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A migratory flight of hover-flies (Diptera, Syrphidae) observed in Austria

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During an excursion sponsored by the Entomological Department of the Zoölogisch Museum, Amsterdam, to the village of Vent, Inner Oetztal, Tirol, Austria, the authors and the other participants, W. Dekkers, W. N. Ellis, Mrs. A. C. Ellis-Adam, W. van Raamsdonk, and H. J. L. T. Stammeshaus, witnessed the interesting phenomenon of a migratory flight of syrphid flies.

The migration was first noticed around 9.20 a.m. on August 9th, 1967, when the senior author in the valley of the river Venter Ache near Vent saw a great number of insects flying at high speed into one direction. Under the impression at first that it concerned a nuptial flight of a large ant species, a specimen was caught in the air. When this turned out to be a hover-fly, it was at once realized that a migratory flight of these insects was going on.

The site where the observations were made was about one kilometer from Vent downstream along the Venter Ache at an altitude of about 1860 m a.s.l. The river runs north-east, and the valley is rather narrow there. Its south-eastern side is steep and densely covered with pine-trees. On the 9th of August, as on the two previous days, the weather was bright again, after it had been very cold and raining on the 4th, 5th and 6th. The wind was blowing with moderate force from the south-west.

The flight was seen over the right bank of the river and over the pine-trees on the right wall of the valley. The insects were moving upstream, thus against the direction of the wind. As in the morning the wall was still in the dark, the insects flying in the sunshine could be easily observed in spite of their high speed. The migration, which must have been under way already for some time when it was first noticed at 9.20, lasted until about 11.30 a.m. Around that time the phenomenon became less distinct, in particular because the insects began to fly in all directions. Yet even in the early afternoon small groups of up to ten hover-flies were seen passing between the tree-tops in the original direction along the slope.

In an effort to estimate the number of flies involved in the migration, we tried to count the number passing through a stretch of about five meters on the bank of the river. During half a minute we came to some 80 specimens, flying at altitudes between 50 cm and 4 m above the ground. Many hundreds of syrphids must have passed within the same time higher up along the side of the valley. Probably, therefore, the migration as far as it was observed by us involved some 200,000 flies.

Although the migration went on for several hours, the density of the flight was not constant. At times the number of passing insects decreased during short periods. It was noted in particular that upon a gust of wind the density suddenly increased again. Possibly a number of flies perched on the leaves of shrubs and plants to continue their flight upon disturbance.

During an hour or so the participants of the excursion tried to collect a sample of the migrating flies. The number of specimens caught amounted to 162, and these were identified by the junior author. The material contained the following species:

<i>Sphaerophoria scripta</i> L.	15 ♂, 39 ♀
<i>Scaeva pyrastris</i> L.	2 ♀
<i>Scaeva selenitica</i> Meigen	1 ♀
<i>Syrphus torvus</i> Osten-Sacken	1 ♂, 26 ♀
<i>Syrphus vitripennis</i> Meigen	3 ♂, 9 ♀
<i>Syrphus corollae</i> F.	3 ♀
<i>Syrphus balteatus</i> De Geer	14 ♂, 47 ♀
<i>Eristalis arbustorum</i> L.	1 ♂, 1 ♀

Apparently the flight consisted mainly of *Sph. scripta*, *S. torvus*, and *S. balteatus*, although it is possible that the ratio was biased in the direction of *scripta* and *balteatus*. It seems likely that the species of *Scaeva* and the larger *Syrphus* species were less easily caught in the air than *scripta* or *balteatus* due to their probably much higher speed. That for instance *Scaeva pyrastris* must have been involved in the flight to a considerable extent could be concluded from the comparatively large number of specimens seen on umbellifers in the afternoon.

The preponderance of female specimens in the flight is, however, indubitable. This may indicate that female specimens are more likely to take part in a migratory flight than males. Unfortunately, nothing is known of the progress of the sex ratio of the collected species during the season, or, in particular, of the populations from which the flight emanated.

Of course, the exact location of the area from where the migratory flight started that day is not known, but considering the course it took when it was observed by us, its area of departure should be somewhere downstream the Venter Ache or Ache rivers. If we may estimate the mean velocity of a flying syrphid at 15 km an hour, and assume that the flight started between 7.30 and 8.30 in the morning, the area could have been scarcely farther than about 30 km downstream from Vent, i.e. halfway the Oetzal near the village of Winkl.

In this connection it is of interest to mention the unusual abundance of syrphids in and around the village of Zwieselstein, about 12 km north-east of Vent at the junction of the Venter Ache and Gurgler Ache rivers, at an altitude of 1460 m a.s.l. There, on the 12th of August, at about 8.30 in the morning we saw innumerable specimens high up in the air flying into all directions. A little later we noted many syrphids, up to three specimens on a single leaf, sunning on isolated elder-bushes around the village. Among these flies were many specimens of *Scaeva pyrastris*, *Syrphus balteatus*, and *Syrphus* of the *vitripennis*-group, but only few of *Sphaerophoria*.

With the exception of *Eristalis arbustorum*, the larvae of the species captured in the migration are known to feed on plant-lice. The mass occurrence of hover-flies in the Oetztal may have had something to do with the rather large numbers of aphids which indeed we noticed at various places.

The casual observations published here can, of course, throw hardly any new light on the problem of syrphid migration, and, moreover, cannot serve as a base for a more detailed discussion on the phenomenon. They are, however, of some importance in view of the apparent paucity of records from Central Europe.

Williams et al. (1956 : 404) and Williams (1958 : 97, 98) have briefly reviewed the literature on syrphid migration. From these surveys it appears that in Europe the phenomenon has been observed in three main areas. The most numerous are the records of mass appearances of syrphids near the south and east coasts of England and on lightships off the British coast. Although perhaps a number of these records give only indirect evidence there can be no doubt at all that the migration of hover-flies is a frequent although rather irregularly occurring phenomenon there.

Observations of a different kind were made since 1950 in the south of France, where the southward movement of insects across the Pyrenees appears to be a regular phenomenon. These movements, in which the Syrphidae take a large part, have been observed mainly in September and October, and are regarded by Williams to be return migrations.

In Central Europe records of syrphid migrations are still few, and Williams cites only the observations by Eimer, 1880, by Prell, 1924, and by Gansser, 1934 and 1951, all of which were made in Switzerland.

In comparison with previous observations some particulars of the presently recorded flight deserve attention.

The date, August 9th, is a relatively early one, since most records of syrphid migrations are from September or October, and in Central Europe only Gansser's record of a flight on August 14th, 1951, is similarly early. At least some of the previously recorded flights went on during the afternoon, and even sometimes also on the next day. The migration seen by us virtually stopped around noon. In a number of cases the migration included also Lepidoptera and Odonata, but in the present flight only Syrphidae took part. A few Odonata were seen, but these were probably attracted by the large number of flying insects. In some of the previously recorded flights the syrphids were moving at a height not exceeding one meter above the ground. Although a

part of the flies seen by us were also flying at a low level along the bank of the river, most of them, and especially those flying along the side of the valley, moved at a height of more than a meter up to perhaps 10 meters above the ground.

The species which were collected by us apparently belong to the regular migrants, perhaps with the exception of *Sphaerophoria scripta*. On the other hand, *Eristalis tenax* L., which is the most common species recorded in the migrations across the Pyrenees, was not collected by us during the migratory flight, although it was occasionally seen in the surroundings of Vent. The very similar *Eristalis pertinax* Scopoli was seen near Vent only after the day the migration took place.

The preponderance of females has also been recorded for the species crossing the Pyrenees.

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