

Notes on some European species of *Simulium* (Diptera).

By

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The following notes are based partly on material collected by the writer in Scandinavia, and partly on an examination of the types of MEIGEN, DEGEER and ZETTERSTEDT, in the museums of Paris, Stockholm and Lund respectively. For facilities generously granted for the purpose of making this examination, the writer is greatly indebted to the authorities concerned. Some of the pupae mentioned in these notes will be described in more detail in a forthcoming paper by Mr. I. M. PURI. Many more discoveries are evidently in store for Swedish entomologists who may undertake the study of the flies of this family. The insects are most easily obtained by collecting and rearing the pupae. These hatch out without any trouble if removed from the water, dried, and kept in a slightly moist atmosphere.

The material of this genus in ZETTERSTEDT's collection was reviewed by WAHLGREN in 1904, but his notes are of little value today, since he was unaware of most of the characters which are now used to diagnose the species.

Simulium erythrocephalum (DEG.).

S. argyreatum, LUNDSTR., EDW., nec Mg.

Among the specimens of Nematocera from DEGEER's collection which are still preserved in the Stockholm Museum, are thirty males of his *Tipula erythrocephala*, all gummed on to one piece of card, and in good condition. This species has been recognised as a *Simulium*, though from the description alone it is impossible to determine the species. The specimens, however, are quite recognisable, all of them belonging to the species which has been determined by LUNDSRTÖM as *S. argyreatum* MG. Since it seems certain that these specimens are DEGEER's actual types, his name must replace the one now in use for the species. The change is the more necessary, because I have recently found by examination that MEIGEN's type of *S. argyreatum* (a male in the Paris Museum) is either *S. ornatum* or a closely allied

species with a broad first hind tarsal segment, quite different from the species so identified by LUNDSTRÖM.

Simulium nanum ZETT.

This has been identified with *S. argyreatum*, but the two males and three females in ZETTERSTEDT's collection are as far as I can see *S. reptans* (L.) Edw. The external characters agree, and one of the males shows the long point of the adminiculum fairly distinctly. The male from Åreskutan, labelled »*vix nana*», is apparently *S. monticola* FRIEDR.

Simulium humerale ZETT.

WAHLGREN suggested that the type of this species was an immature *S. argyreatum*. This it is not, but is most probably *S. reptans* (L.) EDW. It will be necessary to mount its hypopygium before its identity can be fully established.

Simulium annulitarse ZETT.

This is represented in ZETTERSTEDT's collection by two females from Lyksele, one of them rather immature, and hence with yellow legs. They are extremely similar to *S. tuberosum* LUNDST., perhaps identical, but in view of the absence of a male, and the slight pale rings on the hind tarsi (which are not discernible in *S. tuberosum*), I do not feel justified in sinking LUNDSTRÖM's species.

Simulium pubiventris ZETT.

This has been quoted as a synonym of *S. equinum* L. (*lineatum*, MG.), but an examination of the three females in ZETTERSTEDT's collection shows that it is not so. The claws are small, with a basal thumb which is not very well marked. So far as can be seen the second hind tarsal segment has only a moderate excision, somewhat as in *S. subexcisum* EDW. The mesonotal integument is not striped. The species resembles *S. pusillum* in many respects, but is larger.

Simulium aureum FRIES.

S. bracteatum COQ.

S. angustipes EDW. (nec FRIEDR.).

My identification of this species with *S. angustipes* is confirmed by a male and female in ZETTERSTEDT's collection, though I have not seen FRIES' specimens. It may be worth mentioning here that FRIEDRICH'S figure purporting to represent the hypopygium of *S. angustipes* apparently depicts *S. equinum* L.

Simulium lanio (L.)

Culex lanio LINNÉ, Mantissa Plantarum, ii, p. 541 (1771).

This name does not appear in KERTÉSZ's catalogue. The description is as follows: — «lanio» *Culex ater*, alis hyalinis, tibiis albis. *Habitat in* provincia Banat, *Vallachiae* confini, Boves occidentis. M. T. BRUNNICHE. *Corpus* atrum, magnitudine majoris *Pediculi*; affinis *C. equino*. *Thorax* gibbus. *Abdomen* ovatum. *Femora* nigra, basi albida. *Pedes* toti longiusculi. *Tibiae* maximam partem albae, apice fuscae. *Plantae* nigrae: *Digito* articulus nigris. *Ungues* minuti.»

From this description it would seem certain that *Culex lanio* is a species of *Simulium*, not improbably the same as *S. columbaschense*, SCHONBAUER. LINNÉ's mention of the small claws is interesting, as it seems to imply a comparison with another species with larger claws; if so it is an indirect confirmation of the present writer's identification of *S. equinum* L. with *S. lineatum* MG.

Simulium pusillum FRIES.

S. minutissima ZETT.

S. pygmaea ZETT.

? *S. costatum* FRIEDR. (?♂ nec ♀).

In ZETTERSTEDT's collection at Lund there are 1♂ 4 ♀ specimens labelled *S. minutissima* from Luleå. Of these the single male is either *S. venustum* SAY or a very closely allied species; the females, however, are certainly different. They are superficially very much like small specimens of *S. latipes*, with which they have the following characters in common: Frons and face dull, covered with a sparse golden pubescence. Mesonotum blackish, without grey reflections, clothed with dull golden pubescence, which is not very dense, but uniformly distributed. Abdomen with a scanty whitish pubescence, the last tergites not shining. Front tarsi slender and practically cylindrical. The most obvious distinction from *S. latipes* ♀ is in the claws, which are devoid of the basal thumb-like projection characteristic of *S. latipes* and most of its allies.

Under *S. pygmaea* in ZETTERSTEDT's collection there are 4♂ 3 ♀ which as far as I could ascertain from an examination of the dry specimens are the same as his *S. minutissima*. The first segment of the hind tarsus of the male is large and flattened, almost as in *S. latipes* MG.

Although I have not seen the types of *S. pusillum* FRIES, I have examined in the British Museum a male and female from Alten, Finmark, so named by ROUBAUD, the accuracy of whose determination there seems no reason to doubt. These are identical with *S. minutissima* ZETT.

I have mounted the hypopygium of the male and find that it

agrees with FRIEDRICH'S figure of his *S. costatum*, and this name may therefore be another synonym of *S. pusillum*, although his description of the female of *S. costatum* does not agree with *S. pusillum*. It is possible that in this as in one or two other instances FRIEDRICH'S has confused two distinct species. The hypopygium of *S. pusillum* is very similar to that of *S. latipes*, though the clasper is considerably less expanded; it has much less resemblance to *S. aureum* (*angustipes*) or *S. angustitarsis*.

In August 1923, in the neighbourhood of Åre and Duved, I captured a few specimens of *S. pusillum* which approached to bite; also above the Tännforsen waterfall I was fortunate enough to obtain a few pupae, whose identity was established by dissecting out a female and also the hypopygium of two males. These pupae have four respiratory filaments on each side, as in the *S. latipes* group; the arrangement of the filaments, and the absence of any median projection on the cocoon, strongly recall *S. aureum*, which, however, is quite distinct in the adult stage.

S. pusillum is of special interest, because although it is evidently related to *S. latipes*, it differs markedly in the structure of the female claws, and therefore quite invalidates ENDERLEIN'S tribe *Nevermanniini*.

Simulium pallipes FRIES.

In ZETTERSTEDT'S collection are two pairs of this species from Wilhelmina. The males, so far as can be seen without mounting, agree with LUNDSTRÖM'S description, especially in the large anal segment; they have the radial sector simple; first hind tarsal segment without produced tip, moderately expanded; second segment with very shallow basal excision. The females are similar; their claws have distinct basal thumbs.

On a flying visit to Tännforsen waterfall on August 17, 1923, I made a small collection of *Simulium* pupae from stones in the rapids just above the falls. A subsequent examination of these revealed the presence of no fewer than nine species; four of these, though structurally very distinct, were immature and therefore indeterminate; the other five, identified by dissecting out the fully-formed adults, were *S. pallipes* FRIES., *S. lyra* LUNDSTR., *S. pusillum* FRIES., *S. venustum* SAY and *S. tuberosum* LUNDST.

The pupae of *S. pallipes* (a single male of which was dissected out) were completely enclosed in a well-formed boot-shaped cocoon similar to that of *S. equinum* L. and *S. auricoma* (MG.) FRIEDR. Structurally, however, the pupa is very different from either of these species; it has strong tail hooks like those of *S. hirtipes*, and dense tufts of filaments (at least 50 in each bunch). Three of the other species form similar cocoons, but have no tail hooks; they differ from one another in the

number of respiratory filaments, *S. lyra* having about 25 and the other two (undetermined) species about 50 and 14 respectively.

All the above species are evidently river breeders; an examination of the small streams in the neighbourhood produced only *S. latipes* MG.

Simulium lyra LUNDSTRÖM.

From pupae of this species, obtained as above mentioned, I dissected out one male and one female. The hypopygium of the male was found to agree closely with that of two of LUNDSTRÖM's paratypes in the British Museum, and the identity of the species is thereby established. The female has not previously been identified, and may be diagnosed briefly as follows:—

Front moderately narrow, dull, with golden pubescence. Mesonotal integument with dark greyish ground colour, on which are four rather broad dull blackish stripes, the middle pair close together and abbreviated behind, the lateral pair broader and abbreviated in front. The stripes are of course most easily seen in denuded specimens; similar but less distinct stripes are present in, *S. subexcisum* EDW. Pubescence for the most part dull golden or ochreous, but over the dark stripes it is mainly dark brown in colour. A small but (unless denuded) distinct patch of similar pubescence on the membranous area of the pleura. Abdomen with moderately dense whitish-ochreous pubescence, last segments not shining. Legs entirely black; front tarsi cylindrical; first hind tarsal segment only very slightly produced at the tip, the second cylindrical, without any excavation or emargination near the base. Claws with a large basal thumb. Wings with a small basal cell as in the *Prosimulium* group, but with a simple radial sector.

From the above description it is clear that *S. lyra* occupies an intermediate position between the *hirtipes* and *latipes* groups in regard to its adult characters and is nearly related to *S. pallipes*. The same may perhaps be said of the pupae, which although they have numerous respiratory filaments (about 25 in each bunch) have no tailhooks, and are enclosed in a definite cocoon. In fact *S. hirtipes*, *S. pallipes*, *S. lyra*, and *S. subexcisum* form such a graduated series that it seems quite clear that no useful division into subgenera can be made.

Females of *S. lyra* or a closely allied form were rather troublesome at our camps and were more numerous than any other species. Some were found in complete agreement with the female dissected from the pupa, but the majority differed in having the mesonotal pubescence uniformly pale. These may be merely a variety of *S. lyra*.

Simulium hirtipes FRIES.

Although this species is common in mountainous districts of northern Europe, the only description of its early stages is that of MALLOCH,

which is based on North American material. This description now proves to be inapplicable to the European species, and unless MALLOCH was mistaken in his association of the early stages, the American form known as *S. hirtipes* must be specifically distinct from the European.

Larvae and pupae were found by the writer on stones at the edges of the river below the tourist hut of Skogadalsbøen, Norway, at the end of July 1923. The pupae were completely enclosed in shapeless cocoons of loosely woven threads (as described by MALLOCH); many of them were placed among the moss on the stones and were difficult to detect. A number of adults of both sexes were hatched from them. They are provided with a pair of strong tail-hooks which hold them firmly in the cocoons. But whereas the pupae described by MALLOCH had a large number of branches (about 40—50) in the respiratory tufts, those found by the writer had only 16. No other species was found associated with *S. hirtipes*, although *S. latipes* occurred in the small streamlets running into the river.

Simulium rufipes MEIGEN.

S. fulvipes EDW.

In describing *S. fulvipes* I suggested the possibility that it might be the same as *S. rufipes* MG., though it was not possible from MEIGEN'S description to ascertain whether or no his species belonged to the *Prosimulium* group. A subsequent examination of the type in the Paris Museum shows that this is the case.

Simulium ferrugineum WAHLB.

In ZETTERSTEDT'S collection are three females of this very distinct species from Areskutan mountain. I found larvae which I feel sure (from their large size) must be those of this species, on stones in small streams in the spruce woods covering the lower slopes of this mountain, in August 1923. Unfortunately I failed to obtain any pupae, though both larvae and pupae of *S. latipes* were common on the same stones.