TYPICAL FLIES

A PHOTOGRAPHIC ATLAS

BY

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SECOND SERIES

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PREFACE TO THE SECOND SERIES

This supplementary volume of Typical Flies endeavours to complete the series of British Types, which, before the Great War, Professor Theobald was good enough to select and suggest as a sort of itinerary. And his notes in both volumes, especially those on larvae in the present volume, have greatly added to their value. Thanks are due in addition to the British Museum; to the Museum of Mr Rothschild at Tring, for the loan of micro-slides of the Nycteribiidae; and to Mr H. Waddington, of Bournemouth, for micro-slides of the Culicidae. To the late Mr F. C. Adams, of the New Forest, and to Mr N. D. F. Pearce, of Grantchester, for various notes and specimens captured by them¹. The only specimens which were included in the original list, and have not been obtained sufficiently well set for photography, are those of Medeterus micaceus, Agromyza lutea, Diplosis pyrivora, and of Oscinis frit, to be added later.

To Mr Harwood, of Sudbury (Suffolk), I am again greatly indebted for many specimens, especially those of Trypetidae², and seq. There appeared to be no recent illustrations of these beautiful flies and similar species, or even of some rare and common flies, of which identification is difficult. So these, too, have been included in this little volume.

It is not claimed that the venation is always clear; that would be difficult to secure in many cases: but every effort has been made to give a clue to the collector. Whenever possible a comparison with actual named specimens in collections and museums, or with lens, is desirable. The requirements of the Dipterist have been dealt with in the previous volume. They include a good net, bottles, pins, fine brushes, and forceps, for setting. Setting boards, killing bottles, cork-lined boxes for keeping specimens (in these expensive days of cabinets), a low-power microscope, and a good hand lens are desiderata. The hours for collecting are those of calm, March to October; a warm sun is essential. For unknown reasons specimens not only inhabit

¹ I greatly regret to hear of the death of Mr Adams since this series of Typical Flies went to press.

² In the Entomologist’s Record and Journal of Variation Mr T. C. Collins deals with the variation in wing markings of Trypetidae, stating that the banded mottled wings constitute specified and even generic characters.
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certain districts, but as often desert them for even a term of years. Nevertheless, it is in well-known resorts that the capture of certain species is alone possible. A classification of Brauer will be found in this volume, as in its predecessor; a cross marks the specimens contained in this volume, and a star intimates they will be found in the preceding volume. It is hoped that this little book may not be in vain in inducing students to commence a study of wide possibilities.

The following books may be of use to the student:

   Theobald's Monographs of the Culicidae. (British Museum: some of which are out of print.)

   Verrall's List of British Diptera.

   British Diptera (two volumes).

   Austen's Bloodsucking Flies. (British Museum of Natural History.)


   Staveley's British Insects.

   Instructions for Collectors. (British Museum.)

   Insects at Home. (Wood.)

   A map showing known distribution of Anopheles mosquitoes. (British Museum.)

In the Exhibited Series of Insects in the Department of Zoology, British Museum (Natural History), Cromwell Road, S.W., will be found a short series of British Diptera: those in table cases having fine enlarged coloured illustrations on the lids of the cases, of great use to students—the main collections of the Museum being reserved elsewhere.

   E. K. PEARCE.

KEMPSTON, BOURNEMOUTH,

Aug. 16th, 1921.
PREFACE TO THE FIRST SERIES

THE study of Diptera (two-winged flies) is rendered peculiarly difficult by the lack of elementary treatises on the subject. Certain groups are fully treated in the two large (and costly) volumes published by the late Mr Verrall, there are a few scattered papers in various magazines, and one or two monographs (such as Lowne's on the Blowfly); but there is nothing to compare with the numerous manuals dealing with Lepidoptera and Coleoptera, to name two orders only. This little book does not claim to fill the gap, but it is hoped that it may be of some use to the beginner, and attract attention to an order which possesses great interest, and is moreover of much economic importance. It is chiefly a picture book, as pictures appeal more to the eye than many pages of letterpress; and an important dipterous character—the venation of the wings—can be rendered with fidelity in a photograph.

I have found it difficult to obtain specimens set sufficiently flat for photographic reproduction; since, in photographing on the enlarged scale required, no amount of "stopping down" will produce an image sharp all over, unless the subject be fairly in one plane: in addition to this, some species when set and dried shrivel up, and give but a poor idea of their appearance when fresh. This of course chiefly applies to the bodies of flies, the wings and legs are not so affected.

Flies may be taken with the usual entomological net, preferably a green one, as less likely to cause alarm than a white one. Mosquito netting, which may be dyed the required colour, is much better than green leno. The net should be fairly large, but light and easily managed, as many flies are very swift and strong on the wing. When caught, the fly may be transferred to a glass bottomed entomological box: a good supply should be carried, and it is better that only one specimen be placed in a box. On returning home the flies may be killed in a laurel bottle, care being taken that the leaves do not become mildewed, which would probably ruin the specimens; a circular piece of white blotting paper should be placed over the leaves, and frequently renewed. Flies should remain in the bottle till they are thoroughly relaxed, which will require a day or two; if left too long they become rotten.
and easily break whilst setting. Narrow boards, such as are used for the smallest lepidoptera, will be suitable for large and medium sized flies; small ones may be set on strips of flat cork, covered with thin white paper. Entomological forceps will be needed to insert the pin in the thorax of the fly; I prefer these curved, as they are also useful for moving pinned specimens. If the flies are to be photographed the pin must be cut off as short as possible above the thorax, and the cut end blackened with a touch of “matt black.” No. 20 pins will be useful for most flies, though the large species require something stronger, whilst the very small ones, if pinned at all, require the finest silver pins obtainable. Taylor, New Hall Works, Birmingham, will supply a sample card of pins. For setting, strips and triangles of stiff writing paper, to hold legs and wings in place, and a stiff sable paint-brush, a few handled bristles and a fine needle or two, also handled, will do all that is required: a lens is indispensable in setting small flies, and may with advantage be mounted on a simple stand to leave both hands free. Some flies, especially the Tachinidae, are very brittle: care must be taken in manipulating them. Culicidae should be set and photographed as quickly as possible, they very soon shrivel. Other flies may remain about ten days on the setting boards. As to numbers, half a dozen specimens should be ample, both sexes being represented, where possible. Fewer will often have to suffice with rare species, and for purposes of photography one well set specimen would be sufficient, were it not for the ever present risk of damage in moving from the store box: the slightest touch or jar will often cause the loss of a leg or antenna, and the attempt to replace these is seldom successful.

Store boxes may be had in many sizes (10×8 inches is as good as any); whatever size is used should be adhered to, as far as possible, for the sake of uniformity. They should be carefully examined for mites, a great enemy to the collector; even new boxes are sometimes contaminated. In sending flies by post it is well to use two boxes, pinning them well into the inner, and supporting them by extra pins if possible; then packing the box with shavings inside a larger one. The label will of course be tied on. When finally pinning flies into the store box it is essential to use a small label giving date and locality, which can be pinned, written side down, by the same pin as the specimen. The name, etc. of the fly is written on a second label and pinned behind it in the box: the sex should be marked, where known, and a number added to correspond with that in a notebook, where fuller details may be recorded. Flies should be stored in a cool
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dry place, free from accidental jars and careless handling. Naphthalin wrapped in a piece of net should be pinned in a corner of the box as a guard against mites, the great enemy of the dipterist as of the entomologist in general.

The chief season for collecting in this country is from March till October, the sunny forenoon being the best time. Windy days are very unproductive. Even well-known and good localities are sometimes a blank, from causes we do not know, for flies seem very capricious in their habits. But, like other creatures, they have special haunts where they may usually be found at the proper season, and where they may be expected to occur if carefully searched for. Considerable experience in their habits and localities is needed by the collector. Generally speaking, umbelliferous plants, also bramble, hawthorn and ivy bloom seem to be most attractive. Flies often settle upon gate-posts, railings, and tree-trunks, especially if wounded or decayed. Others frequent salt-marshes and swamps, ponds and river-sides; whilst heath-lands, sheepruns, bare hot sandy areas and commons attract others. Horse and cattle droppings and decomposing animal and vegetable matter are well-known baits for many species. Others attack living animals, not excepting man; and certain flies prey on insects and spiders. Should horses or cattle be approached for the purpose of taking flies, much care must be exercised, as a net will generally stampede them; it is difficult to employ it to advantage under such conditions.

This little book has received the kind encouragement of many entomologists, among whom I may mention Professor Nuttall and Mr Warburton, both of Cambridge. Much practical help in the selection of species, and information as to types selected and their larvae, has been afforded by the kindness of Professor Theobald, whose assistance, it is hoped, has added greatly to the utility of this book. Thanks are also due to Mr Harwood, of Colchester, for the fine specimens of diptera which he has furnished for the photographs herewith presented. It has not always been possible to do them justice, owing to the difficulties previously noted as besetting the photographer. Mr H. Waddington kindly supplied some fine microscopic slides. The author's brother, Mr N. D. F. Pearce, has also helped with the illustrations, as to the success of which the reader must be left to judge. Acknowledgement has been made in every case, it is thought, where help has been received: and if this effort is successful it is hoped that it may be some day supplemented by a further series of pictures, to fill a few gaps that were unavoidable in the present volume.
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The life history (ovum, larva, pupa) of many of the species shown is yet to be traced by entomologists. Measurements are given in every case in millimetres (25 mm. = 1 inch), the first dimension being the length of the fly, and the second the expanse of wings. For various reasons it has not been found possible to reproduce the specimens on one uniform scale: the same difficulty was met with by Dr Michael in illustrating the Oribatidae.

E. K. PEARCE.

BOURNEMOUTH.
June 1915.

Scale of 5 centimetres of which one is divided into 10 millimetres.
BRAUER'S CLASSIFICATION OF DIPTERA

(† A cross denotes that the family is illustrated in this book. • An asterisk intimates they will be found in the preceding volume.)

Sub-order 1. ORTHORRHAPHA

Larva with a distinct head. Pupa obtected.
The adult escapes from the pupal skin by a straight dorsal slit which may be transverse but is more usually longitudinal. Imago lacks the frontal lunule and ptílinum.

Sub-order 2. CYCLORRHAPHA

Larva without any distinct head. The Pupa coarctate.
The adult escapes from the puparium through a more or less round opening at the anterior end. Frontal lunule present; ptílinum usually present.

Sub-order 1. ORTHORRHAPHA

Section I. NEMATOCERA

Antennae long and thread-like, composed of many similar or very similar segments. The maxillary palp usually elongate and flexible of from 2 to 5 segments. Second long vein often forked.

Section II. BRACHYCERA

Antennae usually of three segments, the third usually elongated and sometimes composed of a number of indistinct sub-segments and often bearing a style or arista. Maxillary palp of 1 to 2 segments, not flexible. Second long vein not forked. Squamae completely concealing the halteres.
CLASSIFICATION OF DIPTERA

1. THE ORTHORRHAPHA. Section I. NEMATOCERA
contain the following families:

*1. Pulicidae (Fleas).
*2. Cecidomyiidae (Gall Midges).
†*3. Mycetophilidae (Fungus Gnats).
†*4. Bibionidae (Fever Flies, St Mark's Flies).
†*5. Simuliidae (Sand Flies).
  7. Orphnephilidae.
†8. Psychodidae (Owl Midges).
†*9. Culicidae (Mosquitoes).
†10. Dixidae.
*11. Ptychopteridae (False Daddy Long Legs).
*12. Limnobiidae (False Daddy Long Legs).

Section II. BRACHYCERA

†*15. Stratiomyidae (Chameleon Flies).
†*16. Tabanidae (Gad Flies).
*17. Leptidae (Leptis Flies).
†*18. Asilidae (Robber Flies).
*20. Therevidae.
†21. Scenopinidae.
†22. Cyrtidae.
†*23. Empididae (Empia Flies).
†*24. Dolichopodidae.
†25. Lonchopterae.

2. THE CYCLORHAPHA. Section I. ASCHIZA

Frontal lunule more or less indefinite; no frontal suture.

†27. Pipunculidae.
†*28. Syrphidae (Hover Flies).

1 These are by some raised to the rank of an order called Aphaniptera or Siphonaptera, but there is no reason whatever for separating the Fleas or Pulicidae from the Diptera.
CLASSIFICATION OF DIPTERA

Section II. SCHIZOPHORA
Frontal lunule and frontal suture marked.

Sub-section A. MUSCOIDEA
Produce ova as a rule.

Sub-section B. PUPIFARA
Produce fully matured larvae.

Sub-section A. MUSCOIDEA
Series a. Acalyptrata
Squamae small, not concealing the halteres.

Series b. Calyptrata
Squamae concealing the halteres.

Section II. SCHIZOPHORA

Sub-section A. MUSCOIDEA. Series a. Acalyptrata

*29. Conopidae.
*30. Cordulidae.
31. Phycodromidae.
32. Helomyzidae.
33. Heteroneuridae.
*34. Sciomyzidae.
*35. Psilidae.
36. Micropedidae.
37. Orealidae.
*38. Trypetidae.
*39. Lonchaeidae.
40. Sapromyzidae.
41. Opomyzidae.
42. Sepsidae.
*43. Piophilidae (Cheese Flies, etc.).
44. Geomyzidae.
45. Ephrydidae.
*46. Drosophilidae.
*47. Chloropidae (Gout Flies).
48. Milichidae.
49. Agromyzidae.
*50. Phytomyzidae.
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51. Astiidae.
52. Borboridae.
53. Phoridae.


54. Oestridae (Warble Flies).
55. 1Tachinidae (Tachina Flies).
56. Muscidae (House Flies, etc.).
57. Anthomyiidae (Root-feeding Maggots, etc.).

Sub-section B. Pupipara

58. Hippoboscidae (Forest Flies).
59. Braulidæ (Bee Flies).
60. Nycteribiidae (Bat Flies).

1 The Sarcophaginae and Dexinae are sometimes separated from the Tachinidae as two separate families.