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## Chironomidae (Diptera) collected in the forest reserve Sihlwald ZH, with 21 new records for Switzerland

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During an intensive investigation into saproxylic Diptera and Coleoptera in the Forest Reserve Sihlwald (Kt. Zurich, Switzerland), we collected 55 taxa of Chironomidae (Diptera); 21 species are recorded for the first time in Switzerland. The composition of subfamilies and tribes in our samples is characteristic for medium sized mountain streams which are frequent in our study area. The records are presented in a table and notes on the ecology of the species new to Switzerland are added.

Keywords: Chironomidae, Switzerland, faunistics, Diptera

### INTRODUCTION

Chironomids are one of the most speciose families in Diptera and contribute significantly to secondary production in temperate streams (BERG & HELLENTHAL, 1991). Their larvae and pupae can be found in various types of aquatic habitats such as stagnant water or fast running streams. Some species of the subfamily Orthoclaudiinae are secondarily adapted to terrestrial habitats, mainly to humid and wet soils (FITTKAU & REISS, 1978). As IDINGER & KROMP (1997) point out, non-aquatic species largely depend on a sufficient supply of decomposing organic material and on soil humidity (see also HEALY & RUSSEL-SMITH, 1971; DELETTRE, 1983). The palaearctic fauna comprises 1290 species (ASHE & CRANSTON, 1990), 535 species have been recorded in Austria (MOOG, 1995) and 698 in Germany (SAMIETZ, 1996a). In Switzerland, the check list includes 290 species so far (LODS-CROZET, 1998). We present here the chironomid species collected in the course of an intensive ecological investigation into saproxylic Diptera and Coleoptera carried out by the junior author (DEMPEWOLF & SCHIEGG, 1998; SCHIEGG & MUNARI, 1999).

### METHODS

The insects were sampled in the Forest Reserve Sihlwald (Kt. Zürich, 47°15' N; 8°33' E). The forest is dominated by beech (*Fagus sylvatica*) and spruce (*Picea abies*) and is situated at a north-eastern oriented slope at 400–700 m altitude about 20 km south of Zürich. We analysed the chironomid species collected with 56 trunk-window traps (KAILA, 1993) between April and September 1996. All traps were positioned within 50 m of running water. Only male individuals were considered because females cannot be identified to species level with certainty (SAMIETZ, 1996b). The material is deposited in the entomological collection of the Eidgenössische Technische Hochschule Zürich (Swiss Federal Institute of Technology, Zürich) and in the collection of the senior author.

Tab. 1. Chironomid species collected between April and November 1996 in the forest reserve Sihlwald. \* new to the Swiss Fauna.

| Subfamily/Tribus/Species               | Trophic level<br>after Moog<br>(1995),<br>Wilson (1996) | Biotop<br>after Mol (1984),<br>Moog (1995) |
|----------------------------------------|---------------------------------------------------------|--------------------------------------------|
| <b>Chironominae</b>                    |                                                         |                                            |
| Chironomini                            |                                                         |                                            |
| Chironomus cf. cingulatus              | detritivore                                             | stagnant water                             |
| Microtendipes britteni                 | detritivore                                             | running water                              |
| Parachironomus frequens                | detritivore                                             | running/stagnant water                     |
| Polypedilum (Pentapedilum) sp.         | detritivore                                             | stagnant water                             |
| Polypedilum (Polypedilum) albicorne*   | detritivore                                             | running water                              |
| Polypedilum (Polypedilum) convictum*   | detritivore                                             | running water                              |
| Polypedilum (Polypedilum) laetum       | detritivore                                             | running water                              |
| Tanytarsini                            |                                                         |                                            |
| Micropsectra atrofasciata              | detritivore                                             | running water                              |
| Micropsectra attenuata*                | detritivore                                             | running water                              |
| Micropsectra junci                     | detritivore                                             | running water                              |
| Neostempellina thienemanni*            | detritivore                                             | running water                              |
| Stempellinella flavidula*              | grazer                                                  | running/stagnant water                     |
| Virgatanytarsus arduennensis*          | detritivore                                             | running/stagnant water                     |
| <b>Orthoclaadiinae</b>                 |                                                         |                                            |
| Brillia modesta                        | scraper                                                 | running water                              |
| Bryophaenocladus cf. vernalis*         | grazer                                                  | semiterrestrial                            |
| Bryophaenocladus cf. nidorum*          | grazer                                                  | semiterrestrial                            |
| Camptocladus stercorarius*             | detritivore                                             | terrestrial                                |
| Corynoneura sp.                        | grazer                                                  | running/stagnant water                     |
| Cricotopus (Cricotopus) annulator      | grazer                                                  | running water                              |
| Cricotopus (Cricotopus) tibialis*      | grazer                                                  | running water                              |
| Cricotopus (Cricotopus) tremulus       | grazer                                                  | running water                              |
| Cricotopus (Cricotopus) trifascia      | grazer                                                  | running/stagnant water                     |
| Eukiefferiella brevicar                | grazer                                                  | running water                              |
| Eukiefferiella claripennis             | grazer                                                  | running water                              |
| Eukiefferiella gracei                  | grazer                                                  | running water                              |
| Gymnometrocnemus brumalis*             | grazer                                                  | terrestrial                                |
| Gymnometrocnemus subnudus*             | grazer                                                  | terrestrial                                |
| Heleniella ornatocollis                | grazer                                                  | running water                              |
| Limnophyes habilis*                    | grazer                                                  | running water                              |
| Limnophyes minimus*                    | grazer                                                  | semiaquatic                                |
| Limnophyes pentaplastus*               | grazer                                                  | running water                              |
| Metriocnemus albolineatus*             | grazer                                                  | semiaquatic                                |
| Metriocnemus fuscipes*                 | grazer                                                  | running water                              |
| Orthocladus (Euorthocladus) rivicola   | grazer                                                  | running water                              |
| Orthocladus (Orthocladus) sp.          | detritivore                                             | running water                              |
| Parakiefferiella cf. gracillima        | detritivore                                             | running water                              |
| Parametriocnemus stylatus              | detritivore                                             | all waters                                 |
| Paraphaenocladus exagitans*            | grazer                                                  | terrestrial?                               |
| Parasmittia carinata*                  | grazer                                                  | terrestrial                                |
| Paratrachocladus rufiventris           | grazer                                                  | all waters                                 |
| Paratrachocladus skirwithensis         | grazer                                                  | running water                              |
| Pseudorthocladus curtistylus*          | grazer                                                  | semiaquatic                                |
| Pseudosmittia curticosta*              | grazer                                                  | terrestrial?                               |
| Rheocricotopus fuscipes*               | detritivore                                             | running water                              |
| Rheocricotopus tirolus*                | grazer                                                  | running water                              |
| Smittia cf. pratorum*                  | grazer                                                  | semiterrestrial                            |
| Smittia cf. leucopogon*                | grazer                                                  | semiterrestrial                            |
| Smittia sp.                            | grazer                                                  |                                            |
| Synorthocladus semivirens              | grazer                                                  | running water                              |
| Tvetenia calvescens                    | grazer                                                  | running water                              |
| Tvetenia verralli                      | grazer                                                  | running water                              |
| <b>Prodiamesinae</b>                   |                                                         |                                            |
| Prodiamesa sp.                         | detritivore                                             | running water                              |
| <b>Tanypodinae</b>                     |                                                         |                                            |
| Nilotanytus dubius                     | predator                                                | running water                              |
| Psectrotanytus (Psectrotanytus) varius | predator                                                | stagnant water                             |
| Zavrelimyia sp.                        | predator                                                | running/stagnant water                     |

## RESULTS

We collected 1678 individuals out of 55 taxa, 21 species are new to the Swiss fauna (Tab. 1). Additionally, we found 14 individuals belonging to the genus *Bryophaenocladius* (THIENEMANN, 1934), which we could not identify with certainty. Some are most probably *B. nidorum* (EDWARDS, 1929), others *B. vernalis* (GOETGHEBUER, 1921). Similarly, we are not sure about the identity of the individuals belonging to the genus *Smittia* (HOLMGREN, 1869), as this genus needs to be revised. We almost certainly found 40 specimens of *S. pratorum* (GOETGHEBUER, 1927) and most probably four specimens of *S. leucopogon* (MEIGEN, 1804). All these four species have not yet been recorded in Switzerland. Most species in our samples belong to Orthoclaadiinae (Fig. 1), which is the only chironomid subfamily with terrestrial representatives (PINDER, 1995). The composition of subfamilies and tribes present in our samples is characteristic of medium-sized mountain streams (LINDEGAARD, 1995). Consequently, the larvae of most species we collected are confined to running water (Fig. 2) and grazers and detritivore species are dominating the spectrum (Fig. 3). However, we also found a high proportion of terrestrial, semi-terrestrial and semiaquatic species (Fig. 2), about which ecological knowledge still is scarce. All non-aquatic species are new to Switzerland.

In the following section we briefly describe the species new to Switzerland in alphabetic order. The number of individuals is given after the species name.

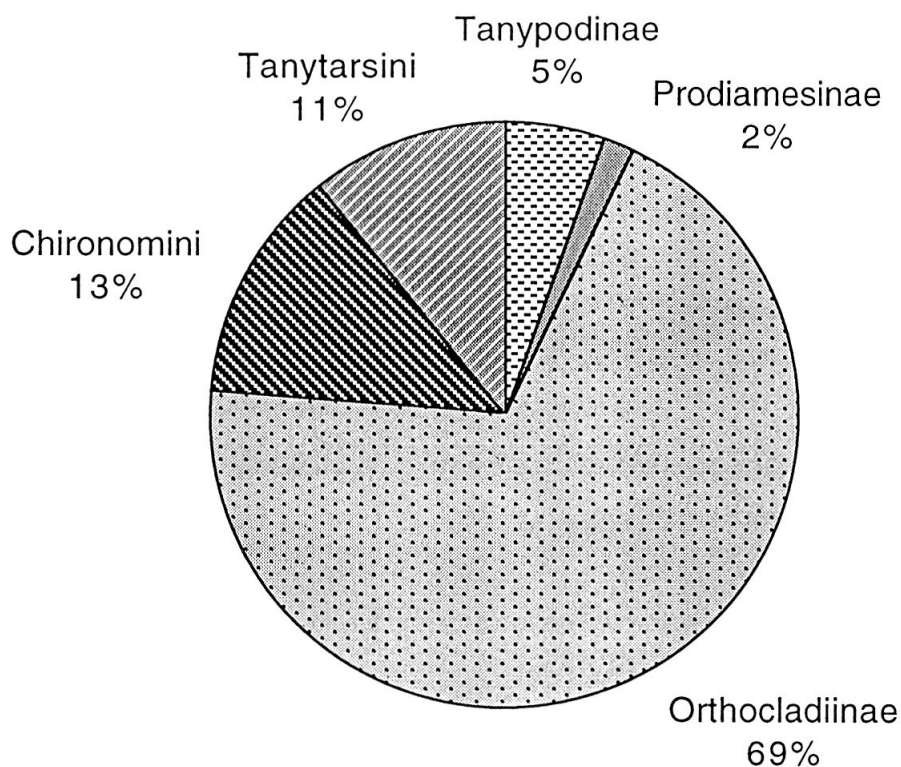


Fig. 1. Proportions of families and tribes. n=55 taxa.

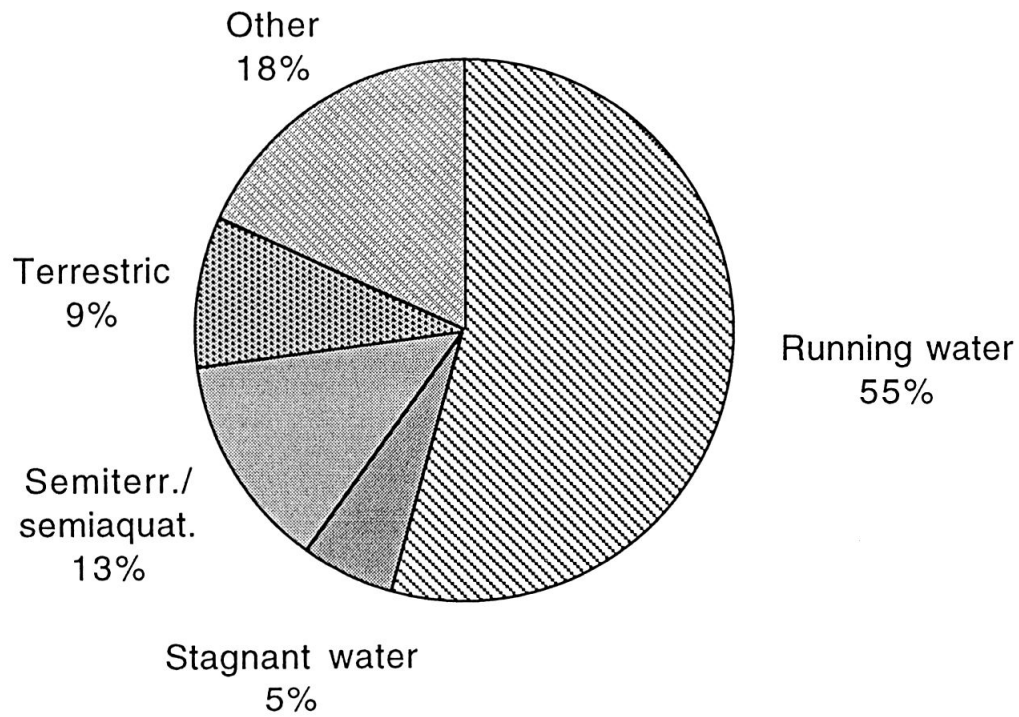


Fig. 2. Number of aquatic, terrestrial and intermediate species. n=55 taxa.

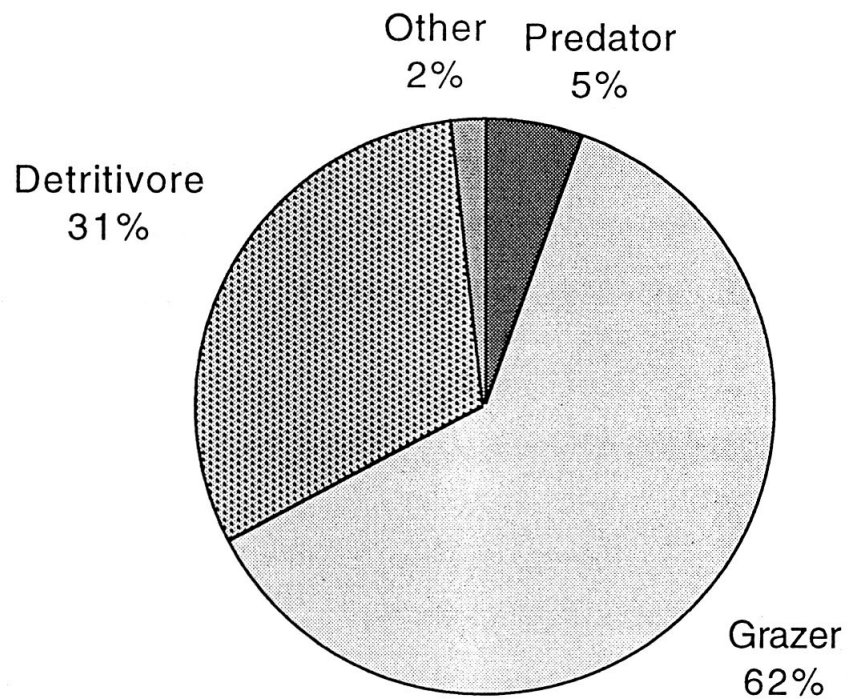


Fig. 3. Number of species according to their trophic level. n=55 taxa.

## Subfamily Chironominae

### *Micropsectra* KIEFFER, 1909

*Micropsectra attenuata* REISS, 1969 –2–

PINDER (1995) attributes this genus a large ecological diversity. *M. attenuata* is temperature sensitive and confined to cold and oxygen rich springs and streams (REISS, 1969).

### *Neostempellina* REISS, 1984

*Neostempellina thienemanni* REISS, 1984 –1–

According to REISS (1984) the larvae of this recently described species live in the moss cover near springs and the upper part of streams.

### *Polypedilum* KIEFFER, 1912

*Polypedilum albicorne* (MEIGEN, 1838) –1–

*Polypedilum convictum* (WALKER, 1856) –7–

The species of *Polypedilum* have been reported to feed on submerged wood (DUDLEY & ANDERSON, 1982). Both *P. albicorne* and *P. convictum* occur in various types of aquatic habitats (FITTKAU & REISS, 1978; MOOG, 1995), the latter species, however, is most frequently found in fast running streams (REIFF, 1994).

### *Stempellinella* BRUNDIN, 1947

*Stempellinella flavidula* (EDWARDS, 1929) –1–

The larvae of this species are encountered in various kinds of stagnant waters (FITTKAU & REISS, 1978).

### *Virgatanytarsus* PINDER, 1982

*Virgatanytarsus arduennensis* (GOETGHEBUER, 1922) –5–

According to FITTKAU & REISS (1978) the larvae of *V. arduennensis* occur in the upper part of streams as well as in stagnant waters.

## Subfamily Orthocladiinae

### *Camptocladius* VAN DER WULP, 1874

*Camptocladius stercorarius* (DE GEER, 1776) –2–

The larvae of this genus are detritivore and mostly found in cow dung and rotting vegetable matter (STRENZKE, 1950, MOLLER PILLOT & BRUSKENS, 1990)

### *Cricotopus* VAN DER WULP, 1874

*Cricotopus tibialis* (MEIGEN, 1804) –1–

Many species of this genus are scrapers and therefore have well-developed mandibles (BERG, 1995). *C. tibialis* has only been recorded so far from rivers and springs (HIRVENOJA, 1973).

*Gymnometriocnemus* GOETGHEBUER, 1932

*Gymnometriocnemus brumalis* (EDWARDS, 1929) –10–

*Gymnometriocnemus subnudus* (EDWARDS, 1929) –18–

The genus *Gymnometriocnemus* is entirely terrestrial and little is known about its ecology. *G. subnudus* is characteristic of deep soils of meadows and deciduous woods (STRENZKE, 1950).

*Limnophyes* EATON, 1875

*Limnophyes habilis* (WALKER, 1856) –8–

*Limnophyes minimus* (MEIGEN, 1818) –113–

*Limnophyes pentaplastus* (KIEFFER, 1921) –7–

*Limnophyes habilis* is mostly found in swamps and wet soils (FITTKAU & REISS, 1978), whereas the facultatively parthenogenetic *L. minimus* occurs on banks of small streams (SAETHER, 1990). *L. pentaplastus* prefers moss layers on stones and hygropetric zones (the film of water and algae or detritus on stones and rocks, e.g. ILLIES, 1978).

*Metriocnemus* VAN DER WULP, 1874

*Metriocnemus albolineatus* (MEIGEN, 1818) –3–

*Metriocnemus fuscipes* (MEIGEN, 1818) –2–

The genus *Metriocnemus* includes species that occupy a wide range of habitats. Both *M. albolineatus* and *M. fuscipes* are found in and along running waters (FITTKAU & REISS, 1978; MOOG, 1995).

*Paraphaenocladus* THIENEMANN, 1924

*Paraphaenocladus exagitans* (JOHANNSEN, 1905) –14–

*P. exagitans* is terrestrial as are most species of this genus. It occurs in wet woody debris, in leaves and weed (*Phragmites* sp.).

*Parasmittia* STRENZKE, 1950

*Parasmittia carinata* STRENZKE, 1950 –7–

The genus *Parasmittia* is terrestrial and usually encountered in humic soils. STRENZKE (1950) describes *P. carinata* as typical for deep soils of meadows and deciduous woods.

*Pseudorthocladus* GOETGHEBUER, 1932

*Pseudorthocladus curtistylus* (GOETGHEBUER, 1921) –2–

As a typical representative of its genus, *P. curtistylus* occurs in stagnant waters and hygropetric zones (see above) in meadows and swamps (STRENZKE, 1950).

*Pseudosmittia* GOETGHEBUER, 1932

*Pseudosmittia curticosta* (EDWARDS, 1929) –25–

The species of *Pseudosmittia* are frequently encountered in soil or damp peat (LANGTON, 1995). According to STRENZKE (1960), *P. curticosta* occurs in forest soil.

*Rheocricotopus* THIENEMANN & HARNISCH, 1932*Rheocricotopus tirolus* (LEHMANN, 1969) –2–*Rheocricotopus fuscipes* (KIEFFER, 1909) –4–

Most representatives of this genus are shredders, with “chewing, mining, gouging or rasping” methods to acquire food (BERG, 1995). *R. tirolus* feeds on algae in the upper part of streams and rivers (FITTKAU & REISS, 1978; BERG, 1995), *R. fuscipes* is found in springs and lakes (FITTKAU & REISS, 1978).

## DISCUSSION

Most studies and surveys focusing on Chironomidae are carried out in aquatic habitats (e.g. MURRAY, 1980; LODS-CROZET, 1992; BÄNZIGER, 1995) as most chironomid species are confined to water in some form and many species can be used as indicators of water quality (e.g. REIFF, 1994; LANG & LODS-CROZET, 1997). According to LINDEGAARD (1995), the composition of subfamilies and tribes present in our samples is typical for middle sized mountain streams. Our study area, the Forest Reserve Sihlwald, is characterized by small streams running in little valleys. Although our traps were not placed along these waters, our collections reflect the communities present in these streams. Apparently, wind is the main factor inducing males to land (SYRJÄMÄKI, 1964; PAASIVIRTA, 1972; DELETTRE, 1984), although some species have been shown to stop swarming when wind speed exceeded  $0.8 \text{ ms}^{-1}$  (DELETTRE, 1984). Despite the design and position of our traps, we could therefore expect to catch a considerable number of aquatic species. On the other hand, the occurrence of non-aquatic species is favoured by the shady and humid conditions in our study forest, providing large amounts of decomposing organic material. Detritus in its many forms as well as algae are the most common food types in chironomids (e.g. BAKER & McLACHLAN, 1979; MACKEY, 1979; HILDREW *et al.*, 1985; WARD & WILLIAMS, 1989). Diatoms, fungal hyphae and parts of vascular plants also belong to chironomid diet, but only in small quantities (TAVARES-CROMAR & WILLIAMS, 1997). Generally, little is known about the distribution and ecology of terrestrial chironomid species. It is not surprising therefore, that all 10 non-aquatic species in our samples have not been recorded in Switzerland so far.

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## ZUSAMMENFASSUNG

Im Laufe einer Studie über Totholzinsekten im Sihlwald (Kt. Zürich) wurden mit Fensterfallen 55 Taxa von Zuckmücken (Diptera, Chironomidae) gefangen, 21 Arten wurden zum ersten Mal in der Schweiz nachgewiesen. Das gefundene Artenspektrum ist charakteristisch für mittelgrosse Bäche der montanen Stufe, wie sie im Sihlwald in grosser Zahl zu finden sind.

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