TYPICAL FLIES

SERIES III
TYPICAL FLIES
A PHOTOGRAPHIC ATLAS OF DIPTERA

BY

E. K. PEARCE
F.L.S., F.E.S.

SERIES III

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To

THE MEMORY

OF

MY MOTHER & FATHER
PREFACE TO THE THIRD SERIES

In the preparation of this third Series I have again to thank Professor Theobald for many of the notes elucidating the life-histories. I am also indebted to Major E. E. Austen, D.S.O., F.R.S. and to Mr Edwards, of the British Museum for the determination of several specimens and for some important notes; to Dr Hugh Scott for permission to obtain a photograph of the Atheris Ibis cluster in the Museum at Cambridge; and to Mr B. Harwood of Sudbury, Mr Waddington of Bournemouth, the late Mr Carter of Monifieth, Dundee, Mr Grimshaw of Edinburgh, Dr Haines of Dorset, Mr N. D. F. Pearce of Grantchester and Mr H. Jones of the New Forest for the provision of specimens.

I must have photographed some 500 specimens in the course of many years. Only those who have handled these wonderful insects can understand the great difficulties of doing them full justice; and incidental blemishes will, it is hoped, be overlooked.

The sequence of species has followed that given in the late Mr Verrall's List of British Diptera and Brauer's Classification has been given by Professor Theobald's permission; all suggestions as to method of collection are indicated in the Prefaces to the first and second series.

E. K. PEARCE

MORDEN, WAREHAM, DORSET
May 14, 1928

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 sundry scattered papers in various magazines, and 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.
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It is chiefly a picture book, as pictures appeal more to the eye than many pages of letterpress; and an important diptereous 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
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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 x 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 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
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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 Sudbury, Suffolk, for some of 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. 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

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BRAUER'S CLASSIFICATION OF DIPTERA

* An asterisk intimates that the family will be found in Series I.
† An obelus that it is illustrated in Series II.
§ A section-mark that it occurs in Series III.

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 ptilinum.

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; ptilinum usually present.

Sub-order 1. ORTHORRHAPHA

Section I. NEMATOCERA

Antennae long and thread-like, composed of many similar or very similar segments. The maxillary palpi 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 palpi of 1 to 2 segments, not flexible. Second long vein not forked. Squamae completely concealing the halteres.
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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).
§*6. Chironomidae (Midges).
7. Orphnephiidae.
†8. Psychodidae (Owl Midges).
§†*9. Culicidae (Mosquitoes).
§†10. Dixidae.
§*11. Psychopteridae (False Daddy Long Legs).
§*12. Limonobiidae (False Daddy Long Legs).
§†*13. Tipulidae (True 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 (Empis Flies).
§†*24. Dolichopodidae.
†25. Lonchopteraidae.

2. THE CYCLORRHAPHA. 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 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. PUPIPARA
Produce fully matured larvae.

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

Series b. Calyptrata
Squamae concealing the halteres.

Section II. SCHIZOPHORA

Sub-section A. MUSCOIDEA. Series a. Acalyptera

§§ 30. Cordyluridae.
§ 31. Phycodromidae.
§ 32. Helomyzidae.
§ 33. Heteroneuridae.
§§ 34. Sciomyzidae.
§ 35. Psilidae.
§ 36. Micropezidae.
§§ 37. Orlaidae.
§§ 38. Trypetidae.
§§ 39. Lonchaeidae.
§ 40. Sapromyzidae.
† 41. Opomyzidae.
§ 42. Sepsidae.
§ 43. Piophilidae (Cheese Flies).
  44. Geomyzidae.
§ 45. Ephydridae.
† 46. Drosophilidae.
§ 47. Chloropidae (Gout Flies)
  48. Milichidae.
  49. Agromyzidae.
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†50. Phytomyzidae.
51. Astiidae.
†52. Borboridae.
†53. Phoridae.

Sub-section A. MUSCOIDEA. Series b. Calyptrata

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

Sub-section B. PUPIPARA

§†*58. Hippoboscidae (Forest Flies).
†59. Braulidae (Bee Flies).
†60. Nycteribiidae (Bat Flies).

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

The following books may be of use to Students and should be consulted in important libraries if out of print.

G. H. Verrall. List of British Diptera. 2nd Edition. 2s.
—— British Flies. Masterly volumes on (1) Stratiomyiae, (2) Syrphideae. 2 vol.
British Museum. “Instructions for Collectors,” and “Map of Distribution of Anopheles”; also “The House Fly as a danger to Health,” “Mosquitoes.”
—— An Account of British Flies (short series).
W. Lundbeck. Diptera Danica (in English).
Millar. The Natural History of Aquatic Insects. (Macmillan.)
Dr H. Scott. “Notes on Nycteriibiidae.” Parasitology, Vol. IX.
Osten-Sacken. Comparative Chaetotaxy: on the arrangement of bristles of Diptera: see also Williston’s North American Diptera.

Many others (such as G. H. Verrall, Eaton, J. E. Collins) may be learnt in Grimshaw’s Guide already named—a full and concise epitome of Diptera literature, Many of these Transactions must be sought in Public or Museum Libraries, or those of the Learned Societies in London and the provinces.

Macquart. Diptères, 1834 (ancient classics of Dipterology) often alluded to, can be seen as above.