

Records of *Atherix ibis* in Finland (Diptera, Athericidae)

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Eight clusters of mummified females of *Atherix ibis* (Fabricius) were found on 6.IX.1988 under a bridge over the Kouvanjoki River, PP: Pudasjärvi, northern Finland. Inspection of 120 bridges during the winter yielded 17 new finds. A distribution map complemented with records from museums indicates that the distribution in Finland is northern. Features of the clusters and characters of the larval stage are described and discussed. The larval development seems to last two years.

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A characteristic feature of the Ibis-fly (*Atherix ibis* (Fabricius)) is the egg-laying behaviour of the females, which become glued with their eggs in large clusters of up to several thousand flies (e.g. Straffen 1915, Lindner 1925, Coyer 1951). Straffen (1915) describes the phenomenon as follows: "In May–June the females can be found on branches hanging over water. They lay their egg-masses at a certain point, die and remain hanging on the branch. More and more females become glued to them, so that finally a large crowd is left suspended on the branch, which from some distance looks like a swarm of bees. The larvae develop by first eating the remains of their mothers and later drop into the water." In their lotic environment the larvae are predacious. They suck the internal tissues from soft-bodied aquatic invertebrates (e.g. nymphs of the Ephemeroptera and Plecoptera) (Thomas 1975, see also Hackman 1985). Pupation always occurs out of the water, on the adjacent river bank (Thomas 1976).

A. ibis is the only athericid species living in Finland (Hackman 1980). Its relative *Ibisia* (formerly *Atherix*) *marginata* Fabr. occurs in South Sweden (Wahlgren 1907). These two species are easy to separate from each other even in the larval stage (see e.g. Brindle 1961, Rozkosny & Spitzer 1965).

The distribution of *Atherix ibis* is palearctic, extending from Japan through Siberia and the whole of Europe and up to the northern tundra zone (Thomas 1978). The information on its occurrence in Finland is poor: one male was recorded in Utsjoki in 1949 (Frey 1950) and some larval finds were reported in a thesis (Kauppinen 1978) and stencilled student courses of the University of Oulu (edited by Tapani Valtonen and Kalevi Kuusela). Hackman (1985) reports that the species lives on river banks in Lapland. The present situation is summarized in this paper, for which the collections of Finnish entomological museums have also been checked. In addition some aspects of its ecology are treated.

Records of female cluster

In autumn 1988 the author Räinen found a conspicuous occurrence of eight clusters underneath a timber bridge over a small rapid in the River Kouvanjoki (PP: Pudasjärvi, Grid 27°E 73065: 5312. 6.9.1988). Six of them were hanging on the downstream beam and two on the upstream beam of the bridge (Fig. 2). The biggest cone was 10 cm high, with a diameter of 7 cm at its base. A smaller cluster (7.5 cm × 5.5 cm = ca. 67 cm³) was taken

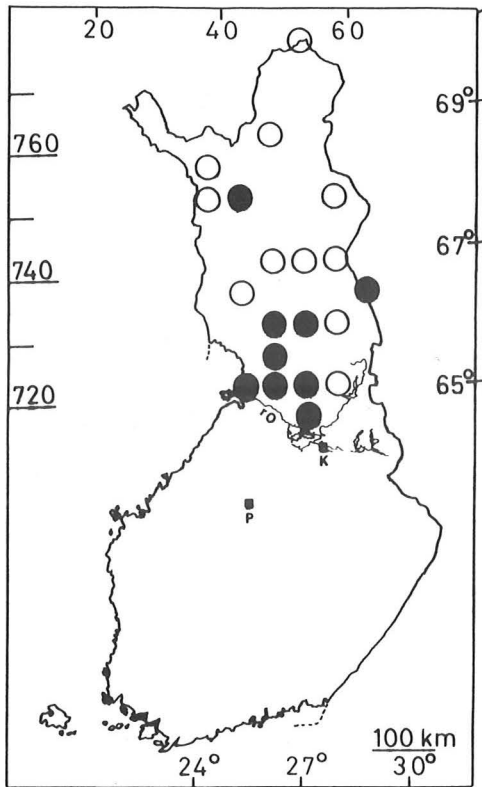


Fig. 1. The present-day records of *Atherix ibis* (Fabr.) in Finland. Open circle: the exact site not known (only name of parish); black circle: the newest records made by the authors and their colleagues (see Acknowledgements). (rO = the main channels of the Oulujoki, K = the city Kajaani, P = the parish of Pihtipudas).

to pieces and 613 almost undamaged females were counted: the density was thus nine per cubic centimetre and the biggest cluster must have contained about 1500 flies. This number is still far below the 10 000 in one cluster reported by Lindner (1925), but we feel that his figure may have been overestimated, since the cone mentioned by him measured only 16 cm × 10 cm and, according to the density calculated by us, should not have contained more than 5000 females. Rozkosny & Spitzer (1965) have found an aggregation of more than 1000 flies. Muttkowski (1929) mentions that the depositions of nearctic *Atherix variegata* (Walker) may often contain "several thousand dead flies".

After our first find in Pudasjärvi, we (and some of our colleagues) inspected 119 bridges during the winter and spring of 1989. These yielded 17 new records, all made north of the Oulujoki River (Fig. 1). We also checked four bridges on highway 4 from Pihtipudas northwards and 43 bridges in the area SE and E of the town of Kajaani, but without finding any signs of clusters of *A. ibis*. It seems probable that it does not occur in Central Finland or in Central and Southern Ostrobothnia, either, since it has not been listed in any of the numerous macroinvertebrate investigations made on rivers there. Judging from the present-day records, *A. ibis* seems to have a northern distribution in Finland, but it occurs in Soviet Karelia, an area corresponding to the southernmost latitudes of Finland.

The occurrence on the River Livojoki (PP: Pudasjärvi, Sarajärvi, 730:51), about 2 km downstream from the mouth of the Kouvanjoki, was impressive in its abundance: the total number of females in the several tens of clusters of varying size was estimated (by eye) to be at least 50 000 (Fig. 3). Interestingly, we could now see that a cluster may be the product of a single or several females (Fig. 3).

The clusters of females were found on a variety of bridges. The smallest had a span of 5 m and a height of 2 m above the water, and the biggest had a span of 80 m and was 6.5 m high. The material of the bridges was wood or concrete, and sometimes the clusters were even hanging from iron nuts and washers. The masses were regularly suspended above the midstream area of the river — none of them were hanging above the river bank. The clusters were always situated at the downstream or upstream edges of the bridges (Fig. 3), never on similar places on girders in the central part of the bridge. At a few localities (including Kouvanjoki) there was a preference for the downstream side.

Phenology

The pinned specimens (136 exx., including some Russian-Karelian samples) in Finnish museums were collected between 20.VI. and 9.VII. Flight thus occurs around and slightly after midsummer. The flying season seems to be short and well

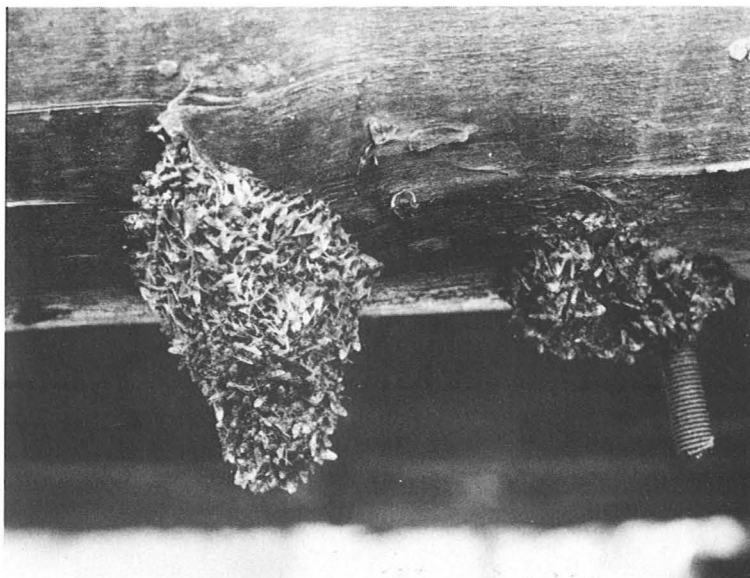


Fig. 2. Two clusters of *Atherix ibis* females (Diptera, Athericidae) on 6.IX.1988 under the bridge over the River Kouvanjoki (Pudasjärvi 730:53), northern Finland.



Fig. 3. A series of clusters of *Atherix ibis* females (Diptera, Athericidae) on 5.I.1989 under the frosty bridge over the River Livojoki (Pudasjärvi 730:51), northern Finland.

synchronized, which accords with the swarming and egg-laying behaviour. A similarly brief flight period, lasting no more than ten days, has been reported by Vanhara (1975) in *Ibisia marginata* in Checkoslovakia.

In Central Europe, the females of *A. ibis* gather for egg-laying in May–June (Straffen 1915). In mountain areas in South France, they have been found throughout the summer (Thomas 1974). The temperature conditions in mountain streams

and rivers may be so local in nature that wide variation occurs in the developmental cycles, giving the impression of a long flying season. Neveu (1976) classifies *A. ibis* to an upstream species.

Size of larvae

For several years *Atherix ibis* larvae have been collected in August from the River Oulankajoki

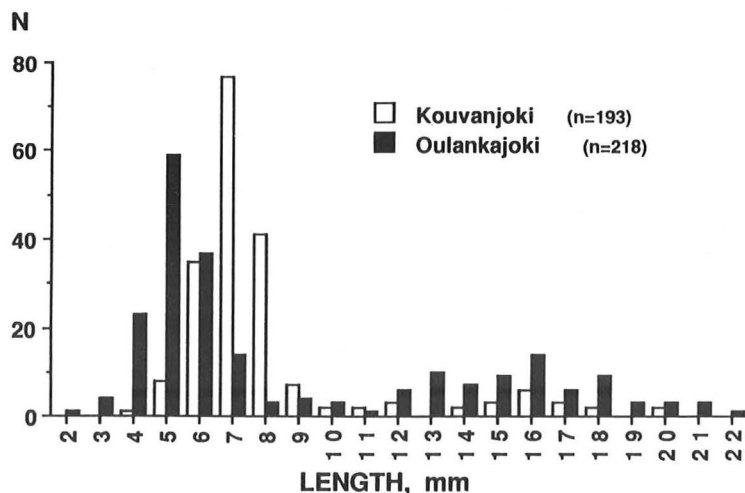


Fig. 4. The length distribution of *Atherix ibis* larvae collected at the end of August (1979, -83, -86) in the River Oulankajoki (Kuusamo) and at the beginning of January (1989) in the River Kouvanjoki (Pudasjärvi), northern Finland.

(Ks: Kuusamo, Kiutaköngäs, 736:60), during the zoological field courses of the University of Oulu. Some samples also exist from the Oulu district (PP: Oulu, Sanginjoki, 720:44). In addition, we collected kicking-net sample from the River Kouvanjoki (downstream from the bridge of our original find) on 5.I.1989.

The total length of the larvae was measured to the nearest 0.5 mm. The Kuusamo material, which had been preserved in alcohol, included some shrunken specimens, whose length were transformed to correspond to those of relaxed larvae using a conversion coefficient based on comparative measurements. The results are thus approximative. The fresh Kouvanjoki material was boiled in 75% alcohol, which relaxed the larvae.

The length distributions of the larvae are bimodal (Fig. 4): small larvae (4–8 mm) predominate in both materials and the larger ones (>8 mm) are evenly distributed, the mode class being the size of 16 mm. As the imago has a short flight period, it is unlikely that the larvae would have so wide a size distribution unless they represented two different phases, i.e. they may have a two-year life cycle. This has been reported for *A. ibis* by Neveu (1976). In Checkoslovakia Vanhara (1975) observed that a small minority of the *I. marginata* population had two years development. We have one larva collected in June in Kuusamo, whose length was 7.8 mm. This accords well with the class of small larvae from autumn and should

thus represent a group of first time hibernated larvae.

Comments

The above observations are not enough to prove two-year larval development. We can be sure, however, that sexual dimorphism is not involved, because the females are only slightly (8–11 mm vs. 8–10 mm) bigger than the males (Thomas 1974). We need extra material, especially from July just after the swarming of the adults and before the new larvae have hatched. The swarming phase itself is undescribed.

Our observations seem to disagree with the reports that the mothers serve as food for the hatching larvae (Straffen 1915, Lindner 1925), because the masses remained complete in autumn and even through the winter. In addition, when we dissected some cones, the females showed no signs of being eaten. Moreover, Muttkowski (1929) found that similar clusters of *A. variegata* were eaten by dermestid beetles and stripped by the wind.

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