Zuid-Holland: Oostvoorne (all ZMAN).

Tipula (Savtshenkia) subvafra is found predominantly in wet forested habitats where the ground is covered with mosses, preferably *Sphagnum*, but has also been recorded from more open habitats, such as humid to dry heathland (Theowald, 1973; Dufour, 1986).

The flight period is from September to November; eleven of the twelve Dutch collecting dates are in November, the latest date being 20 November.

Tipula (Schummelia) yerburyi Edwards

Of this species material was examined from nine localities, all post-1900: Overijssel: Ootmarsum (Springendal); Gelderland: Wageningen (Renkumse beek), Wisselse Veen; Utrecht: Leusden (den Treek); Noord-Holland: Hilversum; Noord-Brabant: Heeze; Limburg: Bunde (Bunderbos), Eyselshoven, Mook (Plasmolen) (ZMAN; Renkumse beek RMNH; Eyselshoven also RMNH).

Tipula (Schummelia) yerburyi occurs in or near wet, usually acid woods, and in southern England it has a preference for such woods on heaths (Falk, 1991; Stubbs, 1992); the occurrence in carr woodlands is given by Drake and Godfrey (1989), Falk (1991), and Denton and Fry (1998). The flight period is from May to July.

Tipula (Tipula) mediterranea Lackschewitz

On Noord Hinder, a Dutch lightship situated until March 1994 between England and The Netherlands about 70 km west of Vlissingen (51° 39'N 2° 34'E), one male was collected in 1960 (ZMAN). Lempke (1962) reported on the insects found on this lightship from 1958 to 1961. His list includes the tipulids *Tipula (Tipula) oleracea* L. and *Nephrotoma guestfalica* (Westhoff), and the weather conditions on the day of collecting. For example, 22 June 1961 must have been a quiet day with a SW wind of force 2; nevertheless, about a hundred crane-flies were on board (of which according to the list only two specimens of *T. (T.) oleracea* were identified).

The male of *T. (T.) mediterranea* has no precise collecting date, and therefore we have no information about the conditions under which it reached the ship. The nearest localities from which the species is known are some 1000 km to the south in northern Spain (Oosterbroek, 1994) and the mediterranean side of

southern France (Pyrénées-Orientales, Gard, Bouches-du-Rhône, ZMAN).

Tipula (Vestiplex) excisa excisa Schummel

Reported as new for the Dutch fauna by Theowald (1971) after one female collected by Br. Arnoud at Anseidal (Limburg, near Kerkrade) on 1 September 1965 (ZMAN).

Tipula (Vestiplex) excisa has a disjunct boreo-alpine distribution including the Pyrenees (Dufour & Brunhes, 1995; distribution maps in Theowald & Mannheims, 1962, and Dufour, 1992). The only records from the European lowlands are the type-locality "um Breslau, sehr selten" [near Wroclaw, very rare (the description is based on two males)], the Anseidal female, and one male from a wet spruce forest in southern Lithuania (Podenas, 1995). The life cycle of this predominantly tundra and alpine species is discussed by Hofsvang (1972). The larvae life in moist soils and, at least in Norway, have a life cycle of two years. The flight period is from June to September.

Tipula (Vestiplex) hortorum Linnaeus

Until now collected between 1936 and 1956 at five localities in the eastern and southern parts of The Netherlands only: Gelderland: Barneveld (de Schaffelaar), Oosterbeek (bron Duno); Limburg: Strucht (Berghoven), Vaals, Vijlen (ZMAN; Duno RMNH; de Schaffelaar also RMNH); the record from Heerlen (Theowald, 1957a) could not be confirmed. The species was listed as new for the Dutch fauna by Theowald (1952b), under the name *nubeculosa* Meigen.

Tipula (Vestiplex) hortorum is predominantly a species of broad-leaved or coniferous forests with an abundance of mossy habitats (Dufour, 1986; Falk, 1991; Stubbs, 1992); in Lithuania one-third of the individuals were collected on river banks and nearly as many in the city of Vilnius, being fairly common in gardens (Podenas, 1995). Brauns (1954b) mentioned as larval habitat areas infested by the moth Black Arches (*Lymantria monacha*

L.). The larvae live under moss and in damp soils in woods. Oviposition in the soil amongst the moss *Mnium hornum* Hedw. was observed by Clemons (1998). The flight period is in April to June.

Tipula (Vestiplex) nubeculosa Meigen

As in the previous species, known from the eastern and southern parts of The Netherlands only, but from twice as many localities and all post-1950: Drenthe: Borger; Overijssel: Delden, Markelo, Vasse (Hazelbekke); Gelderland: 't Harde, Tongeren; Limburg: Caumerdal, Heerlen, Holset, St. Pietersberg, Vijlenerbos (all ZMAN). Also listed as new for the Dutch fauna by Theowald (1952b), under the name *rubripes* Schummel.

This is also a species of forests, either coniferous or broad-leaved, especially beech. The larvae develop in the soil, under leaf-litter, under mosses, under the bark of trees, and have also been bred from wood-mould of beech (Brauns, 1954a, 1954b; Cramer, 1968; Dufour, 1986; Brinkman, 1991; Falk, 1991; Stubbs, 1992; Podenas, 1995). The flight period is from May to early September.

Tipula (Yamatotipula) caesia Schummel

Added to the Dutch fauna more than a hundred years ago (Van der Wulp & De Meijere, 1898), and not collected since: Limburg: Bunde (Bunderbos), 1 ♂, 18.vi.1882, ZMAN.

Tipula (Yamatotipula) caesia prefers more open and humid habitats such as along small brooks and rivers, wet meadows, swampy alder groves, and seems to have a preference for soils with clay (Czizek, 1913; Mannheims & Pechlaner, 1963; Dufour, 1986; Podenas, 1995). The flight period is in June and July.

Tipula (Yamatotipula) coerulescens Lackschewitz

Known for The Netherlands after a single record only (Theowald, 1952c): Noord-Brabant: Goirle, 1 ♂, 20.iv.1950, ZMAN.

A species of meadows, small flushes and springs beside streams and rivers, and according to Falk (1991) and Stubbs (1992), requiring calcareous conditions. The larvae were found in mud and sandy soils along small streams and river banks, often under water (Falk, 1991; Podenas, 1995). The flight period is from the end of April to August.

Tipula (Yamatotipula) couckei Tonnoir

The species was described in 1920. Dutch material that was collected between 1907 and 1917 and initially identified as *lateralis* Meigen, was recognized as belonging to *couckei* by Theowald (1952c). Since then material was examined from fourteen localities, seven of which lie in the province Limburg. Overijssel: Denekamp, Lutterzand, Rouveen (Veerslootlanden); Gelderland: Winterswijk; Utrecht: Amersfoort, Grebbeberg; Noord-Brabant: Rijswijkse Buitenpolder; Limburg: Brunssum, Epen, Geul, Gronsveld, Gulpen, Mechelen, Wijlre (all ZMAN).

Recorded from a variety of more open humid habitats, frequently near running water and/or with emergent vegetation such as reed-grass (*Phalaris* sp.), rushes (*Scirpus* sp.), or sedges (*Carex* sp.) (Lackschewitz, 1923, as *gracilentata* n. sp.; Stubbs, 1992). In Lithuania Podenas (1995) noted a marked preference for river banks and alder groves peppered with springs. The larvae live in damp or wet soils, particularly on the banks of small rivers (Brindle, 1959; Theowald, 1967; Podenas, 1995). The flight period is from late April to late August.

Tipula (Yamatotipula) marginella Theowald

Known from 16 localities. Material was examined from Flevoland: Zeewolde: (Wilgenreservaat); Utrecht: Linschoten, Vreeland; Noord-Holland: Heemstede, Kortenhoeft; Zuid-Holland: Bodegraven, Reeuwijkse plassen, Zwammerdam; Noord-Brabant: Biesbosch (spaarbekken 130); Limburg: Venlo, Mook (ZMAN; Reeuwijkse plassen RMNH). Addi-

tional localities from the literature are Flevoland: Urk; Noord-Holland: Amsterdam, Hilversum; Noord-Brabant: Rijen; Limburg: Plasmolen (Van der Wulp & De Meijere, 1898; Theowald, 1956).

This species can be found in a variety of humid habitats, such as marshes, damp heathland, pools, fens, river banks, flood-land meadows, usually in open situations, but sometimes in broad-leaved groves, especially of alder (Falk, 1991; Stubbs, 1992; Podenas, 1995). A strict preference for peat bogs is given by Dufour (1986) and oviposition at a schwingmoor of an old peat bog is mentioned by Mannheims & Pechlaner (1963). Larvae were found in mud on river banks (Podenas, 1995). The flight period is from late April to late August.

Tipula (Yamatotipula) montium Egger

Known from eleven localities, one from the central part of the country, Gelderland: Barneveld (de Schaffelaar), the others from the south: Noord-Brabant: Balsvoort (Beerse), Heeze, Oisterwijk; Limburg: Borgharen, Epen, Geul, Geulhem, Gulpen, Heek, Mechelen, Wijlre (ZMAN; de Schaffelaar, Mechelen, and Wijlre also RMNH; Heek Theowald, in litteris: Museum Maastricht). There is one record from 1896, the others are from the 25 year period 1935-1959.

Tipula (Yamatotipula) montium is a species of river- and lakesides, with a preference for larger rivers where the banks are reasonably stable with some sediment and vegetation. Larvae have been found in wet soils, especially along rivers and lakes, or in mud and dead organic material at the bottom of rivers and lakes close to the banks (Theowald, 1957b, 1967; Brindle, 1959; Dufour, 1986; Stubbs, 1992; Podenas, 1995).

Tipula (Yamatotipula) quadrivittata quadrivittata Staeger

Known from four localities only. Material was examined from Noord-Holland: Bussum (1 ♀,

2.vii.1903; De Meijere, 1907), Den IJp (Ilperveld) (2 ♂, 8.viii.1981, 1 ♂, 14.viii. 1981); Zuid-Holland: Zwammerdam (1 ♀, vii.1920; De Meijere, 1907) (all ZMAN). It is furthermore reported from Noord-Holland: Naardermeer by Theowald (1957a).

Little is known about the biology of this species. Habitats from which it is known are bogs, marshes, flood-land meadows, banks of small rivers, alder grooves with abundant springs (Savchenko, 1961, 1966; Podenas, 1995). The flight period is from early June to mid August.

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