SOME INSECTS FROM A PORTION OF EAST FLANDERS MOSS, CENTRAL REGION

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INTRODUCTION

East Flanders Moss is an area of peat bog over 5 km square situated to the north of the River Forth approximately 18 km west of Stirling. It is the remains of a larger moss the edges of which have been reclaimed for agriculture. Its biological importance, mainly botanical and ornithological, has been recognised by its inclusion in the Nature Conservation Review, Ratcliffe (1977) and in 1982 part of the moss was declared a National Nature Reserve. The butterflies and moths were described by MacLaurin (1974) who also gave a general description of the area.

THE STUDY

The aim was to identify the more abundant insects present together with their times of appearance by sampling regularly for a year (1981). This gives an introduction to the insects of a habitat about which there is little published information relating to Scotland.

THE STUDY AREA

Much of the moss is covered by active birch and pine regeneration which appears to increase the insect diversity. For this reason an open area with few trees was selected as its fauna was expected to resemble more closely that of the primordial bog surface. Such conditions were found at around map reference NS 623976 at an altitude of about 20m where the vegetation cover consisted of a limited number of species. Heather, cross-leaved heath and cottongrass were codominants with *Sphagnum* moss, deer grass, purple moor grass, cranberry and bog rosemary occurring in lesser quantities. The peat has an average depth of 4·3m and retains its surface moisture as the underlying carse clay impedes drainage. It is therefore too wet to be grazed by domestic animals and perhaps because of this has been subject to infrequent but extensive fires.

METHODS

Once a month, except for February, November and December, 10 pitfall traps 6·5 cm diameter and 3 orange washing-up bowls 31 cm diameter all containing water with a few drops of detergent were exposed on the bog surface. The former caught species moving on the bog surface while the basins actively attracted some flying insects and

caught others accidentally. In addition, when the traps were being visited and the vegetation was dry enough and wind conditions would allow, a sweep net was used to collect insects from the study area. This consisted of a line 100m long with pitfall traps sunk into the bog surface at 10m intervals. The catch was sieved off after a week, preserved in industrial spirit and where possible identified. Some small fragile insects such as chironomid flies were too badly damaged by this treatment to allow identification. Other species e.g. some spring-tails were so small that they passed through the sieve.

RESULTS

From the catch 148 species were identified in addition to about 40 species of spider not included in this analysis. The breakdown of the catch given below shows that flies were the main component in terms of species.

Order	Number of identified species
Collembola (Spring-tails)	1
Orthoptera (Grasshoppers)	1
Hemiptera (Bugs)	12
Coleoptera (Beetles)	25
Hymenoptera (Bees, ants, etc.)	11
Diptera (Flies)	98

Other groups were not identified for a variety of reasons. Thus Lepidoptera were excluded in view of MacLaurin's account. Many more species would be added if the bulk of the Hymenoptera could be readily identified. The list of species identified includes the numbers taken and the months in which their adults were captured.

Most species caught were common and widespread in a variety of damp terrestrial habitats. Others are well known as inhabitants of heaths and raised bogs and show considerable variation in life history and ecological requirements. In the following account only the more obvious species are mentioned with particular reference to those considered to be associated with the moss habitat.

On account of their abundance Collembola (spring-tails) are clearly important as food for larger invertebrates. One extremely abundant species *Isotomurus palustris* was taken in the basins and traps mainly in the first half of the year and is well known for frequenting water-edge habitats. It would appear to be predated upon by some spiders and ground beetles whose periods of activity are synchronized with the explosion in numbers of spring-tails which occurs in the early months of the year.

The catch of Hemiptera (bugs) included a high proportion of peatland

species which being sap feeders are relatively sedentary and consequently were caught in small numbers. Few species of beetles were caught but they included the attractive metallic ground beetle *Agonum ericeti* restricted to peat bogs, and the abundant heather beetle *Lochmaea suturalis* which is so troublesome on grouse moors at lower altitudes. One of the latter's parasites, the fly *Medina collaris* was also abundant.

Few species of Hymenoptera were identified. These included two ants *Myrmica ruginodis* and *Formica lemani* which are not confined to peatlands but were active almost throughout the year and are clearly important predators on other small animals. The capture of two spider-hunting wasps *Arachnospila spissus* and *Anoplius nigerrimus* was rather unexpected. Both as adults capture wolf spiders *(Lycosidae)* which are abundant on the moss and with which they provide underground cells for their larvae. These wasps frequent a range of habitats though *A. spissus* is usually associated with woodland. The solitary bee *Colletes succincta* is a heathland species feeding almost exclusively at heather flowers but as it requires mineral soil in which to dig its nest burrow is unlikely to be resident on the moss.

Among all the flies identified only four can be considered to be exclusively peatland species. The crane-fly *Tipula subnodicornis* was surprisingly scarce but the empid *Empis borealis* a distinctive species with dark brown wings was frequent, performing its mating dance around small birch trees. Its predatory larvae feed on minute enchytraeid worms which are also abundant in peat. Of the numerous species of dolichopodids, which are small usually metallic green flies found in damp habitats, only one *Dolichopus vitripennis* favours peat habitats. *Hydrophorus albiceps* is an interesting northern species which in the adult stage spends most of its time on water surfaces. Flies of the genus *Linnaemya* parasitic on various lepidopterous hosts were very noticeable around heather but though most abundant on heaths do occur elsewhere.

DISCUSSION

Flanders Moss because of its large extent and relative lack of disturbance is an important locality for insects. Only a small proportion of the species present on the Moss are believed to have been found in this study. When compared with Blawhorn Moss (Nelson 1983) Flanders Moss is characterised by the presence of a distinct lowland element typified by the grasshopper, the heath bug and spider-hunting wasps. Its fauna is richer in species than that of Blawhorn which is probably impoverished by frequent burning and consequent loss of tree cover. When compared with the list of species characteristic of heaths in southern England compiled by Richards (1964) the Flanders fauna appears very restricted, this being particularly obvious in the sun-loving aculeate Hymenoptera. The northern upland element though represented at Flanders by species such as *Hydrophorus albiceps* is not an obvious feature of the fauna.

The majority of insects identified appear to be widely distributed in Britain though many are restricted to damp habitats. There is a considerable similarity with insects found on blanket bog at Moor House around 550m in the northern Pennines (Nelson 1971). Of the species found at Flanders 45% also occurred at Moor House where the lowland element in the fauna was impoverished.

Comparison may also be made with the extensive work of Krogerus (1960) on the insects of Scandinavian peatlands. Thus 44% of the species found at Flanders also occurred in the coniferous zone in Scandinavia in which birch is a pioneer species, the true birch zone being found at higher altitudes. Only 11% of the Flanders species were found by Krogerus in the true upland birch zone in Scandinavia. Many of the insects of this zone are not found in Britain.

The catch included a number of species scarce in Britain such as the dolichopodids *Hydrophorus albiceps* and *Campsicnemus pusillus* and the small heleomyzid *Eccoptomera longiseta* apparently associated with the burrows of small rodents and thus perhaps easily overlooked.

An interesting observation was the apparent scarcity of the cranefly *Tipula subnodicornis* which has been shown by Coulson (1962) to be very abundant on upland moorland in the Pennines where it forms a large part of the diet of adult and nestling meadow pipits. He found the population of this cranefly to be greatly reduced when the rainfall was low. It is not possible to tell if this caused the low numbers of *T. subnodicornis* on the Moss in 1981. It seems likely, however, from the catch in the bowls that there would be a plentiful supply of alternative food for meadow pipits provided they were capable of utilising it. Their scarcity on the Moss is thus probably due to other causes while the small numbers of tipulids appears to be a feature of moss sites at low altitudes.

Much remains to be found out about the species of insects present on the Moss and especially their life histories and inter-relationships. With such a complex subject this will be a slow process. If the entomological interest of the Moss is to be retained, however, it is important that management should aim to maintain conditions as they are at present. Alterations to the water table from drainage or reclamation appear to be the greatest risks to the survival of biological interest in this reserve.

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APPENDIX

This lists insect taxa found at Flanders Moss. Figures in brackets indicate the number of specimens taken followed by figures indicating the month(s) of capture. Nomenclature follows Kloet and Hincks (1964-78).

The specimens are deposited with the Nature Conservancy Council, 12 Hope Terrace, Edinburgh.

Order COLLEMBOLA (Spring-tails)
Isotomurus palustris (Very many) 1 3 4 5 6 8 10

Order ORTHOPTERA (Grasshoppers)
Chorthippus parallelus (2) 8 (Meadow grasshopper)

Order HEMIPTERA (Bugs)
Nabis ericetorum (2) 5 (Heath damsel bug)
Anthocoris nemorum (1) 5
Neophilaenus lineatus (6) 9 10
Ulopa reticulata (1) 4
Aphrodes bifasciatus (4) 7 8
Stroggylocephalus livens (4) 4
Sorhoanus xanthoneurus (5) 7 8 9
Scleroracus plutonius (20) 8 9
Macustus grisescens (1) 5
Macrosteles viridigriseus (1) 9
Cixius nervosa (1) 7
Psylla subferrugineus (1) 3

Order COLEOPTERA (Beetles)
CARABIDAE (Ground Beetles)
Notiophilus palustris (1) 5
Loricera pilicornis (1) 5

Bembidion guttula (1) 4
Pterostichus diligens (5) 4 5 6 7
P nigrita (33) 3 4 5 6 7 9
Agonum ericeti (10) 3 4 5 8
Bradycellus ruficollis (1) 3
DYTISCIDAE (Water Beetles)
Hydroporus pubescens (6) 4 9
Agabus bipustulatus (9) 3 7 9
HYDROPHILIDAE
Helophorus aquaticus (15) 4 7 9
H brevipalpis (3) 4 7 10
H flavipes (47) 4 5 6 7 9
H grandis (27) 4 5 9
LEIODIDAE
Agathidium atrum (1) 9
SILPHIDAE
Nicrophorus vespilloides (2) 6 (Burying beetle)
STAPHYLINIDAE (Rove Beetles)
Olophrum piceum (2) 1 3
Philonthus cognatus (1) 4
Platydracus stercorarius (17) 7 8 9 10
Drusilla canaliculata (3) 4 7
SCIRTIDAE
Cyphon ochraceus (1) 5
ELATERIDAE (Click Beetles)
Ctenicera cuprea (Many) 6
Sericus brunneus (2) 5 6
NITIDULIDAE
Meligethes aeneus (3) 5 9
COCCINELLIDAE (Ladybirds)
Scymnus nigrinus (1) 4
CHRYSOMELIDAE (Leaf Beetles)
Lochmaea suturalis (Many) 4 5 6 7 8 9 (Heather beetle)

Order HYMENOPTERA (Bees, ants, wasps, etc.)
ICHNEUMONIDAE
Sussaba cognata (1) 5
S dorsalis (1) 5
S erigator (5) 7
Diphyus palliatorius (6) 7
FORMICIDAE (Ants)
Myrmica ruginodis (94) 1 3 4 5 6 7 8 9 10
Formica lemani (54) 4 5 6 7 8 9 10
POMPILIDAE (Spider hunting wasps)
Arachnospila spissa (5) 7
Anoplius nigerrimus (16) 7 8
COLLETIDAE (Solitary bees)
Colletes succinctus (2) 8 9
APIDAE (Bumble bees)

Bombus lucorum (13) 9 10
B pascuorum (2) 8 9

Order DIPTERA (Flies)
TRICHOCERIDAE (Winter gnats)
Trichocera regelationis (10) 1 3 4 10
TIPULIDAE (Crane flies)
Tipula subnodicornis (4) 5
Pedicia rivosa (3) 7
CERATOPOGONIDAE (Biting midges)
Culicoides (Many) 5 7 8
CHIRONOMIDAE (Non-biting midges) (Many) 1 3 4 5 7 8 10
SIMULIIDAE (Black-flies)
Simulium (Many) 5
MYCETOPHILIDAE (Fungus gnats) (Many) 1 3 5 8 10
STRATIOMYIDAE (Soldier flies)
Microchrysa cyaneiventris (1) 8
EMPIDIDAE
Platypalpus (1) 8
Hybos femoratus (Many) 7 8
Trichina clavipes (1) 9
Rhamphomyia curvula (Many) 5
R obscura (5) 6
R sulcata (Many) 5
Empis livida (1) 6
E borealis (Many) 4
E verralli (Many) 5
E chioptera (4) 5
Hilara chorica (1) 7
H interstincta (1) 5
H manicata (2) 8
Phyllodromia melanocephala (6) 7 8
Chelifera precatoria (3) 9
Clinocera fontinalis (1) 10
DOLICHOPODIDAE
Dolichopus atratus (30) 6 7 8
D discifer (3) 6
D festivus (1) 7
D griseipennis (1) 8
D lepidus (2) 7 8
D simplex (7) 8 9
D trivialis (1) 7
D vitripennis (3) 8
Hercostomus aerosus (9) 7 8
H cupreus (1) 6
H germanus (1) 8
Hydrophorus albiceps (2) 9
Syntormon pallipes (1) 6
Chrysotus kowarzi (2) 7

Campsicnemus curvipes (6) 7
C loripes (7) 1 3 5 9
C pusillus (1) 10
C scambus (14) 4 7
C alpinus (Many) 8 9 10
LONCHOPTERIDAE
Lonchoptera lutea (17) 1 3 4
PHORIDAE (Scuttle flies)
Megaselia brevicostalis 4 7 9 10
M errata 4
M giraudii 4 5
M longicostalis 6
M lutea 6 7 8
M meconicera 4 6
M parva 4
M pulicaria 4 5 6 8 9
M pumila 6
M vernalis 4 5
M zonata 4
Phora stictica 8
SYRPHIDAE (Hover-flies)
Syrphus ribesii (2) 9 10
Dasysyrphus tricinctus (1) 8
D venustus (7) 5 6
Melanostoma mellinum (18) 5
Platycheirus albimanus (1) 5
Sericomyia silentis (4) 8 9
Helophilus pendulus (8) 5 6 7 9
Eristalis pertinax (1) 8
HELEOMYZIDAE
Eccoptomera longiseta (1) 10
SEPSIDAE
Sepsis flavimana (1) 5
S flugens (3) 5
S orthocnemis (1) 4
SCIOMYZIDAE (Snail killing flies)
Hydromya dorsalis (1) 7
SPHAEROCERIDAE
Copromyza atra (1) 10
C equina (1) 1
Leptocera fenestralis (3) 3
L humida (21) 3 4 7 8 10
EPHYDRIDAE
Hydrellia modesta (Very many) 5 6 7 8 9
Scatella stagnalis (2) 3
DROSOPHILIDAE (Fruit flies)
Scaptomyza pallida (11) 1 3
TACHINIDAE (Parasitic flies)
Elpe inepta (1) 6

Linnaemya rossica (Many) 8
L vulpina (Many) 8
Ernestia vagans (1) 5
Actia pilipennis (1) 5
Siphona geniculata (3) 5
Medina collaris (Many) 6
Exorista larvarum (1) 8
SARCOPHAGIDAE (Flesh flies)
Sarcophaga subvicina (1) 8
CALLIPHORIDAE (Blue bottles)
Pollenia rudis (2) 9 10
SCATHOPHAGIDAE (Dung flies)
Scathophaga furcata (4) 1 10
S stercoraria (36) 3 4 6 7 8 10
S suilla (5) 5 7 9
S taeniopa (1) 5
ANTHOMYIIDAE
Nupedia aestiva (3) 3 10
MUSCIDAE (House flies and their allies)
Polietes lardaria (6) 6 9 10
Dasyphora cyanella (1) 10
Morellia simplex (1) 5
Hydrotaea irritans (Many) 7
Phaonia errans (2) 8 9
P incana (2) 6
P serva (1) 5
Mydaea detrita (2) 9
M electa (1) 8
M scutellaris (1) 10
M urbana (1) 10
Pseudocoenosia abnormis (1) 6

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