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Sporting Book Specialist
2 Blossom Way
HILLINGDON, MIDDLESEX
1954
Big Game Hunting Falconry

Wildfowling

19-766

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DRY-FLY ENTOMOLOGY

THE HALFORD DRY-FLY SERIES

VOLUME II.

Dry-Fly Entomology

LEADING TYPES OF NATURAL INSECTS

SERVING AS FOOD FOR TROUT AND GRAYLING

WITH THE

100 BEST PATTERNS OF FLOATING FLIES

AND

THE VARIOUS METHODS OF DRESSING THEM

BY

FREDERIC M. HALFORD

"DETACHED BADGER" *of* "*The Field*"

Author of "*Floating Flies and How to Dress Them*," "*Dry-Fly Fishing in Theory and Practice*," *and* "*Making a Fishery*."

SECOND EDITION REVISED

LONDON

VINTON & CO., LIMITED

9, NEW BRIDGE STREET, LUDGATE CIRCUS, E.C.

—

1902

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LONDON:
JOHN BALE, SONS AND DANIELSSON,
GREAT TITCHFIELD STREET, OXFORD STREET, W.

PREFACE TO THE FIRST EDITION.

It has often been said by Anglers, and hinted in the Sporting Press, that a treatise on the entomology of the floating insects serving as food for trout and grayling would be at once of interest and practical utility. Probably few fishermen or critics have studied the subject, and the majority have little idea of the magnitude of the work entailed in compiling such a treatise. Careful reading of such books as Pictet on the Phryganidæ, Ephemeridæ and Perlidæ, or such monumental monographs as Eaton on Recent Ephemeridæ, McLachlan on the Trichoptera, or (the very latest) Lowne on the Blowfly, would give them some notion of the amount of attention bestowed upon the history of a family, or even a single insect, by modern scientists.

Is it then to be wondered at that the perusal of such works, each of which embodies the study and research of several years, should have long caused me to shrink from undertaking so heavy a task? After all, I have

only dallied with the subject as a beginner, mastered the mere rudiments of the science, and cannot pretend to speak with any semblance of final authority on the question.

As, however, "Floating Flies and How to Dress Them" is out of print, and Messrs. Vinton & Co., Limited, who have purchased the copyright, are of opinion that the present is a favourable time for bringing the information contained therein up to date, I have striven to carry out their suggestion. I have thought it advisable to incorporate in this book the entire subject—the natural insects and their life history, the best imitations, and the most approved and modern methods of dressing them.

In respect to the first part, viz., the entomology, I have the inestimable advantage of finding in the Rev. A. E. Eaton, of the Entomological Society of London, a friend in need. The first living authority on the Ephemeridæ, and an entomologist of great general knowledge, he kindly volunteered to read, and amend where necessary, that branch of the work. If this book is of use to my brother fishermen, their deep gratitude as well as my own are eminently due to him.

My aim has been to convey the required information in the simplest language, avoiding, as far as possible, scientific terms which are

not always easily understood. To assist, however, in the identification of the insects, and to prevent any confusion, I have given the modern scientific names wherever they can be readily ascertained. Latin and Greek terms are only used where necessary, and in all cases where there is difficulty in understanding them, their meaning in plain English is appended.

The second part contains a list of what are considered by the leading dry-fly fishermen of the day the best patterns of artificial flies, copiously illustrated by coloured plates and full description of the materials used in dressing them.

The third part comprises the entire manipulation of fly dressing, with modern improvements, as well as the implements required, the materials used, and receipts for dyeing them to the required tints.

The devotees of the dry fly have given my previous works a welcome so warm and so much beyond my deserts, that I am tempted to commend to their tender mercies this my latest bantling, and to ask their kind forbearance for its numerous shortcomings.

FREDERIC M. HALFORD.

January 1st, 1897.

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PART I.

LEADING TYPES OF NATURAL INSECTS SERVING AS FOOD FOR TROUT AND GRAYLING.

INTRODUCTION.

BEFORE embarking on so complicated a subject as Entomology for the Dry-Fly Fisherman, some explanation is necessary to remind the reader of the scope and intention of this portion of the work as stated in the Preface. The main object is to give the rudimentary knowledge required to enable an enquiring Angler to recognise such insects as are at once plentiful on the water, and serve as food for trout and grayling. It is intended also to impart some elementary information respecting their life and metamorphoses, and their zoological position. This is no scientific monograph or series of monographs, but rather a help for the majority of fishermen, who, being professional or business men, either cannot spare the time or (as happens with a large proportion) have not the requisite aptitude for a

deep study of natural history. Anyone desirous of pursuing his research further, and mastering all the complicated details necessary for the identification of genera and species, must consult modern scientific works devoted to particular orders, families, or groups.

Modern entomological works for the advanced student.

The following are the latest and most reliable works:—Rev. A. E. Eaton's "Revisional Monograph of Recent Ephemeridæ or May-flies;" R. McLachlan's "Revision and Synopsis of the Trichoptera of the European Fauna;" F. J. Pictet's "Histoire Naturelle des Insectes Nevroptères;" "Famille des Ephémérines" and "Famille des Perlides;" R. McLachlan's "Monograph of the British Neuroptera-Planipennia," printed in the Transactions of the Entomological Society of London for 1868; and the monograph, which will shortly appear, of the British Diptera, by Mr. G. H. Verrall.

Floating food and sunk food.

There are good reasons why the First Part of this work should not be entered upon from the point of view of the dry-fly purist only, and why the attention of students should be directed not to the winged forms of the insects alone, but also to their other conditions. It is, of course, understood that the larvæ, &c., are found in the bed of the river and in midwater among the weeds. The late Mr. G. S. Marryat, in that pithy and witty

form of expression which was one of his greatest charms, once said that "while floating food is *caviare*, sunk or midwater food is *beef* to the fish." This explains the position accurately.

No doubt the Salmonidæ in rivers will at times take, and take freely, winged flies on the surface, but, besides minnows and other small fish, Crustaceans, and Mollusks, their staple food consists of Caddis or larvæ of Trichoptera, and the larvæ of Ephemeridæ, Perlidæ, Sialidæ, Diptera, and many other land and water-bred insects. A vast amount of space has been devoted in the sporting press and elsewhere of late years to prove, or try to prove, that one of the effects of the so-called education of the fish has been to cause them to feed more freely on the larvæ and less on the mature or winged insects than they did in olden times. Some eminent authorities, too, have striven to demonstrate that its assumed tendency to prefer subaqueous to floating food is due to the introduction of artificially bred and artificially fed trout and grayling.

It is to be presumed that the writers who have advanced this theory have an implicit belief in its truth and persuade themselves that they have proved it to their own satisfaction. As one of the few fishermen who have for many years consistently studied the

food of the trout and grayling by the only available and practical means, *i.e.*, autopsy, may I be allowed to tender my evidence?

I have invariably found that the undigested insect food has consisted of masses of larvæ and nymphs with a few occasional specimens of the winged insects. This has been the universal result, whether the trout or grayling have been taken in waters fished daily, or in comparatively wild parts where they seldom see an artificial fly. In rivers where in the memory of man no stocking had taken place, or in others, which from neglect or other causes, had been depopulated, and where, therefore, a fresh generation of trout had been turned in from the pisciculturist's ponds, the experience has ever been the same. The earliest autopsies taken do not differ at all in this respect from those of the latest date. It may be urged that the span of an ordinary lifetime is not sufficiently long to yield conclusive evidence of stability of habit, but surely this argument applies equally to the statements of those who trust to their memory in support of the opposite theory.

Difficulty of identifying the insects.

Every fisherman has probably had the experience of finding himself at the riverside when fish are rising freely at some insect invisible to him, or at one of which he cannot readily discover a successful imitation. His first impulse

is to ascertain what is astir, and catch a specimen if possible; and then if his knowledge of insects enables him to recognise the form, or if he has some friend at his elbow who can name it for him, he turns with confidence to his fly-book, and having gained the clue to the most suitable selection for the occasion, may deem himself in luck's way. No one without an inkling of the order to which the specimen to be traced belongs would search at haphazard through ponderous volumes filled with the scientific names and descriptions of other kindred insects, classified in orders and families, or genera and species, however anxious he might be to know its name and learn something of its life history.

But while content at such a juncture to leave exploration of the features essential to identification of the particular genus and species of the creature to advanced students (comprising, as the quest must do, such details as the form and nervures of wings, the proportionate length of the joints of legs, the number of articulations and shape of mouth-parts, the exact form of the abdominal appendages, or markings on parts of the thorax, body, or wings), many a fly-fisher would be happy enough to arrive offhand at a clear conception of its approximate ordinal standing.

The eye can be easily trained sufficiently

for this purpose. It needs but a few hours' observation in a well-managed natural history museum furnished with show-cases exhibiting, apart from the general collection, a small series of specimens of the leading types of every family of insects, together with their metamorphoses, to verify, by actual inspection of the objects, the particular peculiarities of each Order as defined in any systematical handbook of Entomology.

Examination. For the riverside examination of insects all that is required is a pocket lens; the best of these, called Aplanatic, and made by Zeiss, of Jena, or Reichert, of Vienna, in two powers × 6 and × 10, can be bought of C. Baker, Optician, 244, High Holborn, and cost 15s. Specialists in Trichoptera and Ephemeridæ (requiring rather stronger lenses for examining mouth-parts and male appendages) find Coddingtons or Platyscopics × 30 answer their needs. For home use or for more advanced study a microscope is certainly a convenience, but the entomological angler requires only a plain and inexpensive stand, and low power objectives which are not costly.

Collection. A few hints on the collection and preservation of specimens will not here be out of place. For the collection of insects floating on the water, the best form of net is a small bag of cheese-cloth fitted to a ring of stout copper

wire, three inches in diameter, fastened to the point of an old trolling rod. For larvæ or other subaqueous forms a frame of flat iron, seven inches in length and three and a half inches in width, of the form shown (fig. 1),

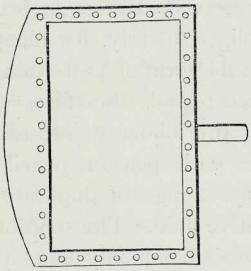

FIG. 1.

can be made by any ordinary ironmonger; a long deep bag of cheese cloth is fastened to it by string passed through the holes. The frame with bag attached is driven on firmly to a stout ash-handle, four feet in length. The spade-shaped front of the frame is designed to dig the mud or weeds, so that they may easily drop into the bag with the larvæ they contain.

Preservation.

Fly fishermen and fly dressers have long felt the want of examples, suitably preserved for reference, of the insects on which fish principally feed. The plan generally favoured by entomologists, after specimens have been netted and killed in an ordinary cyanide bottle —pinning the large kinds and securing the

smaller either with wire to pith or pins to card, for dry storage in boxes or cabinets—is open to the objection that shape and colour change so much in drying as to make it sometimes impossible to recognise the species of specimens thus preserved. Entomological specialists are often obliged to rely, for identification of species, upon the form of parts that shrivel up in dry insects; and, therefore, dry storage entails either the labour of recording fugitive characteristics with pen or pencil, or else a supplementary storage of duplicate specimens in a preservative fluid. The solutions of glycerine and alcohol commonly employed for this purpose do not preserve the natural colours of insects.

Insects in the angler's collection should be so arranged that their general form and contour are maintained, and that the various organs can be examined either by a hand-lens or a low power objective under a microscope. It is also desirable that the colours of the living insect should, as far as possible, be preserved, so as to assist the student in identifying the flies at the riverside.

For the school of fishermen who lay great stress on the reproduction in the artificial fly of the exact shades of colour of the natural insect, this preservation of colour is essential, while for the exponents of the colour blind theory

it is comparatively unimportant. The critic, when looking at preserved specimens, must remember that the Ephemeridæ in their various stages gradually become darker as they approach the successive metamorphoses, and that the imagines also darken with age. In some cases, such as the eggs of the Sherry-spinner (*Ephemerella ignita*), the green colour gradually changes, in a state of nature, to a brown shade. The entomologist's dried insects, in which both form and colour have deteriorated, are evidently not fitted for our purposes, although it must be conceded that mere identification of species is, as a rule, not impossible when working with them.

Preservation in spirit.

At the initial stages of my experiments the insects were collected in fluid, either dilute alcohol or methylated spirit, and although the colour was soon destroyed, yet they served to make a series of microscopic slides, which have been most useful for examination of details. Perhaps the worst feature in reference to these Ephemeridæ in spirit was that they rapidly became very brittle, and setæ, legs, antennæ, &c., often broke off at the slightest touch, or even, in some cases, from the shaking of the tubes in transit from Hampshire to London.

Mounting in Canada balsam and Häntzsch's medium.

A number of fresh specimens were successfully arranged, hardened in spirit, cleared in oil of cloves, and mounted in Canada balsam,

without pressure, and saving the loss of colour, are to-day as good as when collected. Some Ephemeridæ were transferred from the spirit to Häntzsch's medium, consisting of one part pure glycerine, two parts distilled water, and three parts alcohol. These were mounted in the same medium, and, except for the unusually unreliable nature of fluid mounts, were fairly successful.

Formalin as a preservative.

At a later date the use of formalin by modern scientists as a preservative of both tissue and colour opened up a new field of experiment. Formalin is the name given to a 40 per cent. aqueous solution of formic aldehyde. To obviate mistakes it is well to remark that the strength of formalin solutions is by some authorities referred to the percentage of formic aldehyde, and by others to that of its diluted preparation called formalin. Thus, hereafter, there will be references to the 2 per cent. solution. This is made by adding 1 oz. of formalin to 19 ozs. of water, making in all a bulk of 20 ozs., or an imperial pint. To be strictly accurate this should be described as a 2 per cent. solution of formic aldehyde, or a 5 per cent. solution of formalin. It is, however, here and generally described as a 2 per cent. solution of formalin.

At the outset a grave difficulty occurred—fresh or dried Ephemeridæ transferred to this

formalin solution floated on the surface of the fluid, and even after many months the flies showed no sign of immersion in the liquid. Ephemeridæ in the imago stage, and in a far greater degree in the subimago state, are covered with ciliæ or fine hairs, which retain minute air bubbles, and a comparatively dense medium like the formalin solution does not tend to soak into the specimens. This did not occur when collecting in spirit, as, owing to its low specific gravity, it was rapidly absorbed by the ciliæ, and the insects soon became thoroughly immersed. Besides the loss of colour, another great disadvantage when collecting in spirit was that the flies generally died in distorted attitudes, contracting and curling up their legs and setæ, and in many cases drooping their wings, so that the form of the insect was quite changed. Hence to collect in spirit and transfer to the formalin solution was of no avail.

A friend told me that sea anemones and zoöphytes killed in an aqueous solution of menthol died with their tentacles spread out, and as the result of a number of experiments on similar lines with Ephemeridæ, Trichoptera, and other insects, the following method may be recommended: The collecting fluid consists of one part alcohol and two parts 2 per cent. formalin solution, to which as many crys-

tals of menthol as will dissolve are added. Menthol is very sparingly soluble in this mixture. When collecting Ephemeridæ or other insects, pick them up by the tips of the wings lightly between the thumb and forefinger, both quite dry, and drop them into a tube containing the above collecting fluid. As soon as convenient, but certainly within, say, six hours, transfer the insects to another tube containing 2 per cent. formalin solution. It will be found that leaving the specimens too long in the collecting fluid will have an effect on their colours. They can be kept for any length of time in tightly-corked tubes or bottles containing 2 per cent. formalin solution, but exposure to light should be avoided, as all insects, living or dead, dried or in fluid, are more or less bleached by the action of light. When making the formalin solution it should invariably be filtered, or otherwise a fine white precipitate is often formed, and this disfigures the insects.

If the foregoing method is carefully carried out, the colours will not be appreciably altered from those of the living insects, and a fair proportion of them will be found to have died in a natural position, so that the parts can be properly displayed by mounting either prone or in profile. No arrangement of displaced parts is practicable, so that distorted specimens

should be discarded, and only the perfect and best arranged ones kept for mounting for the cabinet or other receptacle in which they are to be kept.

Collecting tubes.

For collecting the specimens corked tubes, 3 inches in length and 1 inch in diameter, are recommended. The makers sell square wooden blocks to take the tubes, so that they can be safely transmitted by post. Ephemeridæ and other insects will travel uninjured if a small wad of cotton-wool is pressed lightly down on the insects in the fluid, and the tube securely corked. Care should, however, be taken that the tube is quite full of fluid when corked.

The Rev. A. E. Eaton, who is working on the Psychodidæ—a family of small moth-like Diptera—has tried this method of collection and preservation, and suggests the following modification. He writes me on the 31st January, 1902:—"In collecting *Psychodidæ*," "which are very retentive of air, owing to" "their excessive hairiness, I take out into the" "field a supply of empty corked tubes (homœo-" "pathic globule tubes) in some of the 3 inch" "× 1 inch wooden-cased tubes referred to" "above and two drop bottles—one of these" "filled with alcohol, and the other with your" "alcoholic and menthol solution of formalin." "Instead of cyanide, my collecting bottle is" "charged with one or two drops of rectified"

" ether. As soon as the fly is overpowered "
" by the ether vapour, I remove it from the "
" collecting or filling bottle and let it fall into "
" one of the smaller tubes. Then moisten "
" the fly with a drop or two of the alcohol, "
" drain this away immediately, fill the tube "
" quite full with the alcoholic and menthol "
" solution of formalin from the second drop "
" bottle, and cork it. The small tubes with "
" flies in them are carried home upright inside "
" the larger wooden-cased tubes ; the fluid is "
" eventually drained away, and 2 per cent. "
" formalin solution substituted. I am mount- "
" ing successfully specimens thus preserved, "
" which were collected last May and June. "
" As the fluid in the small globule tubes is "
" apt to evaporate, they could be stored in a "
" glass stoppered jar containing 2 per cent. "
" formalin solution. The alcohol might efface "
" some of the more delicate subcutaneous "
" markings of *Ephemeridæ*, but not the "
" stronger markings, if care be taken to "
" drain it away promptly."

Whether my method or the modification of it suggested by Mr. Eaton be adopted, the subsequent mounting of the specimens will be identical, and prove a comparatively simple matter. For the collection now being made for the Flyfishers' Club, the insects are in 2 per cent. formalin solution contained in what

are called *solid watch glasses.* These are slabs of plate glass half an inch thick and about two and a quarter inches square, with a concave circular cell about two inches in diameter worked in the centre of each. The cavity is filled to the brim with the formalin solution, the specimen inserted, and a piece of flat glass securely cemented on to the upper face of the solid watch glass. These are arranged eighteen in each drawer of a cabinet, and the insides of the drawers lined with white paper, to show the colours and shape of the insects.

Divisions of the animal kingdom.

The animal kingdom is mapped out by modern scientists into five provinces or sub-kingdoms :—I. Vertebrata (*back-boned*) with two warm-blooded classes (Mammals and Birds) and two cold-blooded classes (Reptiles and Fishes). II. Mollusca (*soft*) with seven classes. III. Annulosa (*ringed*) or Articulata (*jointed*) with four classes. IV. Radiata with four classes; and V. Protozoa, Sponges, &c.

The four classes of the third sub-kingdom are: 1. Arthropoda (*jointed-footed*), for the most part characterised by the possession of an extensive system of internal air-tubes subservient to respiration. 2. Crustacea (*shelly*), comprising many orders provided, like Arthropoda, with jointed limbs, but differing in the mode of respiration, of which may here be cited in illustration Crabs, Lobsters, Crayfish and

Prawns of the order Decapoda, Woodlice of the order Isopoda, Sandhoppers and fresh water Shrimps of the order Amphipoda, Water-fleas of the Ostracoda, and Barnacles of the Cirrhipedia. 3. Annelidæ (*ringed*), containing Earth-worms, Sea-worms (for instance the rag-worm of sea fishermen), and Leeches. 4. Entozoa (*internal animals*) or parasitic worms.

The class Arthropoda embraces three sub-classes :—1st, the Insecta or Hexapoda (*six-footed*), composed of many orders to be hereafter mentioned. 2nd, Arachnida (*web*), likewise of many orders, typified by Spiders, Harvestmen, Scorpions, Ticks and Mites, amongst others. 3rd, Myriapoda (*thousand-footed*) with two orders, one of the predatory Centipedes (*hundred-footed*), the other of the kinds that feed on vegetable substances, such as Julus and the wood-louse-shaped Glomeris. Members of the second and third classes when adult possess (with hardly an exception) a larger number of legs than full-grown insects, and have fewer regional divisions of the body.

Definition of insects.

The following definition of the *Insecta* is given by Mr. Sharp in Volume V. of the "Cambridge Natural History."

"*Definition.* — Insects are small animals, having the body divided into three regions placed in longitudinal succession—head, thorax

and abdomen; they take in air by means of tracheæ, a system of tubes distributed throughout the body and opening externally by means of orifices placed at the sides of the body. They have six legs and a pair of antennæ; these latter are placed on the head, while the legs are attached to the thorax, or second of the three great body divisions; the abdomen has no true legs, but not infrequently has terminal appendages, and on the under surface protruberances which serve as feet. Very frequently there are two pairs of wings, sometimes only one pair, in other cases none; the wings are always placed on the thorax. Insects are transversely segmented—that is to say, the body has the form of a succession of rings; but this condition is in many cases obscure; the number of these rings rarely, if ever, exceeds thirteen in addition to the head and to a terminal piece that sometimes exists. Insects usually change much in appearance in the course of their growth, the annulose or ringed condition being most evident in the early part of the individual's life. The legs are usually elongate and apparently jointed, but in the immature condition may be altogether absent, or very short; in the latter case the jointing is obscure. The number of jointed legs is always six."

The anatomy of internal organs of insects

as well as the microscopic structure of the tissues and their embryology, are excluded from discussion in the present work, although employed in assessing at their true worth many features that bear upon questions of classification. Items of these descriptions, if at all referred to, will only be mentioned in the most summary manner.

Skin of insects. The external covering or skin of an insect is the hardest and most solid portion of its anatomy. It is composed of a tough, flexible and horn-like substance called *Chitin.* Insects that are aquatic in early life shed this protecting envelope on leaving the water, or very soon afterwards, and any organ used in the water only, will be found attached to the old cast skin.

Morphology. The outward form of the body and limbs is diversified by differences in development of their component parts. The regions of a segment are three :—back, belly and sides. The back, termed in thoracic segments *notum* as opposed to the breast (*sternum*), and in abdominal segments *dorsum* or *tergum* as opposed to the belly (*venter*), is liable to be marked out into several portions by sutures, and so are the sides (*pleura*, singular *pleuron*); but in a great many insects the minor constituents of these regions are intimately blended together as dorsum or pleuron without any trace of sub-

division. Legs by their situation are sterno-pleural, and wings noto-pleural, appendages but by development the latter are really appendages that grow out of the notum.

Head and appendages.

Comparison with certain Crustacea supports the theory that the head of an insect, like each of the other regions, should be regarded as a conglomeration of several segments, here intimately blended. Its form and proportionate size vary greatly in different members of the class and sometimes sexually. Most insects can see, and many have two sorts of eyes, viz. :—three or a pair of *ocelli* (single eyelets), and a pair of *oculi* (eyes), formed of eyelets touching one another in faceted or *compound* eyes, but less crowded in *clustered* eyes. A few have the oculi parted, horizontally, in two, and larger facets in the upper than in the lower division ; they are never borne on a moveable stem, like crabs' eyes. In theory, the antennæ and mouth-organs (excluding the lips and tongue) stand in the same relation to segments of the head as legs to segments of the thorax. Their various forms in different kinds of insects are most remarkable. The mouth is an opening between sterna of segments and not a perforation through a sternum ; its organs are modified in construction to suit the food of the animal, and to lend themselves to any uses other than feeding for which they may be required.

Mandibulata. Insects that eat solid food are termed *mandibulata* (jawed); those that live upon fluids suctorial or *haustellata* (suckered); but haustellate mouths are not all of one uniform model, and in Hymenoptera are associated with a pair of mandibles used for biting or gnawing. The normal parts of the mandibulate mouth are—in front, the upper lip (*labrum*); next behind this laterally, a strong pair of jaws (*mandibles*), followed by one or two pairs of weaker jaws (first and second *maxillæ*), the second pair of which is very commonly closely associated with the lower lip (*labium*). This completes the enclosure of the aperture posteriorly and is itself attached to a part of the frame of the head termed the *mentum* (chin). The tongue (*lingua*) occupies the floor of the cavity, and is attached to the labium and second maxillæ; it is often trilobate, and then the median lobe is distinguishable as the tongue proper (*glossa*) and the lateral lobes as *paraglossæ*. The maxillæ carry externally a single-jointed appendage termed the *palpus* (feeler), which is undeveloped in the mandibles of insects; and the first maxillæ have sometimes in addition a moveable lobe articulated with the jaw, immediately beyond or interior to the insertion of the palpus, termed the *galea* (hood). The palpus and galea, in theory, are the outer and inner

branches of a two-branched limb of which the jaw is the basal joint. Forked legs are a common feature in Crustacea. The second maxillæ often resemble in appearance lobes of the labium, and hence their palpi are frequently designated labial palpi.

Haustellata.

In mouths of the haustellate pattern, palpi, when present, show clearly by their attachments which of the parts correspond to maxillæ in mandibulate mouths, and supply a key to the understanding of the homologies (identical relations) of all the remaining elements of the mouth; but in many insects a great reduction is noticeable in the number of the mouth-organs. Thus Trichoptera or Caddis-flies have palpi but no jaws and no tongue.

Thorax and legs.

The thorax is divided into three segments —the prothorax, the mesothorax, and the metathorax; the legs, six in number, are attached, the pair of forelegs to the prothorax, the pair of medial legs to the mesothorax, and the pair of hind legs to the metathorax, and each leg consists generally of five divisions, viz., (1) the *coxa*, or hip; (2) the *trochanter*; (3) the *femur*, or thigh; (4) the *tibia*, or shank; and (5) the *tarsus*, or foot; this last, composed of from one to five joints, and terminated by one or two claws (*ungues*), sometimes also with a pad (*pulvinus*), or a pair of flaps (rarely three) or a bristle.

Wings.

The wings, if there are two pairs, are attached, the fore wings to the mesothorax, and the hind wings to the metathorax; if there should be only one pair it is generally mesothoracic. The attachment of the wings to the thorax is by means of strong muscles and ligaments. The wings themselves are composed of two layers of integument, traversed by nervures and veins; and differences in the arrangement, &c., of the nervures are important factors in determining genera and species. In the Diptera, or two-winged insects, the hind wings are usually present in the form of very minute, pear-shaped appendages, called *halteres*, or poisers.

Abdomen.

The abdomen, or body, is composed usually of ten rings, or segments, and has various appendages at its hinder end, such as the setæ of Ephemeridæ, and the ovipositor, or sting, of Hymenoptera. The ovipositor is formed of several pieces, developed in pairs from more than one segment. In the same situation, as a rule, the male genitalia are located; but in Dragon-flies (Odonata) most of these parts are in this sex relegated to a position close to the base of the abdomen.

Internal anatomy.

The inside of an insect cut open in air presents the appearance of a mass of soft wet substance amidst which nothing can be clearly distinguished; but by opening carefully with

fine scissors by a shallow incision along the back, afterwards pinning apart the gaping skin on a leaded cork, and submerging the whole under water in a shallow trough (*e.g.*, an empty sardine tin) the internal anatomy of the animal can be easily traced under a lens, with the aid of needles fixed in the ends of pieces of stick and a pair of fine surgical forceps. One of the lenses recommended at page 6 could be employed with advantage, held in a horizontal vice of suitable length made to slide up and down an upright stand with a fixing screw to keep it at any height required in focussing the object. If the student is a fly-dresser, either of the forms of vice recommended in Part III., pages 218 and 220, could easily be adapted to the purpose. Light can be concentrated beneficially upon the dissection with a condenser, or the fly-dresser's lamp described in Part III., page 226, would be suitable for the work.

At this stage the viscera in view are muscles of the thorax, and the bulk of the alimentary and reproductive organs, with abundance of fat masses buoyant with air in the abdomen. After a little teasing apart with the needles, removal of some portions of the fat, and a judicious employment of the scissors, the different organs can be floated aside for detailed examination, exposing to view the

ventral nervous ganglia and cords overlying the floor of the cavity, and in addition to these, the main air-tubes of the body.

As regards the alimentary canal and its appendages, and the sexual viscera, the object of this work will have been attained by indicating to the reader an easy method of exploring them.

Nervous system.

The nervous system is very complicated, and according to Sharp "may be treated as consisting of three divisions:—(1) The cephalic system, (2) the ventral or ganglionic chain, (3) an accessory sympathetic system or systems. All these divisions are intimately connected." This subject is, however, too deep for treatment here at any length. It will suffice to explain that the cephalic system consists of a large ganglionic mass or brain, supplying nerves to the eyes, antennæ and mouth-organs, and situated above the alimentary tract; that the ventral ganglionic chain is a series of ganglia, differing in number in different insects and situated below the alimentary canal in the thorax and abdomen, linked one to another by a pair of longitudinal cords and emitting nerves to the parts of the body in those regions; and lastly, that the cephalic ganglion is similarly linked to the foremost of the ventral ganglia by a pair of cords embracing the *œsophagus* (gullet).

Respiration

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CLASSIFICATION OF HEXAPOD INSECTS IN OUTLINE.

Metamorphosis incomplete
- Mouth mandibulate
  - Wingless
    - Body scale-clad; maxillæ furnished with palpi
      - Antennæ and caudal setæ many-jointed, long and setaceous ... Thysanura
      - Antennæ filiform and few-jointed; no caudal setæ ... Collembola
    - Body hair-clad; maxillæ destitute of palpi. External parasites of Birds; labial palpi present (*fide* Piaget) ... Mallophaga
  - Winged with some apterous exceptions
    - Fore wings similar in texture to the hind wings (Neuroptera, Lin., part)
      - Nymph aquatic
        - Antennæ of adult subulate (awl-shaped) and short; wings fully extended in repose
          - Fly gentle, with atrophied, flaccid mouth-parts, filiform or setaceous caudal setæ and wings erect (with few exceptions) in repose ... Ephemeridæ (page 33)
          - Fly predatory, with powerful mouth-parts. Wings outspread widely in repose, or obliquely reclinate in a vertical plane above the back, according to Family. Dragon-flies ... Odonata
        - Antennæ of adult elongate; mouth-parts well formed but feeble; wings (with individual short-winged specimens as exceptions) closely overlapping one another, and the body, in repose ... Perlidæ (page 101)
      - Nymph terrestrial
        - Non-gregarious insects
          - Wings when fully developed imbricate or connivent lengthwise in pairs almost roof-like during repose. Nymphs free roaming ... Psocidæ
          - Wings in the male arranged in repose much the same as in Perlidæ. Nymphs dwelling in silken galleries under shelter ... Embidæ
        - Social insects living together in communities composed of sterile or neuter individuals and both sexes; often lucifugous ... Termitidæ
    - Fore wings (tegmina) firmer in texture than the hind wings. Nymphs terrestrial ... Orthoptera
- Mouth suctorial
  - Wingless. Body beset with hairs; rostrum protrusible. External parasites of Mammals, without palpi (Pediculinæ or lice) ... Anoplura
  - Winged, with some apterous exceptions
    - Fore and hind wings alike (or nearly so) in texture
      - Wings very narrow or linear, deeply fringed, incumbent horizontally upon the dorsum. Tarsi with a terminal bladder-like sucker ... Thysanoptera
      - Wings with some exceptions broad, deflexed towards the costa and reclinate in repose, with the inner margins connivent or touching if not overlapping ... Homoptera
    - Fore wings to a large extent stronger in texture than the hind wings, but thin towards the tips ... Hemiptera

Metamorphosis complete
- Mouth mandibulate; maxillæ, when present, ancillary to manducation
  - Fore wings indurated or coriaceous (leathery), usually free and sheathing a pair of membraneous hind wings ... Coleoptera
  - Wings all membraneous (Neuroptera, Lin., part)
    - Mouth-parts of the fly efficient. Larvæ (except in Osmylidæ and Sialidæ, page 114) terrestrial ... Planipennia
    - All but the palpi weak or atrophied in the fly. Larvæ (except Enoicyla) aquatic ... Trichoptera (page 77)
- Mouth suctorial, or (if mandibulate) with maxillæ especially auxiliary to the organ of suction, when there are any
  - Four-winged (rarely apterous) and mostly scale-clad flies, without mandibles (one genus excepted) ... Lepidoptera
  - Four-winged (rarely apterous) flies, nude or hairy, with mandibles ... Hymenoptera
  - Two-winged flies with halteres or apterous without; mostly hairy or nude, seldom scaly in parts ... Diptera (page 126)

Nervous
tem.

Respiration

are certain small holes called *spiracles*. These communicate with a system of tubes called *tracheæ*, by which air for respiratory purposes is conveyed to the circulating fluid in all parts of the animal. The main tubes extend the full length of the insects horizontally, one on each side of the body, and send off branches like blood-vessels in all directions to the limbs and viscera. Larvæ that inhabit the water have usually, in place of spiracles, tufts of threads or fin-like appendages termed branchiæ, by means of which the air of the entire respiratory system derives oxygen from the water in the same way as the blood in the gills of fishes. Nymphs of Dragon-flies sometimes, in addition to those in the form of tail-fins, have branchiæ composed of longitudinal membraneous plates within the rectum or terminal portion of the bowel. These are abundantly supplied with tracheæ from two large mains that branch in a very beautiful manner, one on each side, exterior to the rectum. The tracheæ of many insects taper gradually like branches of trees, and their walls contain a spiral thread, closely coiled; but some have minutely sacculated tracheæ interspersed with large tracheal pouches that may be likened to the air-cells of birds.

Circulation.

The circulation of the fluid taking the place of blood is effected by a pulsating vessel in

the form of an elongate tube with valves, placed in the upper portion of the body and extending to the thorax. It is called the *dorsal vessel*, and fulfils very much the function of the heart in the Vertebrata.

Sex. Although in communities of social aculeate, Hymenoptera (Bees, Wasps and Ants) and the social Neuroptera, called Termites or White Ants, the species is represented by males, females, and one or two other forms termed collectively neuters (viz., large and small workers in the former, and soldiers and workers in the latter order); and although specimens recorded as hermaphrodite are of occasional occurrence in most orders, every individual insect is essentially uni-sexual—either male or female. For neuter wasps and bees are females reared in a manner that produces ovarian atrophy, while the sting and other external pecularities of the sex remain in evidence, and stingless neuter ants possess the poison glands, the antennæ and the abdomen of the female. An hermaphrodite insect is never, like a snail, potentially bi-sexual, but is an individual specimen with internal organs of one sex and some external sexual features of the other. Symbols often used to denote sexual conditions are, ♂ male, ♀ female, ☿ neuter, and ⚥ hermaphrodite.

Reproduction. The great majority of insects are produced

from eggs that have been fertilised, laid by the adult female. The young insect emerging from the egg, sexually immature and differing morphologically from its parents in a small or great degree, attains its full stature and adult form, while the parts concerned with reproduction are also in course of development, during a series of moults of the integument termed *ecdyses* (casting off of a covering) varying in number with the family. The periods of its life between the successive moults are termed *instars* (instar, *a form*) by some modern authors, and referred to singly by numbers according to their places in the sequence, or by a term specifying the particular stage of life, *e.g.*, the third larval instar, the pupal instar, and so on.

Incomplete metamorphosis.

The changes in outward form through which an insect passes after its birth, prior to becoming adult, are called metamorphoses. They differ in amount according to the degree of morphological development reached by the animal at the time of its exclusion. If this be relatively forward, the remaining alterations needed to perfect the form, already roughly modelled upon the lines of the adult, are increase of stature and finishing touches, as it were, in minor detail, involving perhaps the development of wings and finally the loss of temporary organs peculiar to early stages of life. Changes so small are said to con-

stitute an incomplete metamorphosis. Sexual maturity is not always attained exactly at the same moment as perfection of the outer frame; thus the pairing of Dragon-flies does not take place until they are several days old; but on the other hand nymphs of Grasshoppers very commonly give proof of individual sexual precocity.

Nymph.

Nymph is a term applicable to the young of insects with incomplete metamorphosis; but the word is often used to denote those stages of the metamorphosis during which the wings are undergoing development and are immoveable, the preceding stages being distinguished as larval. Hardly anything is gained in precision by this distinction, since the growth of the wings commences almost imperceptibly and extends over several instars.

Subimago.

In Ephemeridæ, nymphs (at the conclusion of their last stage) rise to the surface of the water to moult, and there give issue to the winged flies; but these, although capable of flying, are not the perfect insects, being covered by a thin hairy integument which is shed at the last. The condition of the fly before this final moult takes place is termed *subimago*.

Complete metamorphosis.

Complete metamorphosis is undergone by insects whose morphological development at

birth has not arrived at the stage of appreciable likeness to the adult form. The young, emerging from the egg, shed their skins at different stages of growth, and with many exceptions are active and voracious, growing in bulk with little alteration in form until the interior sexual parts are well advanced. Then comes a transformation, introducing a stage of repose and total cessation of feeding, during which the viscera and all internal organs receive their final modifications in structure and arrangement, and the outer frame of the perfect insect is fully developed, preparatory to the next moult, which is the last, when the insect effects its transformation into the fly.

Larva, pupa, and imago.

The terms *larva* (mask), *pupa* (effigy, or doll), and *imago*, distinctive of the three principal phases of transformation through which an insect having a complete metamorphosis passes in its development from the egg, were originated by Linnæus, who considered that the animal was masked in the larva (some of the parts of the adult fly being distinguishable beneath the skin in the later larval instars of Lepidoptera), and because the features of the moth or butterfly are discernible in the integument of the quiescent pupa. The alternative terms *chrysalis* and *aurelia*, applicable to the pupa, were suggested by the golden colouration at this stage of certain common species

of butterflies. Many pupæ are enclosed in cocoons spun of silk, or otherwise constructed by the larvæ, after ceasing to feed, in their last stage. In Caddis-flies (Trichoptera) the pupa, at first quiescent, becomes active, and swims to the surface of the water to effect there the final transformation. Flies of one of the chief divisions of the order Diptera have pupæ that are termed obtected, or mummy-pupæ. The last larval integument, instead of being shed, is converted into a smooth, hardened envelope enclosing the pupa. No trace of limbs or segmentation is visible on the outside; a circular piece at one end becomes detached like a lid when the fly emerges. Diptera of the family Hippoboscidæ, to which the Camel-fly and Forest-fly belong, instead of eggs produce full-grown larvæ that moult, and eventually become obtected pupæ; hence they are termed pupiparous.

The series of metamorphoses through which an insect passes generally terminate in a form specifically identical in appearance with its parent; but to this there are exceptions. It has been found that in some of the Gall-flies (Hymenoptera) from eggs laid in autumn a brood, exclusively female, is bred in the following spring, and the issue matures in the ensuing autumn and is bi-sexual; the *agamic* (unmarried) spring-fly is so different from the autumnal

bi-sexual fly, and their galls so dissimilar, that before their life-history was known they were ranked apart in different genera. Analogous differences are sometimes observable in the markings of moths that have more than one brood in the year, but only sufficient to have caused them to be reckoned different species.

Parthenogenesis, or reproduction by virgins without sexual concurrence, in addition to the above instance of Hymenopterous Gall-flies, has been observed in the summer broods of plant-lice (Aphides), a succession of several viviparous agamic generations starting from the issue of eggs laid by females that have paired, and ending in autumn with a bi-sexual brood to recommence the cycle.

Classification.

Since the time of Linnæus a considerable number of methods of classification of insects have been devised. Many of these schemes are only of historical interest, and no useful purpose would be served by passing them here under review. Natural relationships cannot be fully shown by a straight line, and therefore the mention of the several recognised orders seriatim does not very adequately give expression to their affinities. The leading principles of modern systems concern metamorphosis and morphology, the latter with more particular regard to the mouth and wings. Given the main grouping of the Orders, it matters little

which of them is mentioned first or placed highest in the page. The table of classification of Hexapod Insects, in outline, facing this page, has been prepared by the Rev. A. E. Eaton for the assistance of the reader.

In the Chapters of this Part dealing with the flies of special interest to the angler, the sequence in ascending order, if arranged in strict Zoological succession, would be—1, Ephemeridæ; 2, Perlidæ; 3, Sialidæ; 4, Trichoptera; and 5, Diptera. I have, however, arranged them according to what may be deemed the comparative importance of the families, &c., to the fly-fisherman desiring to study this branch of entomology. Thus Chapter I. deals with the Ephemeridæ, Chapter II. with the Caddis-flies (Trichoptera), Chapter III. with the Stone-flies (Perlidæ), Chapter IV. with the Alder (Sialidæ), and Chapter V. with the Diptera and other insects serving as food for the Salmonidæ in the rivers.

CHAPTER I.

EPHEMERIDÆ.

THE Ephemeridæ, or, in other words, the Duns, Spinners and Mayflies, seen floating on the surface of the stream, constitute beyond doubt the most fascinating family of insects for the dry-fly fishermen. It must not, however, be imagined that they represent any important proportion of the food required for the sustenance of the fish. As pointed out in the Introduction, even in streams where insect life abounds, trout feed freely on younger members of their own species and on minnows, stoneloach, bullheads, and lamperns, while both trout and grayling are partial to such crustaceans and mollusks as fresh water shrimps (*Gammarus pulex*), water wood-lice (*Asellus aquaticus*), crayfish (*Astacus fluviatilis*), the various bivalves, snails, &c. Then, too, the Caddis (larvæ of the Trichoptera), the larvæ of the Ephemeridæ, of the Alder and of numerous water-bred and other Diptera, all go to swell the variety and bulk of this heterogeneous diet. When Mayflies or smaller Ephemeridæ in the winged form are plentiful, and when the

fish (as they occasionally will be) are feeding on them with avidity, they will no doubt take and swallow an incredible number, yet it is surprising into how small a space flies are compressed when once in a fish's stomach.

Identification of Ephemeridæ.

When a fisherman by the river side has carefully studied an insect that he has just taken off the water, and which he believes to be the fly on which the fish are feeding, how is he to decide whether it is or is not one of the Ephemeridæ? For the purpose of illustration the accompanying block (fig. 2),

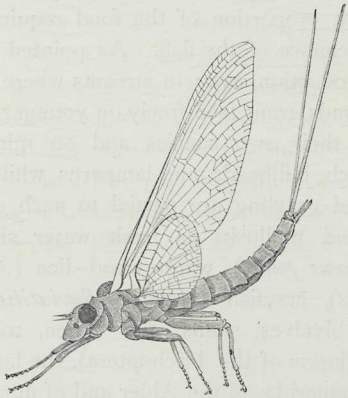

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FIG. 2.

an outline sketch of a March Brown or sub-imago of *Ecdyurus venosus*, is given. The fly

is shown in profile, with the wings erect, such being the position in which it will be seen under normal conditions floating on the water, or resting on a blade of grass or sedge. It may here be noted that entomologists usually show insects laid flat with their wings extended, their antennæ, legs, setæ, &c., arranged so that all the parts can be plainly seen. Following this plan the majority of the plates of flies and their larvæ are thus drawn in this book, but in addition an outline drawing of one example of each family is given in the natural position as a type.

The first points which will strike the student as assisting him in the identification of the family will be the erect position of the wings, the taper and curve of the body upwards towards the tail, and the presence of two or three thread-like tails, which are called *setæ* or *caudal setæ*. In the case of the March Brown there are two, but in some other genera three setæ. These matters of detail, however, will be dealt with under the names of the various flies. If the specimen is examined more closely under a small lens or magnifying glass, the following features will be discovered :—

Head.

The head, generally wider than its length, has apparently no mouth organs, and the antennæ which are attached to it are insig-

nificant and composed of three joints, of which the first two are short and stout, and the third comparatively longer and tapered to a point. The Rev. A. E. Eaton describes the third joint of the antennæ as "a slender, many-jointed setaceous awn," but with the ordinary hand magnifying-glass the articulation of this joint is invisible.

Eyes.

The eyes, of which there are invariably five, are of two sorts — compound eyes (*oculi*) and simple eyes (*ocelli*). The compound eyes are reticulated or faceted on the surface, *i.e.*, made up each of a considerable number of lenses, and the simple eyes are smooth. There are invariably two large compound eyes on the sides of the head, and, to quote Eaton, "The *oculi*, always much larger in the male than in the other sex, are in him, in some genera, divided each into two parts transversely ; the upper portion has larger facets than the lower, and is sometimes differently coloured. The division between these segments of the oculus may amount to nothing more than a mere superficial furrow or impressed line traversing the faceted surface horizontally ; but when it is deeper the upper part of the oculus (always much the larger of the two) assumes a short sub-cylindrical or turbinate form, faceted only on its summit, and supports on

its outer base the smaller division, which is oval, and is faceted all over."

The *ocelli*, or simple eyes, are in all genera, and in both sexes three in number, the two hinder ones between the compound eyes; and the foremost one, which is situated midway between the antennæ, is in some genera carried on a conical stem.

Thorax.

The *thorax*, as usual, is divided into three segments, the *prothorax*, *mesothorax*, and *metathorax*, of which the first is generally short, the second large, forming the greater portion of the thorax, and the third insignificant.

Abdomen.

The *abdomen*, or body, composed of ten segments, tapers from the thorax to the tail end, and, when the fly is on the water or at rest on the herbage, is curved upwards posteriorly. It is cylindrical in form, smooth on the surface, flexible at the joints, and at the last joint carries the tails or *caudal setæ*. These setæ, of which there are three in some genera, in others two, with or without the rudiment of the third, or median one, are long, tapered, and made up of a great number of joints, and more or less fringed with hairs. In the females the oviducts terminate at the junction of the seventh and eighth segments. The males are provided with a pair of forceps placed ventrally at the extremity of the ninth or penultimate

segment of the abdomen. Great stress is laid by Eaton on the form of these forceps, and the identification of the species as named by him is largely dependent on their shape.

Wings.

The wings are usually four in number—two large fore wings and two very small hind wings. In some genera the latter are absent, and in all cases they are very small as compared with the fore wings. The fore wings are almost triangular in form, rounded off at the upper extremities, and are relatively longer in the female than in the male. The wing membrane is usually glassy and iridescent in the imago, and covered with short spine-like hairs in the subimago, at which stage the posterior margin of the wings is closely fringed with short hairs. The neuration of the wings is strongly marked, and is an essential feature in determining genera and sometimes species. The fore wings are appended to the sides of the mesothorax and the hind wings to the metathorax.

Legs.

The legs, six in number, are attached, one pair to each segment of the thorax. The fore legs are always longer in the male than in the female, and in the genera here dealt with are invariably longer than either of the hinder pairs. In the imago stage the excess of length in the fore legs of the male is greatly accentuated.

The foregoing description should be sufficient to enable the fisherman to identify a winged

insect as one of the Ephemeridæ. When dealing hereafter with the particular forms likely to be found on an ordinary trout stream, these general features will not be recapitulated, but attention will be drawn to variations, or to the points to be specially noticed as indicating different genera or different species of the same genus.

METAMORPHOSES AND HABITS OF THE FAMILY.

Oviposition.

The metamorphosis of the Ephemeridæ is incomplete. The stages consist of the ovum or egg, larva, nymph, subimago, and imago. The eggs are laid in the water, and by some members of the family are extruded *en masse*, in which case they are rapidly separated by the action of the water; others "extrude them gradually, part at a time, and deposit them in one of the following manners, viz.: either the mother alights upon the water at intervals to wash off the eggs that have issued from the mouth of the oviducts during her flight; or else she creeps down into the water (enclosed within a film of air, with her wings collapsed so as to overlie the abdomen and with her setæ closed together) to lay her eggs upon the underside of stones, disposing them in rounded patches, in a single layer evenly spread, and in mutual continuity" (Eaton).

After laying her eggs she floats to the surface and flies away, unless perchance her setæ or wings have become sodden, in which case the brief remnant of her life is sacrificed to her care for the next generation. Every observant fisherman has at times, when wading, been surprised to find a number of spinners crawling up his stockings and brogues. Doubtless these are the females striving to regain the surface after depositing their eggs in the manner just described.

Larvæ.

Eaton employs the term "nymph" to designate all the stages in the development of insects with incomplete metamorphosis after they are hatched, preceding the adult in apterous forms, and in others all up to the stage at which the wings first become capable of being used in flying or acquire mobility. He would use the term "pupa" exclusively in connection with those having complete metamorphosis, objecting to the promiscuous application of "larva and pupa" because they do not indicate any precise epoch of particular importance in the life-history of other orders. In fact, as far as the term "pupa" is concerned, since it points to a quiescent or dormant period, it is not strictly applicable to the young of the Ephemeridæ; but, inasmuch as it has been customary for many years among fly-fisherman to speak and think

of the wingless grades as "larvæ," and those showing the rudiments of the wing-covers as "nymphæ" or nymphs, I propose to adopt these names henceforth as likely to be more easily understood than unfledged or wingless nymphs and winged nymphs.

The larvæ inhabit the water, and in shape resemble generally the mature insect, except, of course, in the absence of the wings. They are all provided with three ciliated caudal setæ, and their mouth organs are fully developed, as at this stage they require and take a great quantity of food. Many kinds generally subsist on mud or minute aquatic vegetation; but, judging from their formidable mandibles and the construction of their fore-legs, some must be carnivorous and predaceous. They are all provided with tracheal branchiæ, varying in form, position, and number in different genera. These branchiæ are arranged in pairs on seven or fewer of the foremost segments of the abdomen; and their function is considered to be the change of carbonic acid, introduced into the air contained within the tracheal system from the fluid that serves as blood, for oxygen held in solution in the surrounding water.

Nymphs.

When rudiments of wings become visible, the immature Ephemeridæ are called *nymphs*, and the fact that externally there is no other

apparent difference between the larva and the nymph certainly lends weight to Eaton's determination to designate all their subaqueous stages by the name of nymph.

Pictet's classification of the larvæ.

Pictet, in his masterly monograph on the "Famille des Ephémérines," classifies the larvæ and nymphs in four divisions: (1) *Larves fouisseuses*, or digging larvæ; (2) *Larves plattes*, or flat larvæ; (3) *Larves nageuses*, or swimming larvæ; and (4) *Larves rampantes*, or crawling larvæ. Although these divisions do not correspond with the natural grouping of the genera of Ephemeridæ, and do not embrace every form of nymph (Pictet having only a limited number under observation), yet for the purposes of easy identification of the immature insects they will commend themselves to the fly-fisherman.

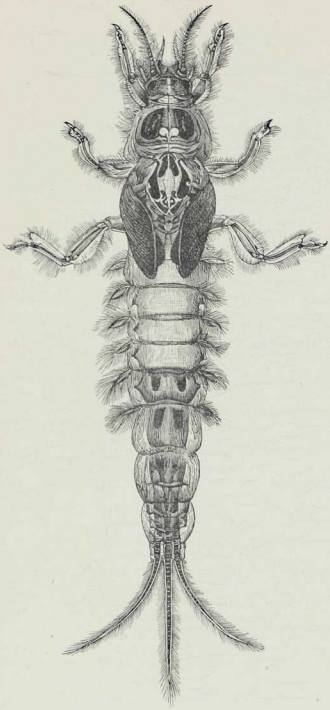
The digging larvæ.

The digging larvæ are so called because as soon as they are hatched they burrow into the mud or clay and form tubular galleries in which they take shelter. The work of constructing these retreats is carried out by means of their mandibles and powerful fore-legs. It is said that these burrows, although somewhat larger in diameter than the larvæ themselves, are not sufficiently roomy to allow the nymphs to attain their full growth in them, and that from time to time the insects, as they grow, construct other larger

PLATE I.

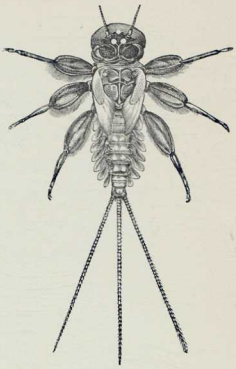
EPHEMERIDÆ NYMPHS.

FIG. 1



× 3

FIG. 2



× 3

FIG. 3

× 3

FIG. 4

× 3

FIG. 5

× 3

galleries. They swim with difficulty, and therefore frequent comparatively still waters. Their branchiæ are in the form of a number of convergent filaments or threads or fringed leaves. The genus Ephemera, which includes the Mayflies, is the type of this division, and a reference to Plate I., fig. 1, will give the angler a sufficient idea of their general form and appearance for recognition at sight. The life of these insects, from the egg to the imago, is not less than two, and possibly extends to three years.

The flat larvæ.

In the flat larvæ, as their name indicates, all parts of the body are flattened out and broad in proportion to their length. This flat shape enables them to cling closely to the underside of stones, where they are usually found; but does not lend itself to digging, in which they do not indulge. They are better able to swim than the larvæ of the preceding division, the thin form of their bodies causing them to be less affected by the current, and their flattened legs serving as fins; and with these characteristics it is not surprising to find that they frequent rapid stony streams. They are said to be carnivorous, and the length of their life, from the deposition of the egg to the appearance of the perfect insect, is considered to be ordinarily one year. The type of these larvæ is the genus Ecdyurus, to which the March

Brown belongs, and the shape and general characteristics of the nymph are illustrated in Plate I., fig. 2. These larvæ are not plentiful on the south county chalk streams, which, considering the class of water they frequent, is not surprising.

The swimming larvæ.

The swimming larvæ differ materially from both the foregoing; they are cylindrical and attenuated in form, with thin, feeble legs. Their most distinctive character is the presence of strong hairs, closely fringed horizontally on both sides of the setæ, which thus serve as a caudal fin or propeller. They cannot dig, nor are they of a convenient form for lurking beneath stones. In swift streams they do not remain in foaming shallows, but prefer rippling or gently flowing water, where they ramble at large over the stones or gravel, or live among the vegetation. In all chalk streams they are found in great numbers whenever the weeds are examined.

The most remarkable feature of swimming larvæ is their mode of progression; their legs are too weak to allow them to run rapidly in the water, and out of it they have difficulty in progressing at all, jumping aimlessly about with curious wriggling movements of the body; but they can swim and steer themselves fairly well. Their duration of life is probably one year, although it is open to doubt whether with

some of them there are not two broods in the year. The type of these larvæ is the genus Baëtis, to which the Olive Duns, Iron Blue Duns, and two of the species called by anglers Pale Watery Duns, belong. The nymphs of the genus Centroptilum, in which the other Pale Watery Duns are included, are also of this type. One of the nymphs is shown in Plate I., fig. 3.

The crawling larvæ.

The crawling larvæ are thus described by Pictet: "The larvæ belonging to this division have been the worst treated by nature. Unprovided with the powerful mandibles and the solid fore-legs of the digging larvæ, having neither the strength of the flat larvæ nor the caudal fin of the swimming larvæ, they are altogether feeble and have slender legs." He goes on to say that their movements are slow, and, being unable to dig, they could not escape from their many enemies unless they made up for their deficiency of strength and agility by their cunning. Larvæ of this type live in streams or parts of streams where the current is moderate, and in swift rivers inhabit the slack water along the banks. The gravelly bed being coated with a thin layer of mud, they cover themselves with *detritus* and are almost invisible; and even when desirous of examining them it is not altogether easy to remove the mud with a fine brush.

Thus hidden, they escape their enemies, and are in a favourable position to lie in wait for the smaller insects on which they prey, the capture of which, but for such concealment, would probably be difficult, in consequence of their slowness. The type of this division, the genus Ephemerella, of which the Blue Winged Olive is the prominent species, is shown in Plate I., fig. 5.

The newly-hatched larvæ.

According to the Rev. A. E. Eaton, the newly-hatched larvæ "are destitute of any visible muscular, nervous, circulatory or reproductive system; their alimentary canal is incomplete, and, being too small to require special breathing apparatus, they respire through the integument at large. During the first few days after their birth the young cast their skin several times, the intervals between the moultings lengthening by degrees (Lubbock). The abdomen is nine-jointed, and the antennæ and caudal setæ have likewise fewer articulations than those of the more advanced nymphs. Blood globules and rudiments of the trachea branchiæ begin to appear simultaneously when the insect is eight or ten days old."

A reference to Plate V., Blue Winged Olive (*Ephemerella ignita*), is recommended. In this illustration fig. 1 is a magnified view of eggs hatching and a larva emerging, drawn from specimens hatched in captivity, and fig. 2 is a

view of one of the same larvæ at the age of three months. The development generally, the presence of the branchiæ in fig. 2, and their absence in fig. 1, go far to confirm the observation quoted.

Development of the nymph.

Eaton also states:—"Adolescence is evidenced by the advancement towards maturity of the reproductive organs internally, and externally by the out-growth of rudimentary wings from the hind borders of the proper segments. The forceps of the male also begin to bud forth, and in certain genera an extension of the apical integument of the penultimate ventral segment becomes perceptible in the female." Growth and development thus proceed until the nymph has attained to its full size and is ready for change to the subimago. If a nymph is examined when ready for this metamorphosis, the subimago will be seen within the nymphal skin—its head, thorax, abdomen, legs and caudal setæ plainly visible and perceptibly smaller than the corresponding limbs and members of the nymph in which they are enveloped, The curious folding of the wings within the wing covers, and the absence in the subimago of mouth organs, branchiæ, and, in some genera, of the central caudal seta, present so striking an appearance that at Plate I., figs. 1 and 4, nymphs are shown at this stage.

Change from nymph to subimago.

The creature is now ready to undergo the great change from a subaqueous nymph to the winged subimago. It accordingly swims upwards through the water, and, if it has calculated its movements accurately, arrives at the surface just before the metamorphosis. Its entire body is inflated, and the external integument distended, until at length it splits along the back of the thorax. First the thorax and then the head is pushed out through this slit in the outer skin. Then the legs are disengaged, and next, just before the abdomen and setæ are quite free, the wings, one at a time, are withdrawn from their covers and quickly unfolded. The winged insect supports itself on the cast nymphal skin or on the water until its wings are dry, and then flies ashore to seek the friendly shelter of grass, rushes, sedges, or even trees.

The above is the normal order in which the various parts are withdrawn from the nymphal shuck, but this, in individual cases, is subject to variation. Sometimes a change in the procedure is fatal to the individual; thus not infrequently subimagines are found dead, or nearly dead, on the surface of the stream, with their wings erect and the nymphal envelope still enclosing the abdomen and setæ. Some have one wing erect and the others still folded in the wing cover, and others again are free

with the exception of two or three of their legs, which they have failed to disentangle from the cast skin.

In places where the current is moderately strong, the change to subimago can only be performed in this manner by active species, such as the digging and swimming larvæ, with supple bodies. Other species with comparatively stiff and horny bodies, and frequenting rapid portions of streams, are unable to do this, but are obliged to find a dry place on stones, where they fix the claws of the nymph and there effect the metamorphosis much in the same way as some Trichoptera and Perlidæ, which will be introduced in subsequent chapters.

The subimago

The following is a translation of Pictet's brief but expressive description of the subimago: "The winged insect which appears as the result of this operation has not yet arrived at the perfect state; it is still enveloped in a semi-opaque skin, which dims its colour, hampers its flight, gives its wings a grey and dull appearance, and its legs and caudal setæ are often of smaller dimensions than they attain later on. It has yet to cast off this covering."

Eaton says of it: "The term 'subimago' is used to denote the penultimate stage of such of the Ephemeridæ (the large majority of them) as moult once after direct respiration through the stigmata has been established and their

wings have become fully expanded. The chief points whereby insects in this condition can generally be distinguished from adult examples are—the dulness of the integuments, especially that of the wings ; the ciliolate terminal margin of the wings in many genera ; the brevity of the forelegs ; the greater hairiness and shortness of the caudal setæ ; the less protuberant and less brightly-coloured oculi ; and, in the male, the marked shortness and stoutness of the forceps. The term 'Pseudimago,' employed by a few authors instead of 'Subimago,' is an etymological solecism derived from two words belonging to different languages."

It may be noted that this intermediate stage between the pupa or nymph and imago exists only among the Ephemeridæ—although Packard notes something analagous in Humble Bees. Generally, the angler can recognise the subimago by the surface of the wings being covered with short spiny hairs and the lower margin of them closely fringed with longer hairs. The movement of the subimago through the air is slow and heavy, and its usual tendency is to make a short flight to the safe shelter of herbage, bushes, or trees.

Change from subimago to imago.

After a certain lapse of time, varying in different genera and species and largely dependent on temperature, the subimago arrives at the period of its existence when the last change

is to take place, and something analogous to the metamorphosis of the nymph happens. The skin, once more distended, splits along the back of the thorax, and then the head, the legs, the abdomen, the caudal setæ, and lastly the wings, are disengaged. The entire subimaginal envelope retains its shape, with the exception of the wings, which collapse, and so the skin has very much the appearance of the nymphal exuvium.

The imago.

The imago or perfect insect is the stage from which the family name of "Ephemeridæ" is derived; for in the species known as Ephemera to the ancients *(Palingenia longicauda*, *Polymitarcys virgo*, and perhaps *Oligoneuria rhenana)* the life of a fly is limited to a single day. This is not the case with those of the genus now bearing the name, for I have kept specimens alive for five or six days, two or three in the subimago stage, and the remainder in that of the imago. Eaton says that there is a tradition of a female Cloëon having been kept alive for three weeks. Data derived from experiments with Ephemeridæ in captivity are not reliable, as no doubt the prevention of reproduction tends to lengthen their life. It may, however, be taken as proved that the duration of life in the imago state is prolonged by cold, and shortened by hot weather.

Habits of the imago.

The adult Ephemeridæ by day generally seek shelter from the sun, but sometimes disport themselves high in air with the swallows and swifts; the clouds of these insects seen engaged in a dance-like up and down motion are always males. Their flight, as regards many genera, is thus described by Eaton: "A fluttering, swift ascent and then a passive, leisurely fall, many times repeated. The body, during the rise, is carried in a position very little out of the perpendicular, with the legs extended upwards in advance, and the setæ trailed behind. During the descent the body, less steeply inclined, is steadied by the half-spread motionless wings and the outstretched setæ and legs. They couple during flight, the male lowermost. Darting at his mate from below, and clasping her prothorax with his elongated fore tarsi, he bends the extremity of his body forwards over his back, grasps with his forceps the hinder part of her seventh ventral segment, and with his outer caudal setæ embraces her sixth segment. Meanwhile the couple gradually sink, the female not being quite able to support herself and mate, and by the time they reach the ground their connection is usually terminated." The male flies away to resume his interrupted dance, and, being prone to polygamy, seeks a new mate. The female,

after some time, lays her eggs as previously described.

Pictet points out that it must not be forgotten that the true life of the individual is in the larval state, and that the imago only exists to perpetuate the species. Hence their life is long in the immature or larval stage and short in the perfect state. Morning and evening are the portions of the day in which they are most numerous, and Pictet says that in Switzerland they do not appear in great numbers while the wind is in the north. It may appear to be presumption on my part, but I feel it right to state that, in my English experience, the exact opposite prevails. All the greatest hatches of duns I have seen have been on the river Test during north or north-easterly winds. Pictet lived on the north coast of a lake.

Of the enormous numbers of Ephemeridæ seen on favourable days every angler has experience, but perhaps the statement of Scopoli will be accepted with some slight reservation. According to Pictet "L'auteur que je cite dit que, près du lac Laz, il nait au mois de Juin une si grande quantité de *l'Ephemera vulgata*, que les paysans regardent comme une faible recolte de pouvoir conduire sur leur champs vingt chars bien chargés de ces insectes, qui forment un excellent engrais."

However, it is a fact that the "Hungu" cake of Central African markets is made of Cænis and midges of the lake pressed together and dried.

OLIVE DUNS AND SPINNERS.

The Olive Dun is placed first on the list of the Angler's Ephemeridæ, because it is, perhaps, the most widely distributed and best known of the family. Then, too, it is present on streams of all sorts and in all parts of the British Isles. It has been seen in numbers in the Vosges, the lowlands of Switzerland, the Tirol, Corsica, and most of the European countries, as well as Madeira, and it is common in Algeria. I have seen good rises of Olive Dun on the Test in March, when prospecting for the earliest trout fishing, and on the same river in December I have seen the grayling taking them greedily while the trout were spawning. The term "dun" is applied by fishermen to the smaller Ephemeridæ in the subimago stage, and the expression "spinner" is used to denote the imago stage of the same genera of insects. Under the heading of smaller Ephemeridæ all members of this family, except the Mayflies and March Brown, are included.

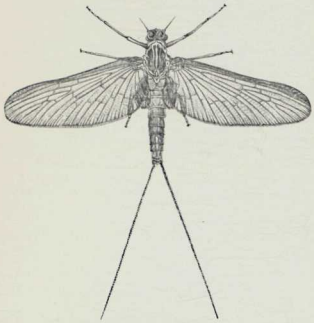
Description of larva.

The Olive Dun, with several other angler's flies, belongs to the genus Baëtis. This genus

PLATE II.

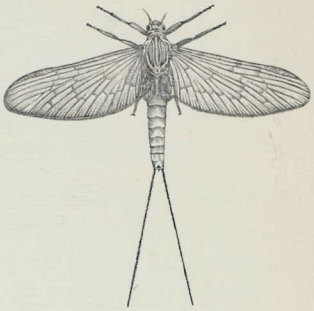
OLIVE DUNS & SPINNERS.

FIG. 1



× 3

FIG. 2



× 3

FIG. 3

× 3

FIG. 4

× 3

FIG. 5

× 10

FIG. 6

× 10

is one of the group proceeding from the *larves nageuses*, or swimming larvæ of Pictet. The following is part of Eaton's description :—"Abdominal tracheal branchiæ, all somewhat alike in form, each obtusely ovate or obovate, and traversed lengthwise by a pinnately-branched, irregularly sub-divided trachea. Antennæ about as long as the head and thorax together. Outer caudal setæ about $\frac{3}{4}$ as long as the body ; median seta commonly $\frac{3}{8}$ as long as it ; the fringes narrowed acuminately to the extremities of the setæ." These details, with a reference to Plate I., figs. 3 and 4, should enable the student to identify the larvæ. He must expect to find them in moderately rapid portions of the stream, among stones, weeds, or other vegetation.

The winged forms have two caudal setæ, and the males have the compound eyes divided as described at p. 36, with the upper portion of a turbinate form, faceted only on the summit. The fore-wings of this genus are remarkable for the small number of cross nervures, and the hind wings are small, with blunt, oval tips.

Scientific names.

The Olive Dun and its spinners, male and female, belong to one of five species of the genus Baëtis, viz. :—B. vernus, B. rhodani, B. atrebatinus, B. tenax, and B. buceratus. Of these the last three, being comparatively rare, are excluded from our list. B. vernus and

B. rhodani are widely distributed and common, and, as they differ chiefly in the form of the forceps of the male, and are not easily distinguished apart, even by the most experienced entomologists, they may be treated here as a single species. Baëtis vernus is not described by Pictet; but he describes and figures B. rhodani under the name of Cloë rhodani.

Description of the Olive Dun.

Eaton's description is as follows:—"*Subimago* (*living*): Wings, either cinereous or dark brownish grey, with greenish grey neuration. Fore-femur greenish grey, with a dark crescentic spot, or an ill-defined light grey spot, before its distal extremity; the tibia light sepia grey; the tarsus dull black; hinder femora light greenish or yellowish white; the tibiæ greyish white; the tarsi dull black; setæ greenish grey, with reddish or warm sepia brown joinings." A reference to Plate II. is now recommended, figs. 1 and 2 showing respectively the male and female subimago.

To assist the fisherman in identifying his specimen the accompanying block (fig. 3), representing one of the hind wings and its nervures, is given, and I would add that the Olive Dun has two caudal setæ; the wings are of a dull grey; the body and legs of an undefined olive tint, neither yellow, nor brown, nor grey, but par-

× 10
FIG. 3.

taking of all these colours. The wing of a large female measures about ·4 of an inch, and that of a male about ·35 of an inch in length. The body of the female, from the head to the last segment of the abdomen, measures about ·35 of an inch, and of the male about ·3. The measurements of different specimens of the same species and genus, if bred in waters alike in climate and character, do not vary greatly. It must be remembered that all winged insects are adults, and the growth of the individual takes place entirely in the larval and nymphal states.

Male spinner.

The spinner of the male Olive (Plate II., fig. 3) has a nearly black head and thorax, with brown red turbinate eyes. The appearance of the head and eyes in profile is also given in Plate II., fig, 5. The six first segments of the body are a very pale and transparent greenish grey, and the remaining four segments at the hinder end of the body a rich brown; the legs are pale olive grey, and the caudal setæ very pale grey, nearly white. The wings are transparent, with faint yellowish grey nervures. The form of the abdominal forceps is shown in Plate II., fig. 6. Altogether it resembles the Jenny Spinner, or spinner of the male Iron Blue Dun; but it can be readily distinguished by the greenish tint on the transparent portion of the body

(which in the Jenny Spinner is translucent white), and by its being altogether a larger insect; also by the nervures of the hind-wings.

Female spinner.

The spinner of the female Olive (Plate II., fig. 4) has transparent wings similar to those of the male, the thorax brown becoming darker, and the body a dead gold colour at first, but also becoming darker and browner, probably from exposure to light. The legs are pale brown olive, and the setæ very pale grey.

PALE WATERY DUNS AND SPINNERS.

The Pale Watery Dun is a fly which appears on the water about the middle of May and continues during the mild weather until well towards the autumn. There are four species of natural flies called by this name, two of the genus Baëtis:—B. binoculatus and B. scambus, both of which are plentiful in the majority of trout streams; and two species of the genus Centroptilum:—C. luteolum and C. pennulatum, of which the former is the more generally distributed. The Pale Watery Dun may therefore be considered as one of four insects, viz.:—Baëtis binoculatus, B. scambus, Centroptilum luteolum and C. pennulatum; and for all practical angling purposes need not be further identified.

For the more advanced student, however,

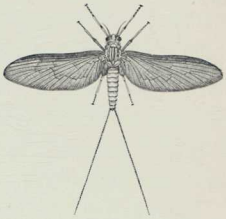
PLATE III.

PALE WATERY DUNS & SPINNERS.

FIG. 1

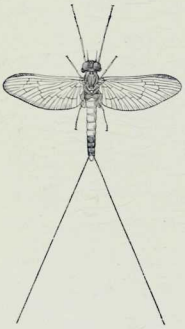
× 3

FIG. 2



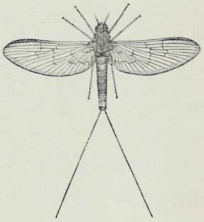
× 3

FIG. 3



× 3

FIG. 4



× 3

FIG. 5

× 10

FIG. 6

× 10

the differentiation of these flies can be effected by reference to the hind wings. The hind wing of B. binoculatus (fig. 4) is broad and obtusely rounded, and the hind wings of the two species of Centroptilum are spur-shaped, the etymology of the word being κεντρωτος a spur, and πτιλον wing. The hind wing of C. luteolum (fig. 5) is acute at the tip, and that of C. pennulatum (fig. 6) is obtuse at the tip. The larvæ and nymph of Centroptilum are very similar to those of the Baëtis, and like the latter are included under Pictet's division of *larves nageuses.*

× 10
FIG. 4.

× 10
FIG. 5.

× 10
FIG. 6.

Subimago.

The following is the description of the Subimago: Wings, pale grey; Legs, very pale greenish-grey; Body, a pale lemon-grey; Setæ, pale greenish-olive. The wing of a female measures about ·27 of an inch and of a male about ·25, and the body of the female, from the head to the hind end of the abdomen, about ·27, and that of the male about ·25 of an inch. Plate III., fig. 1, shows the male, and fig. 2 the female. It will be noted that they are smaller and paler than the Olive Dun.

Male spinner.

The male spinner illustrated in Plate III., fig. 3, has transparent wings with pale yellowish nervures, the turbinate eyes of a pale yellow or

orange tint, the thorax a reddish orange, legs and setæ a delicate lemon grey, and all the segments of the body except the hinder three translucent white, these three segments being orange. The colouring of the turbinate eyes, thorax, and hinder segments of the body will prevent this fly from being mistaken for the spinner of the male Olive Dun. Plate III., fig. 5, shows the head in profile with turbinate eyes, and fig. 6 the abdominal forceps.

Female spinner.

The female spinner in Plate III., fig. 4, has transparent wings like the male, with body, legs and setæ of a golden colour, getting darker with age. It can be distinguished easily from the spinner of the female Olive Dun, being smaller and generally paler in colour. In case of doubt, however, if the specimen is B. binoculatus it can be identified by a careful examination of the nervures of the hind wing, and if it is either of the species of Centroptilum the difference in shape of the hind wing is so marked as to prevent misapprehension.

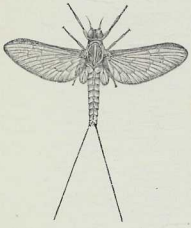
Scientific names.

In Pictet's book Baëtis binoculatus is called Cloë bioculata, Centroptilum luteolum is styled Cloë translucida, and C. pennulatum is not named or described. The plates of Pictet's Cloë bioculata are very good, and give a quantity of detail of structure, both of the nymph and the adult insect; all of which is commended to the careful study of the fisherman

PLATE IV.

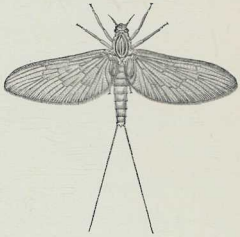
IRON BLUE DUNS & SPINNERS.

FIG. 1



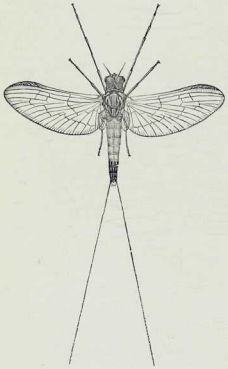
× 3

FIG. 2



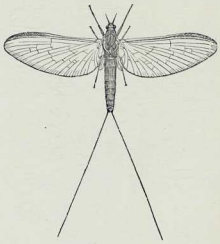
× 3

FIG. 3



× 3

FIG. 4



× 3

FIG. 5

× 10

FIG. 6

× 10

desirous of pursuing the subject beyond the limits of this work.

IRON BLUE DUNS AND SPINNERS.

Wherever the Iron Blue Dun is found on the water it is of interest to the fisherman, not only because of its striking appearance, and the fact that it is usually plentiful in cold and inclement weather, when there is often a paucity of other small Ephemeridæ, but also because, wherever and whenever present, the fish seem to prefer it to any other dun. From the middle or end of April to the end of October it is more or less *en évidence*, and the imitations of it are too often neglected by the modern school of anglers.

Scientific names.

There are two species, both of the genus Baëtis, comprised under the name of Iron Blue Dun, viz. :—Baëtis pumilus and B. niger; they are both fairly plentiful, and as it is not easy even for experts to distinguish them, they may for all practical purposes be considered as one and the same insect. Pictet does not describe B. niger, but in the 5th Edition of Ronald's "Fly-fisher's Entomology" it is called Cloë diptera. B. pumilus is named by Pictet Cloë pumila, as he includes all the insects now classed under the genus of Baëtis among his Cloë. From the modern entomologist's point of view the

genus Cloëon, so named by Leach years in advance of Pictet's Cloë, consists of Ephemeridæ without hind wings, inhabiting stagnant water.

Iron Blue Dun. The following is the description of the Iron Blue Dun:—Wings, a blackish blue grey, legs and setæ greenish grey with dark grey tarsi, thorax and abdomen in the female of a purple grey and in the male of a greenish grey. Plate IV., figs. 1 and 2, show the male and female subimago. The shape and nervure of the hind wings (fig. 7) will assist in the identification of the species. The length of the wing of the female is about ·27 and of the male about ·25 of an inch, while the length of the body of the female is about ·27 and of the male about ·25 of an inch.

× 10

FIG. 7.

Male spinner. The spinner or imago of the male Iron Blue is called by anglers the Jenny Spinner. It has intense sepia or burnt umber brown turbinate eyes, thorax a deep brown, the fore segments of the body translucent white, and the three hind segments a deep red brown. The wings are transparent, and the legs and setæ white. Plate IV., fig. 3, is an illustration of it, and figs. 5 and 6 of the same plate show respectively the head and turbinate eyes in profile and the abdominal forceps. It can be distinguished from

the spinner of the male Pale Watery Dun by the colour of the turbinate eyes, thorax, and hind segments of the body; and from the spinner of the male Olive Dun by being a smaller insect and having the fore segments of the body white, and from either of them by the nervure of the hind wings.

Female spinner.

The imago of the female Iron Blue is a small claret spinner having transparent wings, thorax and body of a claret tint, legs and setæ a very pale grey, nearly white. It is illustrated in Plate IV., fig. 4. The colour of the body is so much darker and richer than in the female spinners of either the Olive Dun or pale Watery Dun, that it can scarcely be confused with either of them—besides which, the greater size of the Olive Dun and the nervures of the hind wings are sufficiently distinctive features to prevent any confusion of the species.

BLUE WINGED OLIVES AND SPINNERS.

A reference to Plates V. and VI., where various stages of the Blue Winged Olives and Sherry Spinners are shown, should convince the reader that there are far more details given of this insect than of any of the foregoing species of Ephemeridæ. This is due to my having had the advantage of the collaboration of a good friend, Mr. T. P.

Hawksley, in hatching the eggs, and attempting to rear the larvæ to maturity in captivity. Although, unfortunately, the experiment was a comparative failure, yet it has conveyed a mass of information which should be of service to the student. We certainly did succeed in getting a single specimen in the subimago stage, and are able to deduce from this, not quite as an established fact, but yet as fairly free from doubt, the statement that the life of the insect from egg to imago is approximately one year.

The first batch of eggs was taken on 18th July, 1887, and after many anxious, and sometimes despairing, examinations, the first larvæ hatched on the 8th February, 1888, and they went on hatching until the 27th of that month. It would be out of place here to treat of the embryology of the species as noted by Mr. Hawksley. Possibly, however, at some future date he may be persuaded to collate his notes, and publish them in book or pamphlet form, when they must infallibly prove of interest and advantage to students desirous of following up the subject.

Ephemerella eggs, larvæ and nymphs.

The genus Ephemerella, of which the Blue Winged Olive is the species ignita, belongs to the group classified by Pictet as *larves rampantes*, or crawling larvæ. The eggs, which are a blue green colour, are dropped

PLATE V.

BLUE WINGED OLIVE.

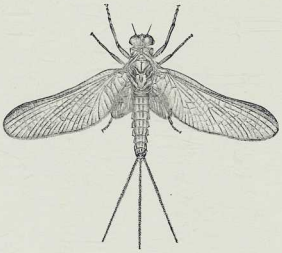
FIG. 1

× 30

FIG. 2

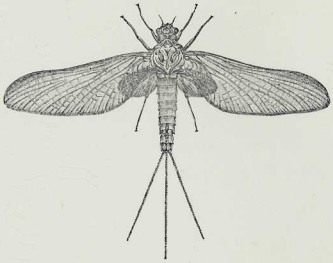
× 15

FIG. 3



× 3

FIG. 4



× 3

by the female imago in a round bunch. They sink to the bottom of the water, and adhere generally to stones on the bed of the river; they swell, and in time hatch. The appearance of the newly-born larva and eggs at this stage is shown in Plate V., fig. 1. The larva at the age of three months is shown in fig. 2 of the same plate, and the nymph in Plate I., fig 5.

The following is an abbreviated form of Eaton's description. Nymph latent under stones or among weeds. Body broadest at the metathorax. Abdomen plump, slightly convex beneath, and somewhat quadrangularly arched above in segments 2-9. This angularity is due to longitudinal protuberances, one on each side of the middle of the back, extending from segments 2-9. Tracheal branchiæ are borne by the segments 3-7, and diminish in size successively from the foremost, those of segment 7 being completely covered by those of segment 6, and hence not visible on the plate referred to. The foremost branchiæ are broad and obliquely quadrilateral, and the hindermost are nearly oval, with an ear-shaped base at the lower side. The other branchiæ exhibit gradations of form intermediate between these. Caudal setæ are thickly fringed in the central portions with hairs that gradually become

less dense at the roots and extreme points of the tails.

Blue winged olive.

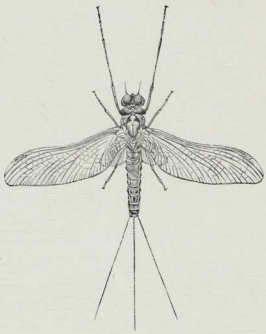
The Blue Winged Olive (*Ephemerella ignita* in the subimago stage) has wings of a shade intermediate between that of the Olive Dun and the Iron Blue Dun. They are distinctly darker and bluer than those of the Olive, but not so dark as those of the Iron Blue. Eaton describes them as "black grey." The thorax and body are generally of a strong greenish olive, and the legs and setæ of an olive grey tint. Plate V., fig. 3 is the male, and fig. 4 the female of this species.

It can be distinguished from the Olive Dun by the setæ, of which the Olive has two, and the Blue Winged Olive three. Apart from the size, the three setæ distinguish it from the Iron Blue, and the darker colour of the fore-wings, together with the form and neuration of both fore- and hind-wings, are so marked that it is not easily confused with the Olive or Pale Watery Duns. It is essentially a summer and autumn fly on the Test and Itchen, but on the Kennet is seen as often as the Olive Dun at the opening of the season. It must be remembered, however, that the small Ephemeridæ are not plentiful on the Kennet in the spring. Pictet figures this insect under three names, viz.:—Potamanthus erythrophthalmus, Pot. æneus, and Pot. gibbus.

PLATE VI.

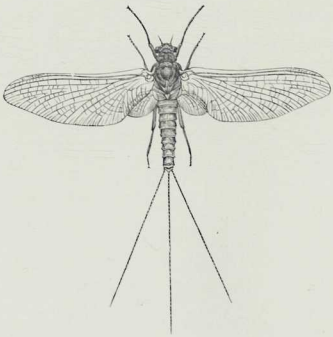
SHERRY SPINNER.

FIG. 1



× 3

FIG. 2



× 3

FIG. 3

× 10

FIG. 4

× 10

FIG. 5

× 10

The spinners of the Blue Winged Olive are called by anglers Sherry Spinners, and the male is shown in Plate VI., fig. 1, the head and eyes in profile fig. 3, and the abdominal forceps fig. 4. The head is of a yellow fawn shade, the upper division of the eyes ruddy brown, and the lower of a paler and more yellow shade. The thorax is a dark red brown, and the abdomen of a similar colour, but paler in shade. The setæ are grey, and the legs almost sulphur colour. The wings are glassy, with dark amber-coloured nervures. Male spinner.

The spinner of the female Blue Winged Olive is that from which the common name "Sherry Spinner" is derived. This is not a very descriptive name for the insect, but since it is well known, and as possibly there may be sherry of the colour of the body, it is perhaps convenient to retain it. The female imago shown in Plate VI., fig. 2, has glassy wings, pale grey setæ, and olive grey legs. Its head and eyes are dark, and the abdomen has a sort of yellow-ochre colour, slightly tinged with green. The sherry spinner is usually seen on summer evenings flying slowly before the wind over the water. It is generally present in clouds, and formerly the late Mr. Marryat and I, looking at some of them against the sky, Female spinner.

took them for a flight of ants, and therefore, neither of us being at the time interested in that group, did not attempt to secure specimens.

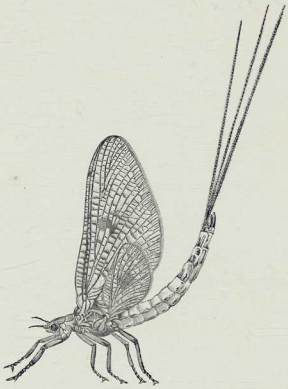
One evening, however, my friend noticed that they were dipping on to the surface of the stream ; this at once roused our suspicions, and getting a butterfly net, we commenced taking some for observation. They were a revelation to us ; each sherry spinner was carrying, held against the hinder end of her abdomen, a little blue-green round ball of eggs, and at the least touch this object was liberated. The eggs were held in position by the pressure of the three setæ, which were doubled under the abdomen and kept up to the thorax. Nature has provided a curious arrangement at the entrance of the oviducts, in the shape of projecting lobes to form a resting-place for the ball of eggs, shown in Plate VI., fig. 5.

The reason of our mistaking the sherry spinners in the air for winged ants was that the setæ turned up under the abdomen were of course invisible, and the ball of eggs was suggestive of the form of an ant's body. The first time the reader has the opportunity, he is advised to look at a flight of these spinners, and he will certainly be struck by the wonderful similarity of their appearance with that of the winged ants.

PLATE VII.

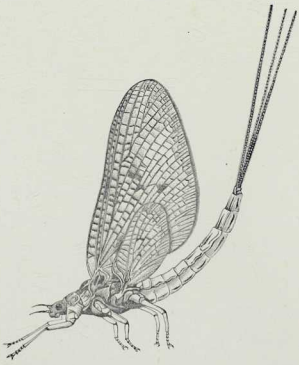
MAYFLY.

FIG. 1



× 2

FIG. 2



× 2

THE MAYFLY.

So much has been written about the Mayfly, and in such extravagant terms, that I am almost tempted to plunge into the scientific description without preliminaries. We have St. Mayfly, Mayfly carnival, Mayfly gorge, &c., *ad nauseam*, and what does it all amount to? Simply that for perhaps a fortnight there is a chance of getting a number of the ugly old cannibals present in every stream, and an occasional specimen of a really good fish, of a size unusual for the dry-fly fisherman on the particular river. What follows? Every man who has or rents water, or who has a friend willing to give leave, the pot-hunter who has the impudence to ask permission of a perfect stranger and gets a favourable reply —in fact, everyone who by any means whatever can get the opportunity, is at the river-side. They all commence hammering the fish before they are feeding on the winged insect at all, kill a few, and make all the rest shy of man, gut, or fly for at least a fortnight.

Of course there is a certain charm about it, the most lovely time of the year, the long days, the continual excitement, and the out-of-door life, all tending to make it a sort of picnic. One of the best (if not the best) fishermen in the old Houghton Club, when other members

were deploring the disappearance of the Mayfly, said that in his experience, provided the supply of insect food is ample in a river, the absence of Mayfly is rather an advantage than the opposite ; and I am rapidly arriving at the conclusion that this opinion is sound. Some of the ultra dry-fly purists, "encore plus royalistes que le roi," have called Mayfly fishing poaching, and only comparable to minnow or worm. In this they are wrong, as it is certainly the most difficult form of dry-fly fishing, and perhaps, taking one season with another, the most disappointing.

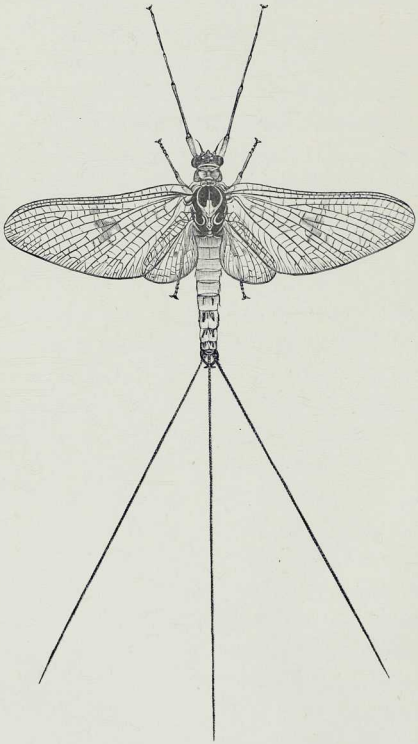
Eggs of the Mayfly.

Having, with the assistance of Mr. Hawksley, hatched some Mayfly larvæ in captivity, I can say with certainty that eggs laid on the 9th June hatched out in London on the 15th August in the same year, or a little short of ten weeks. A keeper of great experience on one of the best parts of the Test, and an accurate observer, tells me that he has collected thousands of Mayfly eggs in large bottles, and finds that they hatch out on that river in three weeks. Although the hatching out of the eggs may be affected by the temperature of the water, I doubt whether difference of temperature alone is sufficient to account for this startling discrepancy. At the same time I have full confidence in the *bonâ-fides* of my informant. Mr. Eaton suggests that the

PLATE VIII.

MAYFLY.

IMAGO ♂.



× 2

hatching in London may have been retarded by diminution in amount or deficiency of bright sunshine.

The average number of eggs laid by a Mayfly, as computed from six specimens from which they were dissected, is approximately 6,500. Although the attempt to keep them alive until they arrived at maturity was unsuccessful, yet from the variation in size of the larvæ taken from the river at different times and seasons it may be inferred that the larval and nymphal stages of the Mayfly last certainly two, and possibly three, years.

Scientific names.

The Mayfly belongs to the genus Ephemera, and in rapid streams *Ephemera danica* is the prevailing species, while in slow rivers or lakes *E. vulgata* is more usually found. There is a third species, *E. lineata*, which is comparatively rare; but for the angler's purpose they may all be considered as practically one. Strange to say the E. danica of modern nomenclature is styled E. vulgata by Pictet, and the modern E. vulgata is neither named nor described. The E. danica of Pictet is the E. lineata of Eaton and the modern school of entomologists.

Larva and nymph.

The genus Ephemera is one of the *larves fouisseuses*, or digging larvæ of Pictet, and the nymph is illustrated on Plate I., fig. 1. An abbreviated description of the nymph is as

follows: "Head narrowed anteriorly and armed in front with two conical projections; mandibles tusked, the tusks subulate, curved slightly upwards and towards their extremities outwards, their tips interlocking when the jaws are closed. Antennæ setaceous—Branchiæ attached to the hinder part of the first, second, third, fourth, fifth, sixth and seventh segments of the body. The first pair are minute, lineal, and fringeless; the remaining branchiæ consist each of two narrow, leaf-shaped, membraneous leaves, tapering to a point and closely fringed on both sides. Setæ short and fringed with hairs on both sides. Legs stout and muscular, covered with hairs, especially the anterior pair."

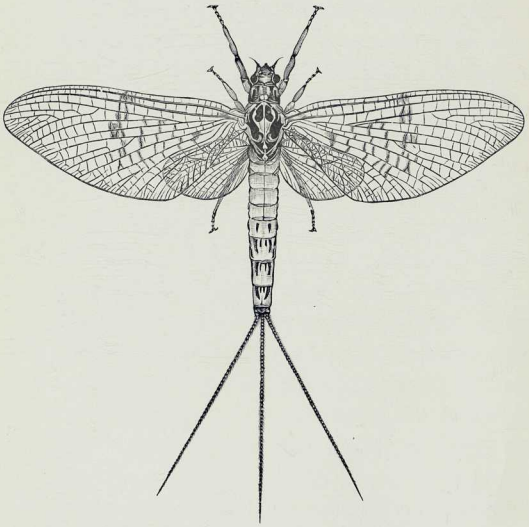
Subimago.

The Subimago of which the male is shown in fig. 1 and the female in fig. 2 of Plate VII., has wings of a blue green grey tint, thickly covered with short thorn-shaped hairs, and fringed with hairs along the posterior margin and base; the veins and cross veins are of a brownish hue, their bordering forming (through confluence) spots in the midst of the fore-wings. The head is dark brown, the thorax olive with pitch brown markings, the first seven segments of the abdomen a pale yellowish straw colour with dark brown markings, and the hinder segments a dark ochre ground with dark brown markings on them. The legs are olive brown and the setæ pitch brown.

PLATE IX.

MAYFLY.

IMAGO ♀.



× 2

The male imago (Plate VIII.) has a black head, thorax blue black, abdomen with the foremost four or five segments ivory white, and the hinder segments deep brown, all more or less marked with dark brown streaks. The legs are pitch black and the forelegs very long. The setæ are very long also and deep brown in colour. The wings are transparent but slightly tinged with a pale grey, and the nervures are nearly black. This fly becomes darker, probably from exposure to light, so that at the end of the Mayfly season assemblies of males dancing up and down in the air look dark brown or nearly black. Imago, male.

The female imago (Plate IX.) is very like the male in colouring, but the fore-legs and setæ are much shorter, and the insect itself much larger than the male. The wings are transparent with a metallic blue grey sheen, and the darker portions of the thorax, hind segments of abdomen, legs, &c., are more brown and less black in colour. At the last stage, when, after depositing all her eggs, the fly lies flat upon the water with extended wings, she is the "*Spent Gnat*" of the angler. When engaged in laying her eggs, just dipping upon the surface of the stream, every time she touches the water some of them are washed off, and in flying up again others move down to the orifice of the oviducts to be washed off at the Imago, female.

next dip, and so on until the laying is finished. I have counted more than fifty dips made by individuals when laying their eggs.

March brown. The March Brown is the subimago of Ecdyurus venosus (Baëtis venosa of Pictet) and although not frequenting the chalk streams, yet it is undoubtedly an acceptable form of food to the trout in rapid stony hill streams and some North country and other rivers where it is found in great numbers. The outline sketch at page 34, fig. 2, coupled with the following brief description, should enable an observant angler to identify it.

It is a large fly of the usual form of the Ephemeridæ, the wings of the female measuring about ·55, and of the male ·50 of an inch ; the body of the female about ·65 and of the male ·60 of an inch. It has two dark brown setæ, a reddish brown thorax and body of reddish brown, with light fawn coloured joinings. The wings are a faint brown colour with strong brown nervures, and the legs more or less dark brown in colour. The nymph, one of Pictet's *larves plattes*, can be identified from Plate I., fig. 2. The imago of the March Brown is the Great Red Spinner of Ronalds.

Turkey brown. The only insect likely to be mistaken for the March Brown is the Turkey Brown, or subimago of Leptophlebia submarginata. The fact, however, that this is much smaller and

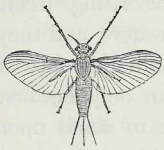
has three caudal setæ, ought to enable anyone to distinguish between the two flies.

Little Yellow May dun.

The Little Yellow May Dun of Ronalds is altogether of a pale lemon yellow colour with blue eyes (turning black, however, in spirit). Its spinner has transparent wings with pitch-black neuration, excepting that, towards the roots, the principal nervures are often tinged with greenish or amber yellow. The body is of an ochre yellow shade, becoming darker and browner on the back. It has two setæ and the nymph (one of Pictet's *larves plattes*) is very similar to Ecdyurus and included in the same group. It is called Heptagenia sulphurea by Eaton, and Baëtis cyanops or B. sulphurea by Pictet.

Caenis.

The little insect shown on the accompanying block (fig. 8) is of the genus Caenis. It is figured and noticed here because, although from the experience of autopsy there is no reason to believe that it forms in any great degree food for the trout, it is desirable to dispel certain illusions and remove wrong impressions. Periodically, some fisherman asks questions about what he calls the "little white curse," and straightway numerous letters appear on the subject. Some one, speaking of the clouds of



× 3.
FIG. 8.

Caenis on the calm June evening, will proceed to argue that, because the fish were rising at an insect which he could not see, and because he was unsuccessful in catching a single trout, all that he required was an imitation of this, the smallest of the Ephemeridæ. Some other eminent authority then tells of the strange thing that happened when the insects settled on his hands and face and bit or stung him.

To answer these points: Firstly, what fly-fishermen call Curses are Diptera, but this is one of the Ephemeridæ. Secondly, in many hundreds of autopsies I have never found a single specimen of Caenis in a trout or grayling. Thirdly, Caenis has no sting, and the mouth organs are so aborted that it is incapable of biting. The tiny insects usually appear in countless numbers on hot, calm evenings when the fish are likely to be rising freely at various other flies on the water; and they settle down on the clothes, the hands, face or any other part of the fisherman only because they require some firm object to stand upon while casting their subimago skin and emerging as the imago or perfect insect.

CHAPTER II.

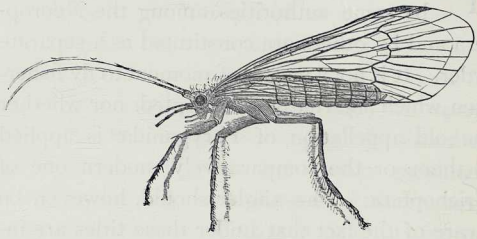
TRICHOPTERA.

THE Trichoptera or Caddis-flies are classed by some authorities among the Neuroptera and by others are constituted as a separate order. It is not a matter of moment to fly fishermen which alternative is adopted, nor whether the old appellation of Phryganidæ is applied to them, or the comparatively modern one of Trichoptera. The angler should, however, be aware of the fact that under these titles are included all the aquatic insects the larvæ of which make cases, either movable ones that they drag about with them, or fixed ones that they anchor to large stones and leave or enter at their pleasure. In the winged or imago state they are occasionally taken by trout and grayling, but as larvæ, at all times of the year, they are almost invariably present, in considerable numbers, in every trout or grayling subjected to autopsy.

Identification.

Pictet, who calls them Phryganidæ, says that they form part of the insects classed as Neuroptera; and that they are easily distinguished from other families of this order by the presence of several characteristics, viz.: the pent-house

form of their wings, the lower or hind ones generally folded lengthwise; their five-jointed tarsi or feet, their long filiform antennæ, the absence of mandibles, and their complete metamorphosis. For the fisherman the accompanying block (fig. 9), showing in profile one of the so-called Caperers (*Halesus radiatus*), will indi-



× 2

FIG. 9.

cate fairly the general appearance of these insects. To this may be added that they are commonly of a cinnamon or brown colour, (lighter or darker); that the wings are four in number, the hinder ones generally broader than the forewings, and both pairs covered with hairs; and that all members of the group have long antennæ made up of many joints, and then there should be no difficulty in their identification.

The following is an abbreviated form of McLachlan's description of the adult insects:—

Head. The head is small, wider than its length, and

generally covered with hairs. The antennæ are multi-articulate and generally tapering towards the tips; their basal joints are attached to the head in front of the eyes. The compound eyes (*oculi*) are hemispherical and finely faceted. The simple eyes (*ocelli*) are either absent or three in number. As to the mouth organs, the *maxillæ* are small, and the *maxillary palpi* vary much in construction. In all female Trichoptera (except in the foreign genus Thamastes) these palpi are five-pointed; but in males the number of the joints ranges from three or four in genera of one Division of the Order to five in genera of the other Division. In one group (*Sericostomatidæ*) the palpi present some strange modifications of form in the male, but with this exception their structure is identical in both sexes. There are no mandibles, or at most mere rudimentary traces of these organs.

Thorax.

The prothorax is short, forming a narrow ring in which the head moves. The mesothorax is large, and the metathorax smaller and triangular.

Legs.

The legs are long, slender, and have five-jointed tarsi, the last joint carrying a pair of claws. The tibiæ are armed with movable spurs in addition to hairs and strong spines. The disposition and number of these spurs are factors of some importance in classification.

Abdomen.

The abdomen is composed of nine segments,

although frequently only eight are visible. For the identification of species the anal appendages attached to the end segment of the body are of great value. In the male there are ordinarily three pairs of such appendages, the superior, intermediate and inferior, the two former appertaining to the last dorsal, and the latter to the last ventral segment. Besides these appendages there are also the penis and its sheaths varying in position, and of use in classification. In the female there is less complexity and the parts are less distinct.

Wings.

There are invariably four wings. The fore-wings are more leathery than the hind ones, and in repose are closed up and deflexed in an almost vertical manner, giving the insect a narrow and elongate appearance. Almost without exception they are clothed with hairs or pubescence more or less dense in its nature, and sometimes obliterating the nervures. The hind wings are broader and more transparent, folded longitudinally in repose and less thickly covered with hairs. Both pairs of wings have numerous longitudinal nervures, but the transverse nervules are few. As usual, wing neuration is an essential feature in determining family, genus, and sometimes species.

According to McLachlan, at the time of his writing, 409 species of Trichoptera had been found within the geographical limits of Europe, of which 148 are natives of the British Isles.

HABITS AND METAMORPHOSES.

Anyone studying the family of the Caddis flies cannot fail to be struck by the wonderful instinct which prompts the larvæ of many genera to form tubes, to cover these tubes with various materials arranged in various forms, to select these materials, and so proportion their weight and bulk as to form a structure strong enough to serve as protection, heavy enough to withstand the force of the current, and yet not too heavy to be dragged about by them with comparative ease. It is strange, too, that larvæ, apparently identical in structure with these, should, instead of making portable cases, fix their habitations firmly to large stones and sally forth defenceless to feed.

Pictet says: "It would be difficult for one who has only vaguely considered the riches of nature to imagine that the smallest brook, or even a little muddy pond, should contain so many marvels, and yet what incredible activity reigns in the waters that irrigate the land. Fish, molluscs, crustaceans, worms, and insects are so numerous there that it may be said without fear of contradiction that the water is more densely populated than the land.

"This great population of the water is often composed of species inimical to one another, among which the absolute reign of force results

in the weaker generally serving as food for the stronger. Hence it comes that small species must have a means of preserving themselves from the large ones, and in particular the larvæ of the Phryganidæ (Trichoptera), soft and inactive, would have been too easily destroyed without the faculty that has been bestowed on them of making these cases for their protection."

Oviposition.

The eggs are often carried in an oval bundle on the underside of the abdomen of the females, and are enveloped in a gelatinous covering. Occasionally the masses are carried considerable distances before the insects deposit them either on leaves or stems of water-plants, or, by dipping and fluttering upon the surface, let them sink to the river bed where they adhere to stones. It is said that, like a few individual Ephemeridæ, some species descend into the water to select a spot favourable for the reception of the eggs, and it is not unusual to find specimens covered by extraneous matter which would lead one to suppose that they had been right down to the mud.

The Grannom (*Brachycentrus subnubilus*) certainly does generally descend into the water and deposit the bunches of bluish-green eggs on posts or piers of bridges, stems or other portions of aquatic plants, stones or other suitable positions; a few days after their

deposition they swell considerably, and the eggs can be distinctly seen with an ordinary hand magnifier. In about three weeks they hatch, and their general appearance as well as that of the new-born larvæ at this stage is shown in Plate X., fig. 1, drawn from specimens hatched in captivity by Mr. Hawksley.

Larvæ.

The Trichoptera larvæ are divided into two well-marked divisions, viz.: (1) larvæ making portable cases, which they drag about with them wherever they go, and (2) larvæ making fixed cases generally attached to large stones, issuing from them to roam in quest of food and returning to them for repose. Among the Trichoptera treated herein, the Rhyacophilidæ alone make fixed cases.

Soon after they are born the larvæ leave the jelly-like mass in which the eggs were enveloped, and at once commence case making. It may here be remarked that as a rule the larvæ in this order are vegetable feeders, living on leaves and shoots of plants such as the Water celery (*Apium inundatum*), Water Crowfoot (*Ranunculus aquatilis*), &c. They do not, however, despise larvæ of other aquatic insects, whether those of the smaller Ephemeridæ, or Gnats and other Diptera, or even those of their own genera, which, before devouring, they tear from the cases.

Larvæ making movable cases.

Amongst the most interesting points con-

nected with a Caddis are the form of the case, and the materials of which it is composed. Some larvæ use stones, others sand, some diverse vegetable matter such as leaves, small twigs, reeds, and any stray particles of plants found in the water; others again use partly mineral and partly vegetable matter. As a foundation for the external covering, all Caddis larvæ spin a silken subcylindrical tube, which is generally broad at the fore end, and comparatively narrow at the hinder.

When the extraneous substance fastened to the exterior of this tube is sand or very fine small stones, the case is regular in contour, but when vegetable fragments are introduced regularity is lost, the most irregular of all cases being those of larvæ employing both mineral and vegetable materials in their construction. Some of the cases built only of vegetable matter, are, however, very neatly made, the fragments being cut into equal lengths and arranged in a regular spiral. Among such are the cases of the Large Red Sedge (*Phryganea striata*). Another insect, the Grannom (*Brachycentrus subnubilus*), makes a quadrangular case, formed of vegetable matter, slightly tapered towards the tail.

Whatever shape the case may take, it must not be too heavy for the insect to be able to move with it easily, nor so buoyant as to en-

danger its footing. The larva in walking protrudes out of the case its head, thorax and legs, and by means of two horny hooks at the tail end of its body, holds on to the interior of the case and drags it along as it progresses. If danger threatens it withdraws out of sight into the case for protection. As the Caddis grows it cuts away part of the case at the smaller end, and constructs a new section sufficiently large in diameter for comfort at the other, or if the case is wide enough but too short an addition is built on of the same diameter.

A number of experiments have been tried as to the effect of forcibly removing a Caddis from its case. If left in the water near the case the creature sooner or later crawls back into it head first, its relative position towards the case being thus reversed, but the sheath in some species is sufficiently wide to enable it to right itself by turning round inside. Where this is impracticable it cuts off the tail end and makes there a new front to the tube as large as the anterior end of the original case. Should the case be removed the larva will in time make a new one of any materials available, and Caddis have thus been persuaded to build cases of coloured beads and other unusual and unnatural substances.

Description of larva.

Mouth organs consist of lábrum, mandibles, maxillæ, and labium—labium bi-lobed; man-

dibles generally blunt-ended, and therefore adapted for dealing with vegetable matter, either for food or for cutting it into pieces for making the case; maxillæ attached to the labium, each composed of a thick ovoid base and a small scaly tip with two very small teeth; thorax in three distinct segments carrying the legs, and having no external respiratory organs; legs—fore-legs shortest and strongest; medial legs weaker than the fore-legs and shorter than the hind legs; abdomen soft and pale coloured, in nine segments, the first tougher than the rest and usually terminated by three fleshy humps, apparently retractile at the will of the larva; the remaining segments yellow or whitish; segments 2-8 usually have each a band of hairs on each side, and in some genera carry the tracheal branchiæ; at the end of the last segment are two movable hooks, by means of which the creature holds on to the case, and so powerful are they that an attempt to pull it out of the case by force usually results in the larva being torn in two. Plate X., fig. 2 shows larva and case of one of the Limnophilidæ; fig. 3 larva and case of another of the Limnophilidæ; and fig. 4 larva and case of a dark sedge (*Anabolia nervosa*).

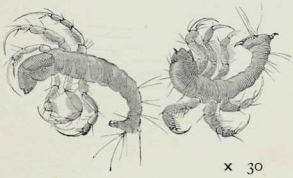
Preparations for the metamorphosis to the pupa.

When the larva is full grown it prepares for the next change by closing the end of the case. Some kinds close the anterior orifice of

PLATE X.

CADDIS.

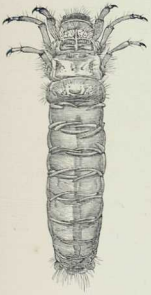
FIG. 1



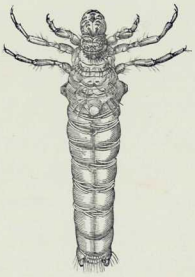
× 30

FIG. 2

FIG. 4



× 3



× 3

FIG. 3.

× 3

the case by means of a grating or sieve made of the same silk as is used for the internal lining of the tube. This grating closes the opening, and yet allows the flow of water necessary for respiratory purposes. Sometimes small pieces of wood, leaves, or stones are also fastened obliquely across the entrance of the case, but not so closely as to render it impervious to water. Besides these precautions, the larvæ inhabiting rapid water fasten their cases to large stones or other solid and heavy bodies to prevent their being washed away.

Larvæ with fixed cases.

The larvæ with fixed cases proceed generally on a uniform plan of construction. A heavy stone being selected, the larva collects a number of little bits of stone and attaches them to the lower side by means of the silk, forming a house closed all over except at one point, where a small irregular-shaped opening is left, large enough for ingress and exit. The shape of this retreat is usually a long oval, cylindrical in section. When full-grown the larva closes up the case altogether, but water flows through the interstices between the stones. The larva then becomes enveloped in a brown horny cocoon, and its metamorphosis to the pupa takes place in this skin. On Plate XII., fig. 1, is shown a larva of Rhyacophila dorsalis, one of the Caddis, with fixed cases, and figs. 2 and 3 show the case made by this insect, as

well as a pupa enveloped in the cocoon. The description of one of these larvæ is given at page 96 under the heading of Rhyacophila dorsalis.

Pupa.

The larva then, whether in the case of the movable or of the fixed type, undergoes the change to the pupa, which is quiescent except for a constant oscillation of the abdomen. The drawing of a pupa of Rhyacophila dorsalis, Plate XII., fig. 4, shows the general appearance of the insect in this stage. It will be noted that the wings are folded up, and the antennæ and legs close to the body; the eyes also are abnormally large, and there is a beak-shaped projection in the neighbourhood of the mouth.

This beak consists of two hook-shaped mandibles, and is used to tear open or break down the grating across the aperture at the anterior end of the case of the portable type, or the stones stopping up the entrance of one of the fixed type. Having thus opened the case it creeps out, enveloped in a thin pupal skin, swims up through the water, generally on its back, and crawls along stones or weeds until it finds a convenient place for effecting the next and last change, preference being given to a dry spot. Here it rests for a few minutes, and the skin having been distended splits along the back. First the head emerges, and then in succession the antennæ, legs and wings. Mean-

while the abdomen moves about and struggles out of the pupal skin, and the perfect insect, which has no further change to undergo, stands free.

Imago.

The new-born flies are soft in consistence, and pale, not acquiring their full colouration until some hours have passed. They fly well, but generally stay in the vicinity of water, hidden usually among the sedges during the day, and seen chiefly in the evening or at night. The insect lives about a year, spending by far the greater part of it in the larval form. Sexual intercourse takes place on the sedges, boughs, hatches, or even walls; soon afterwards the eggs are laid as previously described, and the insect dies, having accomplished its task, viz., that of procreation.

The above is necessarily a somewhat brief history of the habits and metamorphoses of the Trichoptera, but it will probably be found sufficient to enable the fisherman to recognise the larvæ, pupæ, or imagines, when they meet his eye at the river-side.

Sedge Flies.

Anglers usually style the Caddis flies seen in summer evenings on the water, Sedge flies or Caperers. They differ considerably in size and in colour; some species are light, others comparatively dark; some have self-coloured wings, others speckled wings, and some (the so-called Caperers) have blotched wings. It

would be possible, no doubt, to work out and give in detail the family, genus, and species of every one of them, but this would require an inordinate amount of space, and be of no real practical use to the fisherman. To show the great variety of these flies to be found on a good trout stream, the following from the Test at Houghton were kindly named for me by Rev. A. E. Eaton, viz.: Caperer (Halesus radiatus), Large Red Sedge (Phryganea striata), Brown Silverhorns (Notidobia ciliaris), a medium-sized Sedge (Rhyacophila dorsalis), Grannom (Brachycentrus subnubilus), Welshman's Button (Sericostoma personatum), Black Silverhorns (Mystacides nigra), Dark Sedge (Anabolia nervosa), besides the following to which I can give no English names:—Limnophilus rhombicus, Limnophilus lunatus, Stenophylax stellatus, Drusus annulatus, Chætopteryx villosa, Goëra pilosa, Lepidostoma hirtum, Molanna angustata, Odontocerum albicorne, Leptocerus cinereus, Polycentropus flavomaculatus, Tinodes wæneri, Psychomyia pusilla, Chimarrha marginata, and one female of which he could only identify the genus as Hydropsyche. As the genera and species differ chiefly in small details and size, I think that a description of the first six in this list will amply serve all useful purposes so far as this work is concerned.

THE CAPERER.

The name Caperer is applied by the fly-fisherman to all cinnamon-coloured Caddis flies with blotched or mottled wings. Probably the name was originally derived from the peculiar dipping motion on the surface of streams, in which these insects indulge. The motion is not confined to any particular family, genus, or species, but is common to most of the female Trichoptera when over the water. Hence what are known as Caperers vary much in size and in colour, comprising, as they do, flies of many species, genera, and families. I have taken here, however, as the type of the Caperers, the largest, which is classed by McLachlan among the family of Limnophilidæ and named Halesus radiatus. The same insect is placed by Pictet among the Phryganidæ proper and called Phryganea digitata, classification in his days not having advanced to the separation of the two families.

Larva.

The larva is large, and inhabits running water. Its head and thorax are brown with black markings, the abdomen yellow, with a few thread-like tracheal branchiæ, the legs of medium length and brown. Its case is very solid, composed of slips of wood and vegetable *débris*, arranged, some longitudinally, some obliquely, and some in a moderately regular spiral. Beyond the hinder end of the case

longer and stronger twigs are often seen projecting; but, before pupating, the larvæ usually cut off all projections. They live under stones, or in some instances attach themselves to weeds. Pictet says the flies usually appear at the end of September or commencement of October, but in this country they are often seen much earlier in the year.

Imago. Head brown, thorax light brown with its upper side darker. Abdomen cinnamon brown but darker above. Legs fawn-coloured with black spines. Fore-wings broad, closely covered with dark brown hairs, the apex broadly and obtusely parabolic, the nervures yellowish white and the membrane between them mottled with brown and yellowish spots or streaks. The hind wings transparent yellowish. General colouring of the insect cinnamon inclining to brown on the body and thorax and to yellow on the wings. The outline block, fig. 9, at p. 78 is a fair likeness of this Caperer.

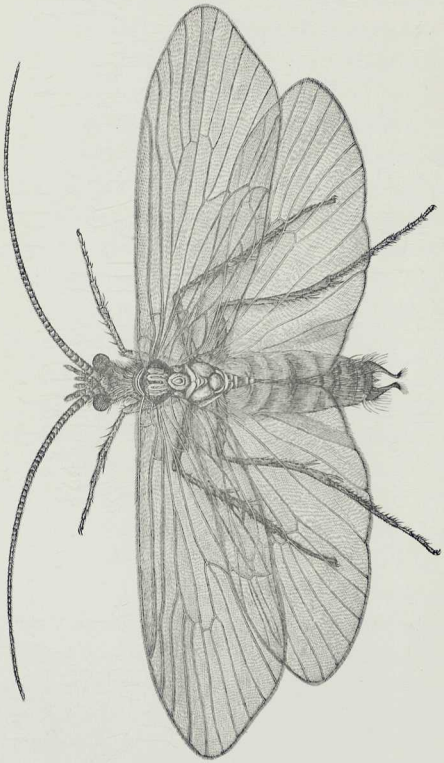
THE LARGE RED SEDGE.

So far as chalk stream fishermen are concerned this is certainly the largest of the British Trichoptera. It is classed by McLachlan in the family Phryganidæ, genus Phryganea, and species striata. Phryganea grandis is a trifle larger, but I have never to my knowledge seen a specimen of it, while of P. striata

PLATE XI.

CADDIS FLY.

LARGE RED SEDGE



× 3

on Test, Itchen, and Kennet there has in no season been a scarcity within my memory. This is the large sedge which is prevalent on calm evenings during the rise of Mayfly or on parts of the rivers where the Mayfly is not seen during the month of June. It is so striking in aspect and so much bigger than any other sedge fly that it hardly needs description. Across the outstretched wings a fair specimen measures 1·80 inches, and its body from head to tail ·9 of an inch in length. Its antennæ are about ·9 of an inch and its hind legs are ·75 of an inch long. Its colour is generally of a red brown tint, darkest at the head and thorax, but a shade lighter in the abdomen, antennæ and legs; the wings are of quite a light brown.

Larva.

The larva is large and stout, with brown head and thorax, short brownish legs, and fawn-coloured abdomen. The case is made of small pieces of weed and leaves arranged spirally, and measures altogether over $1\frac{1}{2}$ inches in length. It is said by Pictet that although the case is constructed at first wholly of vegetable matter, yet, as it requires repairs or lengthening to accommodate the increasing size of the growing larva, the repairs and additions are made with small stones, so that eventually the Caddis is almost entirely enveloped in mineral matter.

Imago.

The Imago is thus briefly described:—Head and antennæ dark brown, thorax and legs light

brown. Abdomen brownish above, but the entire under side of the body is ochraceous. Fore-wings, especially in the male, elongate and narrow, pale brown in colour. The hind wings wide in proportion to their length and folded longitudinally, transparent, and of a pale brown colour. In Plate XI. this insect is illustrated, and there should be no difficulty in identifying it from the details given. Possibly a specimen of the larger species Phryganea grandis might be mistaken for this, but that would not be a matter of any great moment to the fisherman, as in colour, shape, and detail the two insects are almost identical, and the difference of size is unimportant.

BROWN SILVERHORNS.

Caddis flies are often seen hovering about in great numbers close to the surface of a stream in the evening. They are remarkable for the length of their antennæ, and are usually called Silverhorns by fishermen. There are two sorts, one the Black Silverhorns, the smaller of the two, which do not appear very attractive to the fish; at least, they are seldom found in autopsies. This is known to scientists as *Mystacides nigra*, and is curious because at the margin of the posterior wings there is a short series of little hooks (each thickened and upturned at the tip), which fit into a narrow

PLATE XII.

CADDIS FLY.

Rhyacophila Dorsalis.

FIG. 1

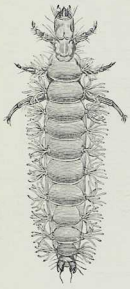


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FIG. 2

× 3

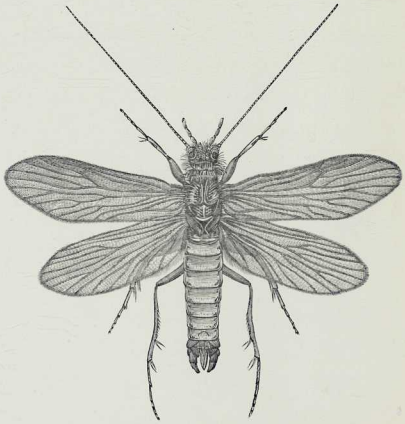
FIG. 3

× 3

FIG. 4

× 3

FIG. 5



× 3

fold at the inner margin of the fore-wings, keeping the two wings coupled together when in flight. The other sort, the Brown Silverhorns, is named by McLachlan Notidobia ciliaris, and by Pictet, Sericostoma atratum. It is larger than the Black Silverhorns, and better appreciated by the trout.

Larva.

The larva inhabits streams, makes a conical case, tapering towards the hinder end, and the covering of the case is usually, but not invariably, formed of sand or small stones. This larva does not appear to be very well known, as Pictet was unacquainted with it, and it is not described by McLachlan.

Imago.

The imago is dark brown, nearly black in the head and thorax, the abdomen brown and the legs a yellowish colour. The wings are brown, sparingly dotted with spots of a paler colour, not easily seen owing to the dense hair with which they are covered. Pictet says that it is usually plentiful in May, McLachlan that it appears from the end of March to June, adding that in northern districts it would seem to occur later, for Kolenati says it is found at St. Petersburg in July, and Zetterstedt gives August (!) as the time of its appearance in Lapland. In Plate XIII., fig. 1, an illustration is given.

RHYACOPHILA DORSALIS.

I can give no English name for this insect, but it is one of the medium-sized light-coloured Sedges, and is very plentiful on the Test and other chalk streams, appearing from May to October. Rh. dorsalis is the commonest British species of its genus Rhyacophila, the type of the family of Rhyacophilidæ. It is the Rhyacophila vulgaris of Pictet and Stephens.

Larva. The larva of this insect is one of those which make fixed cases and inhabit rapid streams. The cases are somewhat oval, formed of fragments of stone affixed to rocks or larger stones. The larva is narrow and elongate, gradually attenuate towards each extremity, with very strongly defined segments. The head is a long oval with powerful mandibles, like the prothorax chitinous, while the remaining segments of the thorax and abdomen are soft; the terminal segment is divided into two processes, each furnished with a long double claw. The legs are short and equal, or nearly so, ending in a powerful claw with a basal tooth. The larva is shown in Plate XII., fig. 1, its fixed case, with the long oval brown cocoon enclosing the pupa at fig. 2, and the pupa in the cocoon at fig. 3.

Pupa. The pupa has powerful mandibles, strongly toothed within and finely serrated along the inner edge. The wings are folded and encased,

PLATE XIII.

CADDIS FLIES.

FIG. 1

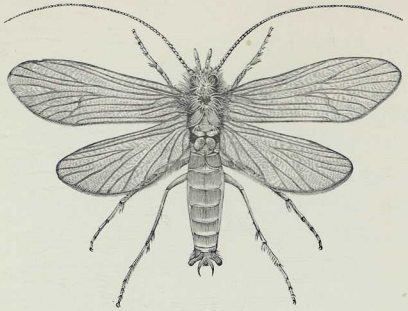


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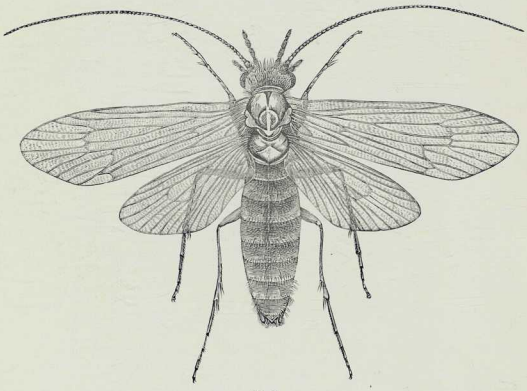
FIG. 2



× 3

FIG. 3

× 3

the antennæ and legs laid down against the body. The legs are not fringed, and McLachlan, from whose description the above is abbreviated, infers from this absence of fringes on the legs that, instead of swimming, it crawls along rocks and stones to the surface. An illustration of this pupa is given in Plate XII., fig. 4.

Head and thorax red brown; abdomen a light brown; legs a little darker than the body; fore-wings a greyish yellow ground colour (the ♀ darker, often nearly uniformly brownish), with ill-defined darker markings and a tolerably distinct dorsal blotch; hind wings paler and more transparent. Across its outstretched wings it measures a little less than 1 inch and the body about ½ inch in length. Plate XII., fig. 5, shows this fly. Imago.

WELSHMAN'S BUTTON.

About the end of May or commencement of June, usually in the forenoon, there suddenly appear great numbers of this fly, which seems to be in continual motion on the surface as if struggling upon the stream. It is usually taken by fishermen for the alder (*Sialis lutaria*), an insect which, unless blown down by the wind on rare occasions, is scarcely ever seen on the water. The Welshman's Button is

named by McLachlan Sericostoma personatum or S. Spencii, and by Pictet S. collare.

Larva. The larva is so similar to that of Notidibia ciliaris as not to need any detailed description. Pictet says that it is easily distinguished by the citron yellow colour of the abdomen and of the two hinder segments of the thorax. The head is a chocolate brown, the legs fawn coloured. It makes a conical tapering case of small stones, and when the time of metamorphosis approaches closes the anterior orifice with the same material.

Imago. Head and thorax dark brown, but covered with yellowish hairs. Abdomen dark red brown, legs golden brown with dark tarsi. Fore-wings brown pink closely covered with hairs. Hind wings paler and more transparent, but of a similar tone. Plate XIII., fig. 2, shows its general appearance.

GRANNOM.

Whenever it is plentiful this insect is well-known to the fly-fisherman. From the middle of April to the middle of May it appears on some parts of the Test in clouds, and when it is rising from the water the fish usually feed on it voraciously. The clouds of dark coloured grannom seeking a suitable place for the deposition of their eggs do not seem to offer any

great attraction to the trout. By McLachlan it is called *Brachycentrus subnubilus*, but it is neither described nor figured by Pictet.

Larva.

The larva is slender and subcylindrical, with branchial filaments short and isolated. The case is a quadrangular tube formed of vegetable matter, slightly diminishing in diameter towards the tail. The species prefers rivers, but occasionally breeds in canals with little or no appreciable current. The imago is a true spring insect, and almost invariably swarms in immense multitudes where it occurs.

Pupa.

The pupa is very similar to that of Rhyacophila dorsalis, but has a dull blue green body. It swims rapidly up through the water, and generally spins round and round on the surface as the thin pupal skin distends and splits and the imago emerges.

Imago.

Head and thorax black with grey hairs. Eyes dark brown, upper portion of the legs dark brown, the lower yellowish. Fore-wings with pale smoky grey coloured membrane clothed with pale yellow hairs and marked more or less with large pale yellowish spots. Hind wings pale or dark smoky grey with whitish fringes and fawn coloured neuration. The body of the imago immediately after its metamorphosis from the pupa is of a yellowish-green grey colour. The female carries an enormous oval mass of bluish green eggs en-

veloped in gelatinous matter. After the eggs are voided, the body turns dark lead colour, nearly black. This description with a reference to Plate XIII., fig. 3, should enable the angler to recognise the insect.

Since the publication of the first edition of this book I have often thought that there are many dry-fly fishermen who would be glad to be able to identify the various Caddis flies found on their streams. With this object I consulted my good friend the Rev. A. E. Eaton, and he has once more responded to my appeal. The drawing of Index Wings made by his own hands and the following table compiled by him should enable any one to determine the genus of any of the Trichoptera described or referred to in this work, where that can be done without entering more fully upon minutiæ of detail than is here attempted. The material for the table is derived partly verbatim from the monographs of Mr. McLachlan on British and European Trichoptera, who selected from his own collection the specimens used in preparation of the Index-figures of wings.

CHAPTER III.

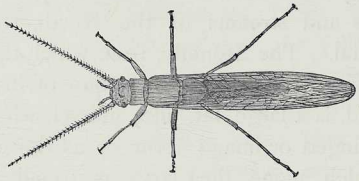
PERLIDÆ.

THE Perlidæ or Stoneflies are certainly not so important for the dry-fly fisherman as the two preceding families, but for the wet or sunk-fly fisherman, or for one frequenting the brooks and streams of the North, they are essential. The Stonefly, from which the English name applied to this group of insects is derived, is a large, fat, juicy morsel, whether in the winged or imago form, or as the creeper, by which name the larva is usually designated in our northern counties and in Scotland. Wherever it is plentiful the trout feed on it freely, but the imitations are not usually successful, and hence fly or creeper in the natural state is more generally fished. For the dry-fly purist there are two species which may serve as food for the fish, the Yellow Sally (*Chloroperla*) and the Willow Fly (*Leuctra geniculata*).

Identification.

Having caught a specimen which he believes to be one of the Perlidæ, it is not a difficult matter for the angler to make sure of the fact. The salient features of the order are unmis-

takable—the flat head with mandibles and maxillæ; the long, thread-like antennæ; the four long, narrow wings, folded together so as to appear but little wider than the back of the insect when it is walking or in a state of repose (which wings, during flight, set out at right angles to the body, and fluttering backwards and forwards, make the insect seem to be far larger than it really is); the body in some genera without setæ and in others with two. The accompanying block, fig. 10, shows the



× 3
FIG. 10.

Willow Fly (*Leuctra geniculata*) in its natural position when at rest.

Description of Imago.

Head flat, broad. Eyes hemispherical, often elongated. Ocelli three. The first joint of the antennæ cylindrical and stout, the second as long as the first and half its diameter, the rest very short and slender, gradually tapering towards the tips Mouth organs—mandibles and maxillæ much smaller and softer than in the larva, maxillary palpi much longer than

those of the larva. Thorax of three very distinct segments, prothorax a thin disc, and mesothorax and metathorax thicker. Abdomen very similar to that of the larva. In some genera there are two ciliated multi-articulate caudal setæ, and in others none, or merely rudiments. Legs without apparent hairs, longer and more slender than in the larva, each with two thin claws and a pad. Wings large in proportion to the insect, except in the case of males of some genera, when they are quite short and rudimentary. The fore-wings narrow and long, and the hind wings much broader, all with strongly-marked nervures.

METAMORPHOSES AND HABITS.

Oviposition.

The eggs, which are oval and generally dark in colour, are arranged in a bunch covered by a thin skin and carried at the hinder end of the abdomen. They are easily detached, and are not surrounded by any gelatinous secretion. The female probably drops them while flying at some distance above the water, and they separate as they sink towards the bed of the river. Pictet says that he has never seen the female going under water to deposit eggs like some of the Trichoptera and Ephemeridæ.

Larvæ.

The larvæ are all aquatic, those belonging to the genus Perla always inhabiting rapid parts of streams, and those of the genus Nemoura

(Pictet) frequenting, some species quick-running, and others comparatively quiet and stagnant, water. They are usually hatched during the summer and at the commencement of autumn, from eggs deposited by the imago shortly before. By the beginning of winter they have grown to a small extent, and pass the inclement season in the middle of the river bed, seeking deeper water as the weather becomes colder. In the spring they work towards the bank, grow more rapidly, and then change to the imago; the earliest in the late spring, and others in the summer and autumn. In genial weather the species inhabiting fast water frequent the strongest and roughest parts of streams, the others quieter places. They are not strong swimmers, but usually walk on the bed of the river, the larger sorts living under stones and the smaller sorts on sandy mud, these covering themselves with fine *detritus*, so as to be almost invisible. This instinct of hiding is almost necessary, as all are carnivorous, feeding on the small larvæ of the Ephemeridæ and of their own family. The nymphs, as previously mentioned, only differ from the larvæ in having fixed rudimentary wings.

Description of Larva.

Head generally smooth and flat, as broad as the prothorax, or even broader. Eyes hemispherical. Ocelli three in number, larger in the

larva than in the imago. Antennæ long and flexible. Mouth organs—labrum broad and short; mandibles about half the length of the head, obliquely truncate at the extremity, with five or six teeth at the end, the outer of which is large and only moderately sharp; maxillæ about the same length as the mandibles, but thinner, flatter, and with sharper teeth; maxillary palpi five-jointed; labium square, and forming the greater portion of the lower side of the head. Thorax with the three segments subequal. Abdomen smooth, cylindrical, in ten segments of approximately equal length, with small, short, stiff hairs at the hinder ends of the segments. All genera and species with two caudal setæ. Legs ciliated with long hairs, tarsi three-jointed, the fore and medial legs very short, and the hind legs powerful, all armed with two strong curved claws.

Metamorphosis to the Imago.

When the time for the last metamorphosis has arrived, the nymph makes its way out of the water to a favourable spot, selecting as such a large stone, a wall, the trunk of a tree or the stem of a plant. It requires a somewhat rough surface on which to fix its claws solidly during the change of skin. Air passes into the space between the old and the new skin, and the nymphal envelope splits along the back. The thorax, then the head and antennæ, appear, and next the wings are drawn out of their

sheath and unfolded. After these, the legs are withdrawn, and then the abdomen, and, if the particular species has them, the caudal setæ are also freed, and the imago flies away, leaving the envelope behind, adhering to the resting-place chosen by the nymph.

Imago.

The fly on first emerging from the nymphal shuck is softer and paler than later, when its full strength and colour are attained. The imago, heavy in flight, cannot rise easily in the air; the slightest obstacle stops its course and the least touch brings it to the ground. Hence it does not stray far from the water where it was born. Shortly after its appearance sexual intercourse takes place, the male being above the female. This is never attempted while flying, and is soon over.

Many anglers confuse stoneflies with Caddis flies, and imagine that the Caddis, with a case of stone, is the larva of a stonefly. This mistake is not altogether surprising, as the names are certainly calculated to mislead. It is strange, too, that a Swiss entomologist, writing in 1680, according to Pictet, described larvæ of the large stonefly of that country as making a cylindrical tube as a retreat, with which they crawled about the river-bed. The mistake was corrected three years later by De Muralt. In the north the stonefly is called the Mayfly, and consequent confusion often

PLATE XIV.

STONEFLIES.

FIG. 1

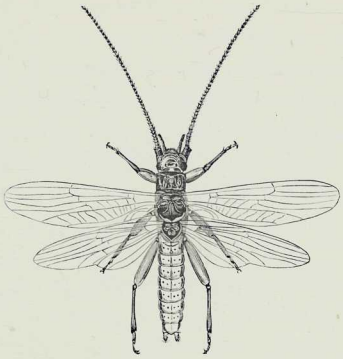


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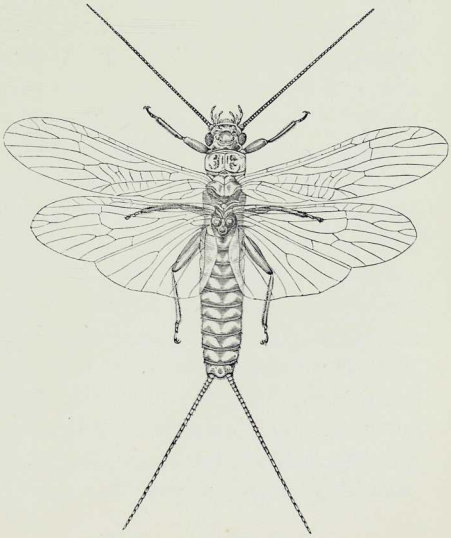
FIG. 2



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arises among angling writers. To assimilate the nomenclature of north and south, this name should be abandoned and it should be applied to the genus Ephemera alone, although possibly the north country nomenclature may have been the earlier in date.

WILLOW FLY.

The Willow Fly, Needle Brown, or Spanish Needle, the insect being called indiscriminately by these three names, is placed by Pictet in the genus Nemoura and sub-genus Leuctra, but in modern classification Leuctra is considered a genus by itself, and the fly named *Leuctra geniculata*. Towards the later part of the summer and throughout the autumn, great numbers of a small member of the Perlidæ family are seen, and when crawling along a post or at rest, have the appearance shown in fig. 10, on page 102. Under these conditions it looks like a long narrow insect, of a steel blue colour, this tint being derived from the four wings folded together and lying close along the back. The same insect seen flying (its long wings, four in number, fluttering through the air) has the appearance of a much larger and more important creature. It is at times taken freely by the trout and grayling, although on the Test and Itchen, where it is very

plentiful, it does not seem to be so well appreciated as on the Welsh and other rivers.

Larva. The larva is similar in form to the imago, except for the absence of wings, and the presence of two caudal setæ. Its head and thorax are of a pale fawn colour, the legs dark brown, the abdomen yellowish, and the setæ dark brown.

Imago. The imago has a broad brown head, with dark antennæ; the thorax is brown, the abdomen dark brown on the back, and a pale yellow beneath, and the legs pale brown with black tarsi. The wings are long, of a pale fawn colour, with nervures of a dark tint of the same colour; the fore-wings narrow and longer than the hind wings, and the hind wings broad. Across its outstretched wings a good specimen measures ·9 of an inch, and the body, from head to tip of tail, about half an inch. Plate XIV., fig. 1, is an illustration of it.

YELLOW SALLY.

Another insect somewhat similar in form to the Willow Fly, is often present in great numbers in the early part of the summer. It is, however, a trifle larger than the Willow Fly, and generally of a slightly greenish yellow hue. It is called the Yellow Sally, and is one of the species of the genus or sub-genus Chloroperla. Some fishermen have the idea that one of the

Ephemeridæ, an upright-winged, lemon-yellow-coloured insect, somewhat larger than the general run of the duns, is called by this name, but this is a mistake, the dun in question being the Little Yellow May Dun of Ronalds (*Heptagenia sulphurea*). The Yellow Sally is not a fly particularly relished by trout and grayling; certainly I have never found it in the numerous autopsies I have made. Some angling writers (notably Francis Francis) say that the fish will not take it because it is too bitter, but I can neither confirm nor contradict the statement, having never been tempted to put Yellow Sally's flavour to a practical test.

Larva.

The larva is similar in shape to that of Leuctra geniculata, but is somewhat larger. It lives in the mud, and has the head and thorax of a yellowish brown; the legs are thick and fawn-coloured, the body a somewhat greenish yellow, and the setæ pale brown, ciliated at the joints. The antennæ are pale brown, and taper at the tips almost to a point.

Imago.

The head is greenish yellow, the eyes black, and the antennæ a green brown. The thorax is brown, slightly tinged with green, the abdomen dark brown with yellowish rings at the joinings. The two caudal setæ are brown, and the legs a pale greenish brown, with black tarsi. The wings are a dull green, slightly tinged with brown, and the margins a light yellowish

green. The nervures are of a similar colour to the membrane of the wings, but of a darker shade. The fly is illustrated in Plate XIV., fig. 2, and it measures very nearly 1 inch across its outstretched wings, and the body is about ½ an inch in length.

THE STONEFLY.

The Stonefly inhabits rapidly-flowing water, and is seldom very plentiful on the South Country chalk streams. The dry-fly fisherman is, however, almost certain to come across an occasional specimen, and it is so prevalent in other parts, and such an important item in the insect food of trout and grayling in brawling becks and strong streams, that this work would be incomplete without some notice of it. It is called *Perla cephalotes*, and is abundant, Pictet says, in the rivers of the canton of Geneva and in different other parts of Switzerland, ascending in places to as much as five thousand feet above sea level. I have also found it in Switzerland and in the Tyrol—in the latter country at Sulden, which is more than six thousand feet above the sea. It also occurs in the greater part of Europe. Newman, indicating its existence in England, adds that he has received specimens from Belgium, Berlin, Halle and Vienna, and an individual speci-

PLATE XV.

STONEFLY.

Perla Cephalotes.

FIG. 1

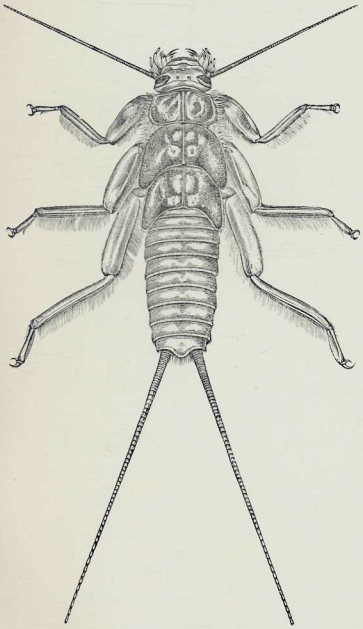

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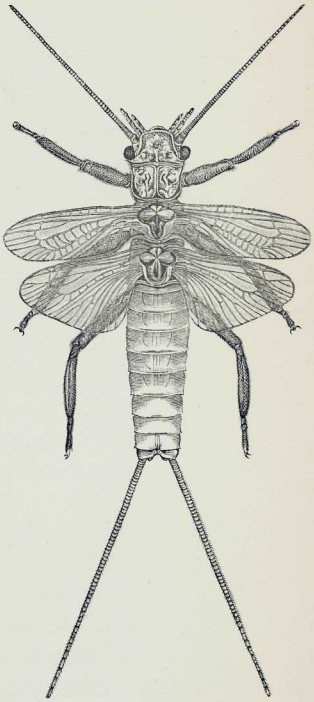
FIG. 2



× 3

men from the Austrian Alps very similar to it but browner in colouration.

The larva illustrated in Plate XV., fig. 1, presents the following characteristics:—The head is pale yellowish brown, marked with brown patches of a darker colour. The eyes are black, and the mandibles and maxillæ are formidable-looking weapons of the type given in the general description of the Perlidæ larvæ. The prothorax, of a fawn colour, is surrounded by a dark brown line which is not quite marginal, and is marked on the back by a medial line and two spots, all dark brown. The mesothorax and metathorax are of similar colour and with somewhat similar markings. The abdomen is of a yellowish brown tint on the underside and brown on the back, with yellowish joints to the segments. The two caudal setæ are a pale reddish brown, and the legs yellow and flattened in shape, ciliated with fawn-coloured hairs. The female is much larger than the male. Larva.

The sexes in this species present but little difference except in respect to size. The female is one of the largest of the Perlidæ, but the male is very much smaller; thus, while the female measures over 2 inches across the outstretched wings, and the body (including, as usual, the head and thorax) is about ·9 of an inch, the male is only about ·8 across the Imago.

wings, and its body about ·7 of an inch in length. The head of the female is wide and of a reddish fawn colour, with a dark brown crescent-shaped marking around the posterior ocelli; the thorax is dark brown, and the abdomen light brown, with two brown caudal setæ. The legs are brown, with dark tarsi, and the semi-transparent wings of a pale brown ground, with dark brown nervures. It is shown in Plate XVI.

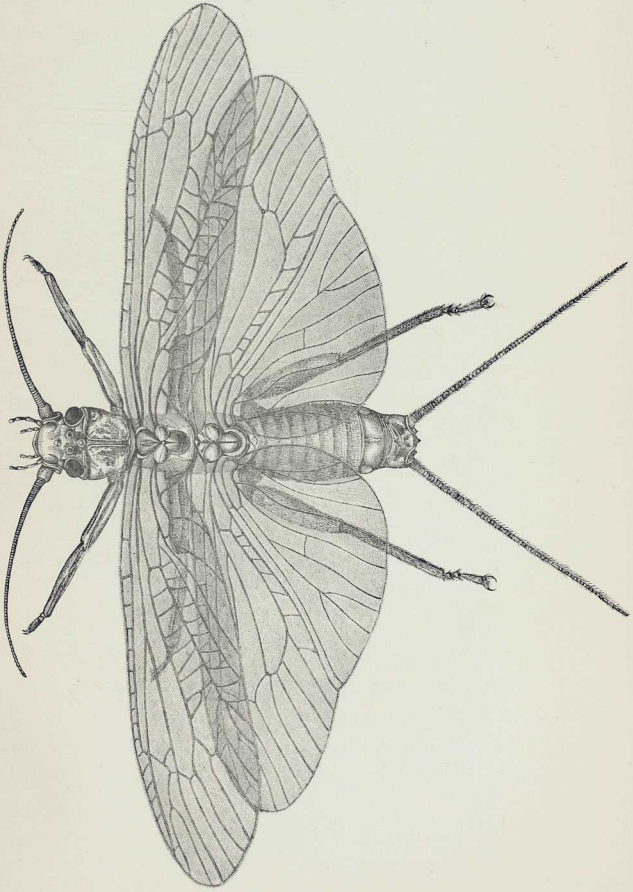
The male has head and thorax and abdomen very much the same in colour as the female, but all very much smaller and slighter. The legs and setæ are perceptibly darker than those of the female. The wings are quite rudimentary, not adapted for flying, and when folded in repose do not extend to the end of the abdomen. The nervures are distinct, and in colour dark brown. Plate XV., fig. 2, gives a very fair notion of its appearance.

Apart from its interest for fishermen, the careful observation of a flat mounted specimen of this insect under a microscope, with a 1-inch or ½-inch objective, is recommended to anyone interested in entomology and desirous of studying the tracheal system of an insect. He will see the two main tracheal tubes, with their markings resembling in appearance the spiral wire spring of a flexible gas-pipe, and serving a very similar purpose. From these main

PLATE XVI.

STONEFLY.

Perla Cephalotes.



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tracheæ smaller branch tubes ramify in all directions, and can be traced almost to the ends of the various members and organs. The air required for respiratory purposes is conveyed by means of these tubes to the circulating fluid in all parts of the insect, as previously noted in the Introduction.

CHAPTER IV.

SIALIDÆ.

THE family Sialidæ comprises in our islands only one genus—Sialis, and of this genus two species, viz., S. lutaria and S. fuliginosa. According to McLachlan, "Transactions of the Entomological Society," 1868, these two species can only be distinguished by the position of one transverse nervule in the anterior wings. Pictet, in "Annales des Sciences Naturelles," 1836, adds to this (1) that the colour of the wings, especially in the males, is darker in S. fuliginosa; (2) that certain markings on the head and thorax are darker in S. fuliginosa; (3) that there is a difference in the colour of the larva; and (4) that S. lutaria appears in April, and S. fuliginosa a fortnight later. But his statements, whenever divergent from those of modern authors, should be viewed with doubt.

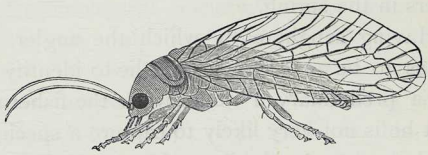
For all purposes to be served here, the two species may be treated as if they were identical, and as Sialis lutaria is certainly the more plentiful in our country, it may be allowable to

call the well-known Alder fly by this name. I am able to speak with greater certainty about this insect than about any other described in this work. In conjunction with the late Mr. G. S. Marryat, I have hatched thousands and thousands of the eggs, have reared the young Alder in captivity, from the new-born up to the full-grown larva ready for the metamorphosis to the pupa. I have taken the larvæ from every chalk stream in which I have fished, and I have found the pupa buried in the ground at or near the banks of all such rivers in the spring.

Identification.

Having caught a fly which the angler believes to be an Alder, how is he to identify it? As a preliminary, I would warn the fisherman that he is not very likely to capture a specimen *on* the water, as the insect is never voluntarily there. During a gale of wind or heavy rain it may on rare occasions be blown or washed on to the river. When searching for it, the grass, the sedges at the edge of the river, or occasionally boughs of trees, wood, or brickwork of hatches or bridges should be closely examined. At the first glance it will be seen that the Alder is a very sober and sombre-coloured creature, with body of a dull brown and wings of a lighter shade of brown with heavily-marked nervures. The wings are somewhat bent downwards when at rest, hence Kingsley's

appellation of "hunchback" when apostrophising it in his "Chalk Stream Studies." It is not altogether unlike one of the Trichoptera, and if the peculiar shape of the wings is not noticed could be easily mistaken for a member of this family. It is, however, only requisite to use a magnifying-glass to dispel any lingering doubt, as the wings of an Alder are destitute of hairs, while those of a Caddis fly are thickly covered with them, or, failing that, the former have mandibles and the latter spurred tibiæ.



× 3

FIG. 11.

The accompanying block (fig. 11) shows a female Alder in profile.

METAMORPHOSES AND HABITS.

Oviposition.

On June 9th, 1890, I was fishing in the Itchen. It was a close, muggy day; the May-fly was over, and there were neither small flies on the water nor trout moving. Seated in a shady spot, I noticed an Alder laying eggs on a flat sedge. Cutting off the blade so as not

to disturb the insect, I arranged it in a good light, and watched the operation for a considerable time through a hand magnifying-glass. When first seen there were a considerable number of eggs already deposited on the sedge. These were arranged regularly in slightly convex rows of about twenty eggs, each row of eggs close to or touching the next.

The Alder's left legs were round the left edge of the sedge. Commencing from the left, it laid usually twelve eggs, the last of these being at the apex of the convexity; it then commenced from the right side and laid eight eggs, this completing the row. Sometimes it would lay the eggs from the left side to the apex, then skip a space of three eggs, lay these three eggs to the apex, and then commence at the right side of the sedge and complete the row. Very rarely it would commence a row from the right side, and reverse the order throughout.

Sometimes an egg space was accidentally missed, but as, before laying, it always felt the egg in the row immediately behind with the hinder end of its abdomen, on such occasions it discovered the blank in the series on its next traverse, and first laid one egg in the vacant space, and then a corresponding one in the row on which it was working. In laying the eggs, it always worked the rows backwards,

crawling over those already deposited, and covering them throughout with the wings, kept flat in pent-house shape. The operation was very slow, and lasted seventy-five minutes, during which time twenty-eight rows, or about 560 eggs in all, were deposited.

A second specimen had its right legs over the right edge of the sedge, and commenced the rows generally from the right. Probably the object of placing the legs over the edge of the blade was to keep the rows of eggs equidistant from the margin. From curiosity I took this specimen off its eggs and placed it close to another patch of eggs on the same sedge. It moved away from these, and after crawling about the leaf for some time found its own eggs and remained on them, but did not recommence laying. After a time it crawled up the sedge, flew off about a foot into some long rank grass, and then crawled under it out of sight.

Eggs.

The eggs are laid, as just described, sometimes to the number of as many as 2,000 or 3,000, on blades of rank grass, sedges, or rushes, usually close to the river, but occasionally they are found at a considerable distance from any water. On a flat surface they are arranged in symmetrical rows, on a round rush or reed, in a spiral, and all invariably in immediate contiguity to one another. The

eggs themselves are a long, narrow oval in shape, with a small projection or stem at the upper end. The appearance of single eggs and of a mass of eggs are shown in Plate XVII., figs. 1 and 2.

Larva

In eight to ten days the eggs split open at or near the upper end, and the newly-born larva, crawling forth, proceeds at once to make the best of its way to the nearest water. The young larva is shown in Plate XVII., fig. 3. It will be noted that the head is large, armed with curved mandibles sharp-pointed at their tips, and furnished with two teeth on their inner edges. The maxillæ are also curved, more slender than the mandibles, and have each a movable lobe (galea) interposed between the jaw and the palpus.[1] The antennæ are short and four-jointed. The legs are fringed with hairs, and the two-jointed tarsi have each two sharp claws. The abdomen is long and tapering, composed of nine segments. Each of the seven anterior segments of the body carries a pair of branchiæ, one on each side; these are four-jointed, tapering towards the points, and are ciliated. At the end of the abdomen is a long, tapering tail, also ciliated but not articulated.

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[1] See Introduction, page 20, where this type of construction is discussed.

As soon as the young larvæ are in the water they swim down to the bottom and bury themselves in the mud, there to pass their larval existence. Their food consists mainly of smaller aquatic larvæ; they are voracious feeders, grow rapidly, and within somewhat less than a year from the date of the deposition of the eggs, are fully grown and ready for the metamorphosis into a pupa. They frequent comparatively still portions of a stream, or even ditches or ponds. The adult larva is shown in Plate XVII., fig. 4, and it will be seen that, except for the great increase of size, the general description of the newly-born larva will apply.

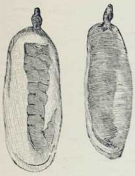
Metamorphosis to pupa.

A short time before changing to a pupa, the larva crawls ashore and digs an oval cavity in the ground into which it retires, about six or eight inches below the surface. It is generally held that the tracheal branchiæ of aquatic larvæ can only be used when wet, because it is said that when they become dry, air or oxygen can no longer pass by endosmosis through the membrane, and their function necessarily ceases. Having with difficulty collected larvæ in the act of making the oval hole, and having selected them from dry places, I can speak with confidence. They were in every way identical, and could not be distinguished from other

PLATE XVII.

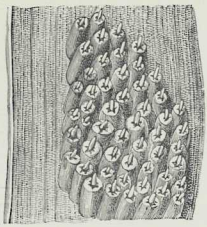
ALDER.

FIG. 1



× 30

FIG. 2



× 15

FIG 3

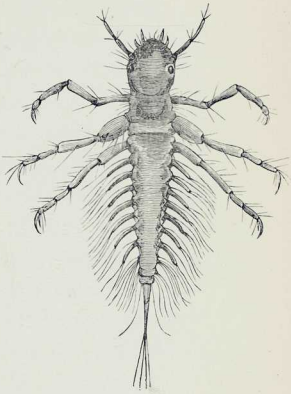


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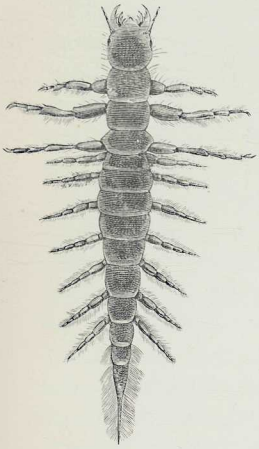
FIG. 4

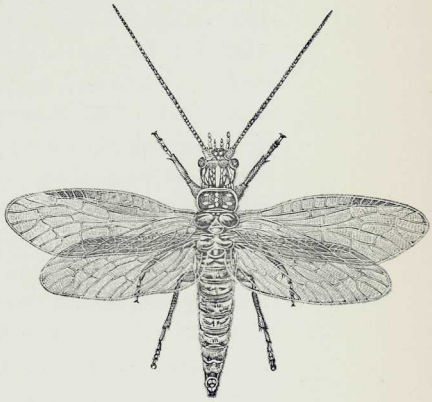


× 3

FIG. 5

× 3

FIG. 6



× 3

larvæ taken out of the water. The tracheal branchiæ were plump, and showed no sign of contraction or shrivelling. Here then is an undoubted instance of an insect breathing in the air by means of an external respiratory branchiæ, unless it has other means of breathing at present unknown. Perhaps it can manage in some way to keep the branchiæ moist! But how? That is a question to which an answer has yet to be discovered.

Pupa.

The larva when in the oval hole changes into a soft, motionless pupa, shown in Plate XVII., fig. 5. This pupa is curiously curved in the cavity, with its head bent downwards and against the lower side of the thorax. The hind end of the abdomen is bent upwards, and the wing covers, antennæ and legs are all lying nearly parallel with the abdomen. Its head, mouth organs, and abdomen are very similar to those of the larva, but the tracheal branchiæ and the tail have disappeared, and there are a number of stiff hairs at the joinings of the segments. The legs have become more slender, and the antennæ longer. In a few days the pupa changes within the cavity to the imago, which makes its way to the surface of the ground, leaving the cast skin, which shows all the organs and the form of the pupa.

Imago.

Head black, antennæ comparatively short,

ocelli absent, labrum nearly triangular and with a deep notch in the middle in the ♂, rounded in front, with a slight notch in the ♀. Thorax large and nearly black. Abdomen short and thick in the ♀, and more slender and tapering in the ♂. Legs dark brown, with four-jointed tarsi. Wings light brown, with very strong brown veining. Plate XVII., fig. 6, shows the male imago.

Sexual intercourse takes place on a post or a sedge, but not in the air; the male during copulation is undermost, and the eggs are laid shortly afterwards. The life of the insect from the egg to the imago is approximately one year. Specimens have been taken as early as the second week of April, but May and June are the months in which the fly is most prevalent.

It will be seen from the foregoing life history that the only stages at which the Alder has any occasion to be near or upon the surface of the water are when the newly-born larva is first entering this element, and when it is returning to dry land, full-grown, preparatory to pupation. Now, in all the families of insects described in the previous chapters the animal has, during its life and metamorphoses, to be at times on the water; in some the nymph or pupa emerges from it, but in every case the female imago has to deposit its eggs in the

water, being itself either close to, on, or below the surface for that purpose. The winged Alder, however, is under no necessity of visiting the water; the larva is safely housed in a cavity in the ground before changing to the pupa, the imago rises directly from that cavity and deposits its eggs on a rush or sedge at or near the river.

It is necessary to be quite clear on this point, to prevent, if possible, amateur writers from indulging in the wild freaks of fancy indicated by references to "great rises of Alder," "Alder bushes from which clouds of the fly named after it are falling on the water," "the fish gorging themselves on Alder and hence refusing imitations of any other insect," and so forth. Let it at once and for all time henceforward be definitely understood that, except under stress of weather or by accident, Sialis lutaria is seldom found on the surface of the river. What hallucination prompts a fish to take the artificial fly intended to represent the Alder is beyond comprehension; possibly it is mistaken for the Welshman's Button (*Sericostoma personatum*), which is often seen in great numbers on the surface of streams when the former species is abundant ashore.

Parasites in Eggs of Alder.

While breeding Alders in captivity, a circumstance occurred which gave the late Mr.

Marryat and myself much extra work. On one occasion, instead of larvæ of S. lutaria, a number of tiny perfect winged insects emerged from the eggs. None of our entomologist friends could identify them, but all agreed that they were parasitic Hymenoptera. I tried the experiment several times, and in some cases found that, from part of the eggs, the Alder larvæ emerged, and from others this little insect.

In despair, we mounted a series of Alder eggs, Alder larvæ, larvæ and pupæ of the parasite, as well as the imago of this fly, and submitted them to the British Museum (Natural History). After considerable delay, the official in charge of that department wrote, after giving his reasons, "that it would be quite allowable to describe it provisionally as a new species." "The insect is, as I told you, a *Chalcis*, *i.e.*, it belongs to the great group of parasitic *Hymenoptera* called *Chalcididæ*."

Some time afterwards, discovering that an entomologist of great experience (Mr. Frederick Enock) was working out insects of this class, I submitted to him the identical mount that had been previously sent to the British Museum. In reply, he said, "The species that you have bred is by no means new; it is *Trichogramma evanescens*. Last year I carried it through the year breeding in various kinds

of eggs, *Sialis lutaria* included, to the seventh brood, and now have the eighth brood in the eggs of a moth."

I mention the matter for two reasons, firstly, to tender my thanks to the British Museum and to Mr. Enock for so kindly rendering me assistance, and secondly, to point out to my readers that if they, or others, are mistaken in the identification of an insect, it is quite excusable, seeing that experts of high standing can differ in their conclusions on such a question.

CHAPTER V.

DIPTERA, &c.

WESTWOOD, in his "Modern Classification of Insects," said of the Diptera: "The two-winged insects constitute one of the most extensive orders of the Ptilota, not only in respect to numbers of *distinct species*, but also to the swarms of individuals of the *same species;* and which from their constant attendance upon man have attracted his attention from the earliest ages."

Mr. G. H. Verrall, the Dipterologist, compiled in 1888 "A List of British Diptera," containing about 2,500 species, and in the preface invited "authentic additions to this list and confirmation for all species printed in italics." These (about 570 in number) were partly doubtful natives of this country, and partly species of questionable authenticity insufficiently described.

Mr. W. F. Kirby, in his "Elementary Text Book of Entomology," second edition, published in 1892, gave a table exhibiting approximately the number of insects in every order

"known to inhabit the British Isles and the world," and reckoned the British Diptera at about 3,000 out of about 28,000 species in the entire world.

Abundance of Diptera on the water.

Every chalk stream angler must have been struck by the frequent appearance on the stream of swarms of small, dark, or black-looking flat-winged insects belonging to this order. If he has carried his investigations further and examined the contents of the stomachs of trout and grayling he has killed, he cannot fail to have observed that flies of this class are almost invariably present in large or small numbers, and seem to constitute in many cases the greater portion of the undigested food. It may, in fact, be said without fear of contradiction that these Smuts, Fisherman's Curses, and Black Gnats, as they are variously styled, are found more often than any other variety of floating food.

Description of Diptera.

Head usually large and most frequently narrower than the widest part of the thorax, rounded in contour more or less laterally, and above and sometimes in front also; but often flattened or concave behind, and attached movably to the thorax by a short neck.

Compound eyes (*oculi*) varied in form in different families or genera, round, oval, reniform or hemispherical; their relative size also varied, sometimes with the genus or family,

and sometimes with the sexes of a species, so that they may be far apart in the female, while in the male approached to each other or in mutual contact above. Three *ocelli* often present.

Antennæ likewise diversiform in distantly related flies, and also sexually in certain families of the *Nematocera* (thread-horned), a portion of the lower division, *Orthorrhapha* (straight-seamed), of the order. Thus in most of the Nematocera they are long in proportion to the head, many-jointed and in their greater part filiform (thread-like) or moniliform (like a string of beads), in the female or in both sexes; but the males, in some families, have plumose (feathery) or pectinate (comb-like) antennæ. In the other portion of the same division, hence termed *Brachycera* (short-horned), and in most flies of the higher division, *Cylorrhapha* (circular-seamed), these appendages are short in comparison with the head; and a large majority of them have the third antennal joint (the biggest of all) compressed, oblong, or else roundly dilated beneath, and the few succeeding jointlets, inserted in its upper edge, either very short or tapering, or in the form of an awn, which is either nude, hairy, ciliate, or plumose.

Mouth-parts adapted to suction, or very rarely undeveloped. The mandibles and first

maxillæ (distinguishable by their palpi from the former), if used for piercing take the form of lancets, as in the Flea and Gnat. The swollen, fleshy-lobed tongue, beyond the palpi in the elbowed proboscis of the Blow-fly, is said to be chiefly labial in its composition.

Theobald, in "An Account of British Flies (Diptera)," the first volume of which was published in 1892, describes the thorax as usually large and compact; the prothorax very much reduced and attached as a collar to the very large mesothorax, which is developed at the expense of the other two segments.

One pair of true wings only developed; these, the anterior, are usually transparent and never folded, but are provided in certain families with an inferior basal lobe which is termed the *alula* (winglet). Veins crowded in front, distant behind. Cross veins few.

The hind legs reduced to small club-shaped laminæ, known as *halteres*. Both pairs of wings may be absent. The abdomen is generally small, but may be elongated as in the Tipulidæ, and is composed of five to nine segments.

Legs slender, having five-jointed tarsi with ungues or pads at the tips (or both) for attachment.

The nervous system presents various modifications; in some the ganglia of the thorax and

abdomen become fused, or there may be three thoracic ganglia and five or six abdominal ganglia.

The male internal genital organs consist of two testes with vasa differentia, and there are external copulatory appendages. The females have three receptacula seminis in connection with the vagina, and in some cases have a retractile ovipositor.

The alimentary system of Diptera cannot here be passed in review. With regard to their respiration, it may be noted that some of them have extremely sacculated tracheæ.

CLASSIFICATION.

Orthorrhapha

Reference has already been made, in the paragraph treating of the antennæ (page 128), to the two principal divisions in which Diptera are arranged by Professor Brauer of Vienna. The flies comprised in the lower division, Orthorrhapha (straight-seamed), emerge from the pupa through a simple slit in the integument of the back. Among them the Nematocera are more numerous in this country than the Brachycera, and comprise a great variety of insects of varied habit, habitat and life history.

The Fleas (Pulicidæ), placed lowest in Verrall's list, are more highly specialized

than many of the families ranked above them; but it is convenient to shelve them out of the way of the others on account of their aberrant form. Living in the habitations or nests of mammals and birds, their larvæ find nutriment (perhaps in particles of animal matter) in the dust, and the imagines—there is no need to say what they do. Cecidomyidæ are mostly minute flies which lay their eggs in the tissues of flowering plants, and thereby produce, in many instances, characteristic deformities and galls. Mycetophilidæ, as their name implies, are chiefly fungus-flies, and their maggots form some portion of the writhing population inside fresh or rotting toadstools.

The larvæ of Bibionidæ live underground and feed on the roots of plants (see Black Gnat, page 142); those of Simulidæ inhabit water, and are largely concerned in the purification of rivers and streams, their food consisting of minute particles of organic matter secured as they drift past within reach of the animal's sweepers (see Reed Smut, page 138). The female Simulia are the well-known Sand-flies—a name strangely misapplied by Ronalds to one of the Caddis-flies (Trichoptera).

Chironomidæ.

Chironomidæ are a numerous family. A large number of them have aquatic larvæ that live amidst water-weeds, especially Confervaceæ; but many are terrestrial and inhabit

damp soil or other moist material. The flies that congregate in dense clouds over roads and footpaths to gambol in the air in the neighbourhood of water and high above rivers are often species of harmless gnats belonging to this family. Other members of it are the little specks of midges (Ceratopogon) that are so maddening in the shade of trees and damp places.

Psychodidæ.

Psychodidæ are small flies similar to moths in aspect. The larvæ feed, some on putrescent animal, excretory or vegetable substances in shady situations; some on the slippery cryptogamic vegetation coating stones exposed to the wash of ripples or to the spray of waterfalls; and others live in wet sand or mud. The transformations of certain species have lately been illustrated by Miall and Fritz Müller in the "Transactions of the Entomological Society of London."

Culicidæ.

Then follow the Gnats or Mosquitoes (Culicidæ), of which the life-history has been a favourite study of microscopists interested in the inhabitants of ponds and other tranquil waters; and at last the highest forms of Nematocera are reached, in families related to the Daddy Long-legs or Crane-flies (Tipulidæ), with larvæ of differing habits, many being destructive to the roots of grasses, &c., others inhabiting marshy ground or the borders of streams, and some living under rotten bark.

Tipulidæ.

Among the Brachycera (which comprise several families) may be mentioned the Chamæleon-fly (Stratiomys), since its larva is figured in many popular natural history books; the Clegs and Stouts (Tabanidæ), and the Fisherman's Curse (Hilara), a genus of the Empidæ (see page 142). Brachycera.

In the division Cyclorrhapha (circular-seamed) the fly issues from the pupa through a round hole formed by the detachment of a lid-like piece from one end of the obtective integument instead of through a slit in the back. The families composing it are separated into sub-divisions according as the flies have a labial proboscis (Proboscidea), or have not (Eproboscidea); a synonym of the latter sub-division is Pupipara, the flies giving birth to larvæ that moult and become pupi-form or moulting pupæ (Mansel-Pleydell) instead of eggs. Cyclorrhapha.

Without mentioning every family, a few members of each sub-division may be named as examples of flies of varied habits among the higher Diptera. Thus in the Syrphidæ, the typical genus yields larvæ that feed upon Plant-lice (Aphidæ), to the great benefit of hop-growers and agriculturists; Volucella larvæ ravage the nests of Humble Bees; Eristalis tenax breeds in putrescent carcases and sewage; and Merodon larvæ bore into the bulbs of Amaryllidaceous and Liliaceous plants. Proboscidea.

Conopidæ provide larval parasites that make inroads on Wasps (Vespidæ) in their nests, like the invaders above-mentioned of Bombus (Humble Bees).

The larvæ of Oestridæ are mammalian parasites, some inhabiting the stomach like the Bot-fly of the Horse (Gastrophilus); others the nasal passages, frontal sinuses or pharynx, like that of the Sheep (Oestrus), and a newly recorded fly of the Elephant; and others again, the Worbles (Hypoderma), establishing setons under the skin of the back of the ox, horse, and even man. The maggots of several Tachinidæ eat out the viscera of larvæ of other insects after the fashion of Ichneumonidæ (Hymenoptera); Sarcophagidæ and some of the Muscidæ are carrion flies, such as the Blow-flies, Green-bottle, and Blue-bottle flies, of which the maggots are more relished by the fish than by the fly-fisherman. In other families there are the Dung-fly (Scatophaga), the Bacon and Cheese-Hopper-flies (Piophila), and numerous species that breed in plants (on their roots, in their leaves, or amidst their inflorescence), some of them garden-pests, like the flies of the celery, parsnip, carrot, and onion.

Eproboscidea (Pupipara).

The Eproboscidea (Pupipara) mentioned in the early part of this chapter, are all of them external parasites. Hippoboscidæ, besides the

Forest-flies (Hippobosca) that harbour on the horse and camel, comprise other flies that attach themselves to birds, one peculiar to deer, and the well-known apterous Sheep-tick (Melophagus). Braulidæ, of which there is but one genus Braula, is a minute blind apterous parasite that clings to Humble Bees, with its head thrown back, upside down upon its thorax. Nycteribidæ are parasites of Bats (Cheiroptera) and are also apterous.

Scope of Chapter.

From this imperfect survey, it will be seen that the order comprises a great variety of insects differing in their habits, habitat and life history. To treat of the entire order here in full detail would obviously be impossible, and practically useless to the fly-fisherman. I propose, therefore, limiting the scope of this chapter to a few species which are commonly seen on the water, and serve as food for the fish. Nor can I refer the fisherman to any reliable modern works in English descriptive of Diptera, with full particulars of their earlier stages or biology.

The majority of entomologists are, unfortunately, too prone to neglect the consideration of the larval and pupal stages. In fact, it almost seems as if their study of the creatures were confined to the imago, and the chief if not the only object of their work were to discover new species or rare varieties. But it

is not everyone who can secure space and leisure for extensive research in the departments of comparative anatomy and metamorphosis, and few can command a facile pencil to record, in the only way that is intelligible to all, original discoveries by means of exact illustration.

Scarcity of English books on Diptera.

Theobald, in his Preface, says that the only English book on the subject is Walker's "Insecta Britannica Diptera," which is out of print, having been published forty years ago, and containing much that is out of date and inconsistent with the knowledge of the present day. Westwood's illustrations of the flies and portions of the letter-press contributed by Haliday give it, however, an intrinsic value, especially in the third volume; but Walker was given to describing the same species repeatedly, re-naming them as often, and slurring over difficulties, so that the work is unequal in merit.

In the older books on Entomology by Westwood and Curtis, some space is devoted to the Order, and although the information given is usually accurate, yet, as regards the flies which are specially of interest to the fisherman, it is meagre. Theobald's book already referred to is useful as far as it goes, but is not exhaustive. Verrall has a monograph in preparation descriptive of the species of flies, but it is said that it will not treat of

their life history in great detail, being designed after the model of Zetterstedt's works.

Foreign books on Diptera.

Hitherto, therefore, English students of Diptera have made great use of foreign monographs on this Order, such as Schiner's "Fauna Austriaca Diptera," in two volumes, completed in 1864 (German); Van der Wulp's work on the Diptera of the Netherlands (Dutch with Latin diagnosis); Zetterstedt's "Diptera Scandinaviæ," in fourteen volumes, completed in the fifties (Latin); and Meingen's "Systematische Beschreibung der bekannten europäischen Zweiflügeligen Insecten," published in the early part of this century and reprinted over thirty years ago, which is especially serviceable on account of its finely-coloured illustrations (German with Latin diagnosis). Brauer, Osten-Sacken and Löwe are also important writers on this order.

Species of Smuts or Curses.

Here let me express my thanks to Mr. Verrall for enabling me to give the generic names of three and the specific name of one of the fly-fisherman's Diptera in this chapter, and now to be mentioned.

Three species of these flies that are freely taken by the fish are called Reed Smut, Fisherman's Curse, and Black Gnat. There is also a fourth Smut, which the late Mr. Marryat and I found on two on three occasions on the Test in considerable numbers. This, from its

wings being of a slaty blue colour, we called the Blue Smut. As we have only found it on the Test, and as I believe it is a somewhat rare insect, it has not been deemed advisable to illustrate it here.

According to Mr. Verrall, the Reed Smut is "a species of Simulium, but species in this genus want to be in beautiful condition for satisfactory naming; we have about eight species in Britain." He says that the Fisherman's Curse "is a Hilara of which we have forty or fifty species in England." He gives the scientific name of the Black Gnat as *Bibio Johannis*, and of the Blue Smut says that it is of the genus *Clinocera* and species "possibly *bipunctata*."

REED SMUT.

The name of Reed Smut was given to the fly illustrated (fig. 12) by the late Mr. Marryat, because he believed that its larvæ and pupæ were found in the water fixed to reeds or ribbon weed (*Sparganium ramosum*). I have long tried to verify this by reference to entomological works, and consulting specialists on the subject. This has unfortunately been impracticable, but I have always found my late

× 3
FIG. 12.

friend so accurate, and so uniformly correct in matters pertaining to natural history, that I have very little doubt as to the fact. In very shallow trout-brooks where there are no weeds, the pupæ are often attached to stones. It must not, however, be considered that I have taken the responsibility of identifying the larva and pupa illustrated at Plate XVIII., figs. 1 and 2, with the insect now called the Reed Smut. Mr. Verrall determined the imago to be one of the genus *Simulium*, and the illustration in question agrees with Miall's description of the larva, pupæ, and imago of Simulium. But I do not vouch for the species.

The following is an abbreviated form of Professor Miall's description in the "Natural History of Aquatic Insects," published in 1895:—

Larva.

In brisk and lively streams where there is a never-failing supply of well-aërated water, plenty of submerged foliage and microscopic organisms, the larvæ of Simulium abound, looking like small black worms, five-eighths of an inch or less in length, attached to water-weeds such as float grass, water-cress, water-crowfoot, and the like, in countless numbers. They are clustered mostly on the underside, and only become visible when leaves are plucked or turned over. Their bodies are cylindrical, and dilated in the hinder part of

the abdomen. On each side of the head is a fringed, fan-like appendage containing about fifty long filaments. This pair of appendages, like the similar apparatus of the larval Gnat, is employed in sweeping particles into the gullet, the food of the larvæ being altogether microscopic; the creatures can often be seen combing out these appendages with their mandibles to prevent their getting clogged.

They have two pairs of small eyes (mere pigment spots) and small three-jointed antennæ. There are two pairs of legs ending in coronets of hooks, each pair coalescing to form a single organ, which is mainly employed as a sucker; the fore-pair is, however, occasionally used in grasping, being opposable to the head. Each sucker is thus a cup roughened on the edge by numerous minute teeth to prevent slipping. The action of these suckers is easily demonstrated by placing a larva fresh from the stream in a saucer of water. It creeps about like a leech, applying the two ends of its body alternately to the smooth surface of the saucer. Even in a rushing stream it appears never to be detached against its will.

When feeding, it holds on by its tail sucker and sticks its body straight out into the current. In an unusually strong stream, when not feeding, the larva doubles up its

PLATE XVIII.

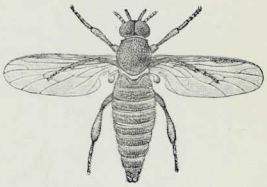
DIPTERA.

FIG. 1

× 4

FIG. 2

FIG. 3



× 4

FIG. 4

× 4

FIG. 5

× 4

body and anchors with both suckers. If disturbed it lets go, drifts a few inches, and then remains stationary in the torrent, and on close observation a thread or a number of threads can be seen extending from leaf to leaf, grasping which it creeps about to regain its former position. On an emergency a new thread can be spun.

Pupa.

Before pupation the larva constructs a kind of nest, which is glued fast to the surface of a water-weed. Sheltered within this smooth and tapering cocoon, whose pointed tip is directed up-stream, while the open mouth is turned down-stream, the pupa rests securely during the time of its transformation. When first formed, the cocoon is completely closed, but when the insect has cast its larval skin, one end of the cocoon is knocked off, and the pupa thrusts the forepart of its body into the current. The respiratory filaments projecting immediately behind the future head (according to Theobald eight in number), very long and filiform, draw a sufficient air supply from the surrounding well-aërated water. The rings of the abdomen are furnished with projecting hooks by means of which the pupa is secured to the interior of the cocoon.

Metamorphosis to Imago.

During the latter part of the pupal stage, the pupa skin becomes inflated with air and assumes a more rounded shape in consequence.

It splits along the back, and there emerges a bubble of air which rises quickly towards the surface and bursts. Then out comes the fly, which mounts to the top of the water, and as soon as its wings are dry takes flight to the trees or bushes overhanging the stream.

The flies of this genus are small and of dull colours, with lighter hair-markings on the legs and sides of the body, differing with the species, and which readily wear off.

FISHERMAN'S CURSE.

Description. The Fisherman's Curse, figured on Plate XVIII., fig. 3, belongs to the Family *Empidæ*, Group *Empinæ*, Genus *Hilara*. The metamorphoses seem to be unknown, but probably the larva is aquatic. The imago is a small insect of a grey black colour, sparsely covered with hairs. The palpi are three-jointed, the proboscis prominent, antennæ curved upwards. Eyes separated in both sexes, ocelli three. Abdomen brown in colour, slender in the male and broad in the female.

It is said that the flies swarm in myriads in the spring and summer over running water, so near the surface as almost to ruffle it.

BLACK GNAT.

Description. The Black Gnat of the Angler is of the Family *Bibionidæ*, Genus *Bibio*, Species *Jo-*

hannis. The larvæ are cylindrical or fusiform maggots living in the earth, in dung, stems of plants, and at the roots, destroying the vegetation. They are furnished with twenty spiracles, and with transverse rows of hairs. They are generally whitish brown in colour with brown head, which is armed with two biting mandibles.

The pupa is dark brown, of shrivelled appearance; the wing cases are small.

The imago is illustrated in Plate XVIII., the male in fig. 4, and the female in fig. 5.

The Black Gnat is a common and widely-distributed fly, occurring about Midsummer (St. John's) day, whence the name. Another species that comes out towards the end of April is for a similar reason named Bibio Marci.

Other Diptera taken by Fish.

The common house fly, the blue-bottle, and the oak fly, are occasionally found in autopsies, and sometimes gnats and gnat larvæ are taken by the trout, chiefly on fine, calm evenings in early spring. No doubt odd specimens of any other members of the order falling in the water near hungry trout or grayling would also be promptly annexed.

OTHER INSECTS FOUND IN AUTOPSIES.

Besides the insects described and referred to in this and previous chapters under the respective Orders and Families to which they

belong, there are a few which are freely taken at times by the fish. Probably the genus of insects most usually found in trout, in addition to those generally described in the fly-fisherman's list, is one of the Corixæ. These are small water bugs, very similar in shape to the well-known Water Boatmen (*Notonecta*), and, like them, belonging to the Heteropterous division of the order Hemiptera. In Corixa the head is short and wide and the body thick. The forelegs are short and the medial and hind legs long. The hind legs are flattened in the lower joints to a paddle shape, and all the legs are fringed with hairs. The hind wings are large and transparent, and the fore wings are mere wing covers of a horny substance; they are a purple brown colour, with spots or markings of a lighter shade. The insect swims rapidly, using its legs, and especially the hinder, as oars. The water boatmen swim on their backs, but the Corixæ swim with the back upwards. They are also able to leave the water and fly, using their hind wings for the purpose.

Aphis.

The Aphis, green-fly, or plant louse, a form of the Homopterous Hemiptera, is often taken by fish, but is too minute for successful imitation. Westwood, in his "Modern Classification of Insects," says, "Each family of plant lice in spring and summer consists of individ-

uals always wingless and of pupæ; all these, however, are females, which produce living young without a previous union with the other sex. The males, of which some are winged and others apterous in the same society, are not born until the end of the summer or autumn. They fecundate the last generation, produced by the previously born specimens, consisting of wingless females, which then deposit fecundated eggs, which remain through the winter and produce young in the spring, capable of reproduction without fresh impregnation." This gives some idea of their life history, which, although interesting, is very complicated, and being of no practical utility to the fly-fisherman need not be further pursued.

Earwigs occur very rarely. An occasional specimen of the winged Red Ant (Myrmica) is present during the summer and early autumn. In certain rivers, notably the lower part of the Dorsetshire Frome, a considerable number of the so-called bloodworms, or larvæ of various species of the genus Chironomus, as well as the pupæ and imagines of the same, are generally present in autopsies. I have not included this insect among the Diptera usually taken by trout and grayling in the South country chalk-streams, because I have grave doubts as to the genus being plentiful in the clear running streams which are comparatively

unpolluted. I believe that wherever in flowing water the bloodworms are abundant, it may almost be deemed a certainty that sewage pollution in considerable volume is also present. No better example can be cited than the river referred to. Above the town of Dorchester Chironomus is comparatively rare, while below the point where all the sewage and filth of the town is or certainly was poured into the river it is present in great numbers and is freely taken by the trout, which certainly seem to thrive and grow to great size on the food they affect. On one occasion, when a quantity of small weed was discovered, microscopical examination revealed the cause of the trout taking this vegetable matter, as it was found to be full of minute larvæ of one of the Diptera (*Simulium reptans*) the genus of which has been previously described under the heading of the Reed Smut.

There are, however, in addition to these, a host of others which have been credited by Angling writers with the quality of being acceptable to the feeding Salmonidæ in the rivers; but I am inclined to consider that in the majority of instances this has been largely due to excess of the imaginative faculty, no substantiating evidence being producible.

Of the caterpillars, spiders, and other creatures which are supposed to fall from the

trees into the water, and into the trout's mouth, and of the consequent advantage of trees projecting over a stream; of the sapient advice, verbal and written, to cultivate vegetation overhanging the river, because it increases the supply of natural food; of the statement that fish under trees are invariably in the best condition, Anglers have heard from time immemorial. My advice is, cultivate your trees, because they are of advantage as giving shelter to the fish! Not a single example of these tree windfalls has been found in the hundreds of autopsies which I have made, and all the caterpillars and spiders that fall from the trees in a mile of water would not suffice to feed a single pound trout for a single day. They may therefore be discarded from consideration.

It will be seen that the entomological chapters of this book, as far as they concern fishing, have been altogether confined to two classes of insects:—firstly, those that undoubtedly do serve as food for trout and grayling; secondly, other species and genera which are occasionally taken by them.

In the first division are included only such insects as have been found by me in autopsies; and perhaps this definition may savour of conceit. It may be argued that the fact of one individual not finding a particular fly in the

fish he has killed is at best but negative evidence on the point. The reader must, however, remember that this individual has for many years on many chalk streams made it an invariable custom to *autopse* fish, and make careful notes of results, besides retaining and preserving in spirits typical examples, with date and name recorded of the artificial fly with which the fish were killed. Nor must it be imagined that all these trout and grayling were caught by me, since it often happens that I examine the contents of the stomachs of fish also killed by my friends.

PART II.

THE HUNDRED BEST PATTERNS OF FLOATING FLIES.

NINETY standard patterns were described and illustrated in "Floating Flies and How to Dress Them," and the above title suggests that the number has since been increased by at least ten. Some readers may express doubt as to whether there is any necessity for the modern dry-fly fisher to equip himself with so great a variety. Some may indulge in a little harmless ridicule, and say that, for the man who can fish, half-a-dozen different sorts of flies are sufficient. Let it be once for all clearly laid down that the writer does not in any way assert that *all* the patterns are required for an adequately filled fly-book; nor does he advise even the most enthusiastic devotee of the art to squander his substance in the purchase of all of them.

The object of this part of the book is to indi-

cate what the experience of many years on South-country streams has taught an observant angler as to the comparative merits of the different flies, and the conditions under which success can be anticipated for each pattern or section of patterns. Every fisherman has a predilection for particular dressings, colours or materials, and, to quote the words written on the subject in 1886, I "leave to the practical fisherman the choice of such as accord with his fancy, and free permission to discard any he does not consider suitable for the particular stream he is in the habit of fishing, nothing, in my opinion, so much contributing to the success of a pattern or dressing, as a firm conviction in the mind of the fisherman that it is the very best of its sort."

The expression so often used, especially by professional fly-tyers, that a certain dressing of a pattern is right, and any variations or deviations from it are wrong, should be disregarded. It is impossible to draw a hard-and-fast line as to the most appropriate combinations of materials or mode of dressing for any fly which is, or pretends to be, an imitation of a natural insect. Some of the very best and most killing patterns of modern times are the outcome of successive experimental alterations of old standards.

Many of these experiments have, as may well be imagined, proved unsuccessful; some have

been of questionable utility, and a few of the patterns evolved have been found so admirable as to result in the original standards being discarded in favour of the improved dressings. This form of development is continuous, and should continue for all time. In respect to fancy flies, by which expression it is intended to designate such as are not imitations of natural insects which are *plentiful* on the streams, there is a little more excuse, and variations or improvements of such patterns should, for the mutual convenience of the fly-dresser and the fly-fisherman, be called by different names, and not by those usually applied to the orthodox patterns.

Some exception may be taken to the above definition of a *fancy fly*, and it may fairly be argued that to warrant this appellation the pattern must not be an imitation of any natural insect, either common or rare. I would, however, urge that if the modern dry-fly fisherman is content to restrict his study of entomology to such insects as are bred in the water in great numbers, or are generally found on the surface of the stream, he will find quite sufficient work for an ordinary lifetime. If the fly-dresser, too, will agree to call all flies not included in this category fancy patterns, it will tend to simplify matters.

To indicate the danger of trying to fit every fancy fly to some natural insect, I can give a curious, but probably not unique, experience. On

July 18th, 1886, I found a specimen of the so-called Fisherman's Curse, with a small bright scarlet parasite fixed on the back of the abdomen close to its hinder end. There was a temptation to proclaim it far and wide as the original of the well-known red tag. What an absurdity it would have been! Never before or since had another such specimen been, as far as I know, even heard of. During the summer of this year I have, however, discovered a considerable number of these scarlet parasites on the Itchen, attached to Blue Winged Olives, Sherry Spinners and Olive Spinners of both sexes.

For convenience of reference in studying the patterns described in subsequent pages, it may be here explained that each fly is distinguished by a number as well as a name, and it should also be noted that wherever a pattern is designated by a name which also occurs in "Floating Flies and How to Dress Them," it is dressed similarly to, and is practically identical with, that given in that book. Where any great improvement has been effected in the dressing, or where the old name has been given to a new pattern, such fact is noticed immediately after the description of the dressing of the fly. It has not been deemed necessary to give coloured illustrations of each pattern, as in many instances the difference of shade or colour is only minute. Fifty-three of the hundred pat-

terns are, however, shown, and in the case of the smaller ones the figures are magnified to assist the dresser in matching, by giving a larger mass of colour in each part. In every such case an outline sketch of the fly, drawn to the natural size, is placed immediately under the coloured plate.

I have also attempted a more natural and systematic arrangement of the patterns, dividing them into two groups—the first such as are imitations of natural insects, and the second such as correspond to the definition given before of fancy flies. Group I. is subdivided into the following nine sections:—(I.) Olive Duns; (II.) Pale Watery Duns; (III.) Blue Duns; (IV.) Blue Winged Olives; (V.) Spinners; (VI.) Mayflies; (VII.) Curses; (VIII.) Caddis Flies; and (IX.) Various, not comprised under the above heads. Group II. is subdivided into three sections:—(I.) Upright Winged Patterns; (II.) Flat Winged Patterns; and (III.) Hackle Patterns.

It will probably be remarked that the proportion of wingless or hackle flies comprised in this series is largely increased as compared with the list given in 1886. Not many years since, winged flies were the sheet-anchor of the dry-fly fisherman, and the number of hackle patterns used, or of the anglers using them, could be counted on the fingers of one hand. Since then such dressings as the Hackle Red Spinner,

Brown Badger, Detached Badger, Jenny Spinner, Orange Bumble, Furnace Bumble, Red and Orange Tags, Half Stone, &c., have advanced rapidly in favour. Then, too, the Egyptian Goose and other hackle patterns of Mayfly have for years killed so well as to necessitate their inclusion in every fully-stocked Mayfly box.

The introduction of the hackle patterns of sedge must be treated somewhat in detail. From the middle of August to the end of the trout season, and thence well on to November, the sedge flies are plentiful during the daytime, the females being usually seen on the wing, dipping occasionally on the water while in the act of laying their eggs. All fish in the stream, whether trout, grayling, or coarse fish, are eager to secure them as they touch the surface of the stream. Naturally an observant fisherman tries the best imitations he has in his book, such as the Silver Sedge or Hare's Ear Sedge. The experience of one and all is that on bright or moderately calm days the winged patterns are generally useless on a south-country chalk stream, and many dismiss the subject with the remark that the fish are shy of gut, man, or shadow of rod, and are content to wait until dusk. Some will impute their want of success to a superabundance or a deficiency of weed, or to the excessive brightness of the sun. Others, again, will take refuge in the safe and oft-repeated formula of "over-fished."

The next time the reader is out, he might find it most interesting and not less instructive to devote a little time to careful observation of the sedge flies and their movements. He will then notice that in the act of laying its eggs the fly barely touches the surface of the stream, and even when it falls and cannot rise again it lands on the water like the proverbial thistle-down. Let him attach the best winged pattern he has to his cast, and, using the greatest care, place it on the water, when it may safely be predicted that he will be disgusted at the force with which it falls, and the disturbance it makes on the surface. If he can see a feeding trout that has just taken a sedge fly, and, combining the utmost delicacy and accuracy in the first cast, puts his fly over it, it is more than probable that the fish will be scared, and retire to the safe seclusion of the nearest weed-bed.

Let him, however, dress one of the wingless hackle patterns described later on with soft landrail or woodcock hackle at the head, and a ginger cock hackle behind it at the shoulder, and it is almost safe to predict that he will find its fall on the water will not scare the fish, but very possibly rise and kill it.

Following on these lines, a number of hackle imitations of duns and spinners have been included in this series. They are all dressed with soft dun hen hackles at the head to imitate the

wings, and cock hackles behind them of the colour of the legs of the natural insect. Such flies can, of course, be indefinitely multiplied, as a hackle variety of any winged pattern can be dressed by substituting the hen or soft-plumed hackle for the wings, and making the legs, body and whisk precisely similar to those of the winged pattern.

GROUP I.—IMITATIONS OF NATURAL INSECTS.

SECTION I.—OLIVE DUNS.

No. 1.—Gold-Ribbed Hare's Ear.

Illustrated at Plate XIX.

Wings.—Medium or dark starling.

Body.—Dark fur from hare's face ribbed with fine flat gold.

Legs.—Dark fur from hare's face laid across doubled waxed silk and worked as a hackle.

Whisk.—Gallina dyed brown red.

Hook.—000 to 0.

This pattern is placed first of the series as the most successful of modern times. From early spring to late autumn it is one of the most killing of all the duns, and is, besides, pre-eminently the fly to be recommended for bulging or tailing fish. It is probably taken for the

OLIVE DUNS

Magnified

1

Gold Ribbed Hare's Ear

4

Hackle Dark Olive Quill

5

Medium Olive Quill

7

Detatched Olive

8

Flight's Fancy

subimago emerging from the larval envelope of the nymph just risen to the surface.

No. 2.—Hackle Gold-Ribbed Hare's Ear.

Head or Front Hackle.—A medium or dark blue dun hen.
Shoulder Hackle.—A grizzle blue dun cock.
Body and Whisk.—As No. 1.
Hook.—000 to 1.

This fly is likely to run the winged pattern very closely in popularity.

No. 3.—Dark Olive Quill.

Wings.—Medium or dark starling.
Hackles.—Two cock hackles dyed green olive (Recipe No. I.*).
Body.—Condor or peacock quill dyed green olive.
Whisk.—Gallina dyed green olive.
Hook.—000 to 1.

No. 4.—Hackle Dark Olive Quill.

Illustrated at Plate XIX.

Head Hackle.—Medium or dark blue dun hen.
Shoulder Hackle.—Dyed green olive.
Body and Whisk.—As No. 3.
Hook.—000 to 1.

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* The recipes referred to are given in Part III., chapter II., "Dyeing."

OLIVE DUNS

Magnified

Gold Ribbed Hares Ear

4

Hackle Dark Olive Quill

5

Medium Olive Quill

Medium Olive

8

Flight's Fancy

subimago emerging from the larval envelope of the nymph just risen to the surface.

No. 2.—Hackle Gold-Ribbed Hare's Ear.

Head or Front Hackle.—A medium or dark blue dun hen.
Shoulder Hackle.—A grizzle blue dun cock.
Body and Whisk.—As No. 1.
Hook.—000 to 1.

This fly is likely to run the winged pattern very closely in popularity.

No. 3.—Dark Olive Quill.

Wings.—Medium or dark starling.
Hackles.—Two cock hackles dyed green olive (Recipe No. I.*).
Body.—Condor or peacock quill dyed green olive.
Whisk.—Gallina dyed green olive.
Hook.—000 to 1.

No. 4.—Hackle Dark Olive Quill.

Illustrated at Plate XIX.

Head Hackle.—Medium or dark blue dun hen.
Shoulder Hackle.—Dyed green olive.
Body and Whisk.—As No. 3.
Hook.—000 to 1.

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* The recipes referred to are given in Part III., chapter II., "Dyeing."

No. 5.—Medium Olive Quill.

Illustrated at Plate XIX.

Wings.—Medium or pale starling.

Hackles.—Two cock hackles dyed medium olive (Recipe No. III.).

Body.—Condor or peacock quill dyed medium olive.

Whisk.—Gallina dyed medium olive.

Hook.—000 to 0.

No. 6.—Hackle Medium Olive Quill.

Head Hackle.—Medium or pale blue dun hen.

Shoulder Hackle.—Cock hackle dyed medium olive.

Body and Whisk.—As No. 5.

Hook.—000 to 1.

Nos. 3, 4, 5 and 6 are very useful patterns, especially for the spring.

No. 7.—Detached Olive.

Illustrated at Plate XIX.

Wings.—Medium or light starling.

Body.—Detached, of a fine slip of india-rubber over an undyed doubled split bristle, with three or four strands of Gallina dyed medium olive for whisk.

Hackles.—Two cock hackles dyed medium olive.

Hook.—000 to 0.

An invaluable spring pattern for very shy fish.

No. 8.—Flight's Fancy.

Illustrated at Plate XIX.

Wings.—Pale starling.
Hackles.—Two pale buff Cochin cock hackles.
Body.—Primrose floss silk, ribbed with fine flat gold.
Whisk.—Gallina dyed slightly green olive.
Hook.—000 to 0.

The primrose silk body when wet is of a green olive tint, and the fly altogether resembles the Olive Dun prevalent during the Mayfly.

All the patterns comprised in Section I., Olive Duns, are imitations of the subimago stage of the Ephemeridæ, *Baëtis vernus* and *B. rhodani.*

SECTION II.—PALE WATERY DUNS.

No. 9.—Pale Watery Dun (Holland's pattern).

Illustrated at Plate XX.

Wings.—Pale starling.
Hackles.—Two cock hackles dyed a pale lemon green olive (Recipe No. II.).
Body.—White horsehair dyed a faint canary, worked on a bare *blue* hook. For a bronzed hook the horsehair should be dyed a pale lemon green olive.
Whisk.—Very pale olive Gallina.
Hook.—000 to 0.

This, the best imitation extant of the natural

insect, was originally worked out by Mr. G. Holland, of Winchester, to whom I am indebted for the above full description.

No. 10.—Hackle Pale Watery Dun.

Head Hackle.—A pale blue dun hen.
Shoulder Hackle.—A cock hackle dyed as the hackles of No. 9.
Body and Whisk.—As No. 9.
Hook.—000 to 1.

The hackle variety of No. 9, and one that kills very well during the summer months.

No. 11.—Pale Olive Quill.

Wings.—Palest starling.
Body.—Pale grey condor dyed a pale canary.
Hackles.—Two cock hackles dyed a pale lemon green olive.
Whisk.—Very pale olive Gallina.
Hook.—000 to 0.

No. 12.—Goose Dun.

Wings, Hackles, and Whisk.—As No. 11.
Body. — A strand of pale grey goose-wing feather, dyed a pale lemon green olive, and ribbed with fine gold wire.
Hook.—000 to 0.

PALE WATERY DUNS

Magnified

9

Pale Watery Dun

13

Hare's Ear Quill

15

Quill Marryat

16

Ginger Quill

17

Hackle Ginger Quill

No. 13.—Hare's Ear Quill.

Illustrated at Plate XX.

Wings.—Pale starling.
Body.—Pale grey condor or peacock quill dyed a pale ramry.
Legs.—Hare's fur worked as a backle.
Whisk.—Pale olive Gallina.
Hook.—000 to 0.

No. 14.—Little Marryat.

Wings.—Pale starling.
Body.—Fur from the flank of the Australian opossum.
Hackles.—Two pale buff Cochin cock hackles.
Whisk.—Pale olive Gallina.
Hook.—000 to 0.

No. 15.—Quill Marryat.

Illustrated at Plate XX.

Wings, Hackles, and Whisk.—As No. 14.
Body.—A strand of peacock eye slightly bleached in hydrogen peroxide, until it is the *café au lait* colour it is present for.
Hook.—000 to 0.

This is the one Mr. Marryat's improvement of the preceding pattern (No. 14) named after him.

PALE WATERY DUNS

Magnified

Pale Watery Dun

13

Hare's Ear Quill

15

Quill Marryat

16

Ginger Quill

17

Hackle Ginger Quill

No. 13.—Hare's Ear Quill.

Illustrated at Plate XX.

Wings.—Pale starling.
Body.—Pale grey condor or peacock quill dyed a pale canary.
Legs.—Hare fleck worked as a hackle.
Whisk.—Pale olive Gallina.
Hook.—000 to 0.

No. 14.—Little Marryat.

Wings.—Palest starling.
Body.—Fur from the flank of the Australian opossum.
Hackles.—Two pale buff Cochin cock hackles.
Whisk.—Pale olive Gallina.
Hook.—000 to 0.

No. 15.—Quill Marryat.

Illustrated at Plate XX.

Wings, Hackles, and Whisk.—As No. 14.
Body.—A strand of peacock-eye slightly bleached in hydrogen peroxide until it is the *café au lait* colour of the opossum fur.
Hook.—000 to 0.

This is the late Mr. Marryat's improvement of the celebrated pattern (No. 14) named after him.

No. 16.—Ginger Quill.

Illustrated at Plate XX.

Wings.—Pale starling.
Body.—Well-marked strand of peacock, undyed or dyed a very faint brown red.
Hackles.—Two pale ginger cock hackles.
Whisk.—Gallina dyed a faint brown red.
Hook.—000 to 0.

No. 17.—Hackle Ginger Quill.

Illustrated at Plate XX.

Head Hackle.—Pale blue dun hen.
Shoulder Hackle.—Pale ginger cock.
Body and Whisk.—As No. 16.
Hook.—000 to 1.

Pale watery duns are essentially summer or late spring flies, and even in the autumn in genial weather they are often present. Of the natural insects usually called by this name there are four common sorts, *Baëtis binoculatus*, *B. scambus*, *Centroptilum luteolum*, and *Centroptilum pennulatum*; and, as their colouring is very similar, and the genera and species can only be distinguished by minor differences, they may, for the fly-fisherman's purposes, be treated as one and the same insect.

The Ginger Quill, whether dressed with or without wings, has been included in this section, and, although possibly some exception may be

taken to this arrangement by the hypercritical, yet, seeing that it almost invariably kills when the Pale Watery Dun is on the water, it would be difficult to place it elsewhere. There is, however, very little of the ginger colouring in the natural insect, nor, for that matter, of the *cafè au lait* tint of the body of the two Marryats, which are also most successful when the Pale Watery Duns are up. With the patterns of Sections I. and II., Nos. 1 to 17, in his book, the dry-fly fisherman should be able to match fairly well any of the spring and summer olive-tinted Ephemeridæ in the subimago stage with wings of the grey or starling colouring.

SECTION III.—BLUE DUNS.

No. 18.—Detached Iron Blue.

Illustrated at Plate XXI.

Wings.—Tom-tit tail.

Body and Whisk.—Detached—a thin slip of india-rubber worked over a doubled split bristle dyed purple, and three or four strands of dark undyed Gallina for whisk.

Hackles.—Two dark honey dun cock hackles.

Hook.—000 or 00.

No. 19.—Purple Quill-Bodied Iron Blue.

Illustrated at Plate XXI.

Wings.—Tom-tit tail.

Body.—Condor dyed purple.

Hackles.—Two dark honey dun cock hackles.
Whisk.—Dark undyed Gallina.
Hook.—000 or 00.

No. 20.—Hackle Purple Quill-Bodied Iron Blue.

Head Hackle.—Dark blue dun hen.
Shoulder Hackle.—Dark honey dun cock.
Body and Whisk.—As No. 19.
Hook.—000 to 0.

No. 21.—Mole Fur Bodied Iron Blue.

Wings.—Tom-tit tail.
Hackles.—Two dark honey dun cock hackles.
Body.—Mole fur ribbed with primrose silk.
Whisk.—Undyed dark Gallina.
Hook.—000 or 00.

No. 22.—Olive Quill-Bodied Iron Blue.

Wings.—Tom-tit tail.
Hackles.—Two cock hackles dyed brown olive (Recipe No. IV.).
Body.—Condor or peacock dyed brown olive.
Whisk.—Gallina dyed.
Hook.—000 or 00.

The wing of the iron blue can also be made of dark starling wing dyed to the required shade by Recipe No. IX., but where procurable the tom-tit is to be preferred.

BLUE DUNS

Magnified

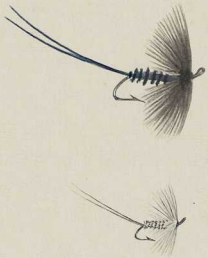
18

Detatched Iron Blue

19

Purple Quill Bodied Iron Blue

24



Hackle Adjutant Blue

25

Blue Quill

29

Whirling Blue

No. 23.—Adjutant Blue.

Wings.—Coot.
Hackle.—Two dark honey dun cock hackles.
Body.—A strand of adjutant wing or tail.
Whisk.—Undyed dark Gallina.
Hook.—000 to 00.

No. 24.—Hackle Adjutant Blue.

Illustrated at Plate XXI.

Head Hackle.—A dark blue dun hen.
Shoulder Hackle.—A dark honey dun cock.
Body and Whisk.—As No. 23.
Hook.—000 to 2.

The patterns Nos. 18 to 24 inclusive are [illegible] of the different shades of Iron Blue Dun, and on streams where this fly is plentiful they are invariably successful spring patterns. In addition to the variations in the colour of the hackle, it may be noted that the purple-bodied patterns are darker, and those in which the [illegible] of a brown olive tint are [illegible]. As in all the Ephemeridæ, too, the females are lighter than the males. The subimago, which is called by anglers the Iron Blue Dun, comprises two species of the genus *Baetis*, viz., *B. pumilus* and *B. niger*.

No. 25.—Blue Quill.

Illustrated at Plate XXI.

Wings.—Medium starling.
Hackle.—Two honey dun cock hackles.

BLUE DUNS

Magnified

18

Dandled Iron Blue

19

Purple Quill Bodied Iron Blue

24

Hackle Adjutant Blue

25

Blue Quill

29

Whirling Blue

No. 23.—Adjutant Blue.

Wings.—Coot.
Hackles.—Two dark honey dun cock hackles.
Body.—A strand of adjutant wing or tail.
Whisk.—Undyed dark Gallina.
Hook.—000 to 00.

No. 24.—Hackle Adjutant Blue.
Illustrated at Plate XXI.

Head Hackle.—A dark blue dun hen.
Shoulder Hackle.—A dark honey dun cock.
Body and Whisk.—As No. 23.
Hook.—000 to 0.

The patterns Nos. 18 to 24 inclusive are imitations of the different shades of Iron Blue Duns, and on streams where this fly is plentiful they are invariably successful spring patterns. In reference to the variations in the colour of the body, it may be noted that the purple-bodied specimens are females, and those in which the abdomen is more or less of a brown olive tint are males. As in all the Ephemeridæ, too, the females are larger than the males. The subimago, which is called by anglers the Iron Blue Dun, comprises two species of the genus *Baëtis*, viz., *B. pumilus* and *B. niger*.

No. 25.—Blue Quill.
Illustrated at Plate XXI.

Wings.—Medium starling.
Hackles.—Two honey dun cock hackles.

Body.—Peacock quill undyed.
Whisk.—Medium Gallina undyed.
Hook.—000 to 0.

No. 26.—Hackle Blue Quill.

Head Hackle.—Medium blue dun hen.
Shoulder Hackle.—Honey dun cock.
Body and Whisk.—As No. 25.
Hook.—000 to 1.

This, the hackle variety of the Blue Quill, is similar to the Devonshire "Blue Upright."

No. 27.—Blue Dun.

Wings.—Snipe or light Starling.
Hackles.—Two pale blue dun cock hackles.
Body.—Pale mole fur spun on yellow silk.
Whisk.—Pale undyed Gallina.
Hook.—000 to 0.

No. 28.—Autumn Dun.

Wings, Hackles and Whisks.—As No. 27.
Body.—A strand of undyed heron herl.
Hook.—000 to 0.

No. 29.—Whirling Blue.

Illustrated at Plate XXI.

Wings.—Medium starling.
Hackles.—Two ginger cock hackles.
Body.—Water-rat fur.

Whisk.—Gallina dyed brown red.
Hook.—000 to 0.

This pattern is continually being reproduced as the "Invincible" or "Infallible" of some amateur or professional, and is generally successful. The colours can be varied to a considerable extent by the use of darker or paler starling for the wings, hackles more or less red in tint, and the body of fur from young or old water-rats.

The patterns Nos. 25 to 29 inclusive are imitations of the Blue Dun. From time immemorial the existence of such a natural insect has been affirmed, and in the face of so much accumulated evidence it must be included in the category of "Imitations of Natural Insects." It has never been my good fortune to find or procure a specimen, nor can I find among the lists of British Ephemeridæ any corresponding to it in colour, &c. Two or three friends have sent me what they took to be individuals of this species, but they have on examination all proved to be subimagines of the Olive or Iron Blue Dun, or of the Blue-winged Olive.

SECTION IV.—BLUE-WINGED OLIVES.

No. 30.—Blue-Winged Olive.

Illustrated at Plate XXII.

Wings.—Coot.
Hackles.—Two cock hackles dyed green olive.
Body.—Grey condor or peacock dyed green olive.

Whisk.—Gallina dyed green olive.
Hook.—00 to 1.

No. 31.—Rough Blue-Winged Olive.

Wings.—Coot.
Hackles.—Two cock hackles dyed green olive.
Body.—Heron herl dyed green olive, ribbed with fine gold wire.
Whisk.—Gallina dyed green olive.
Hook.—00 to 1.

No. 32.—Indian Yellow.

Wings.—Inside grouse wing from a young bird.
Hackles.—Two buff Cochin cock hackles.
Body.—Floss silk about the colour of natural Russia leather, ribbed with bright lemon-coloured tying silk.
Whisk.—Buff Cochin cock hackle.
Head.—Three or four turns of orange tying silk.
Hook.—00 to 1.

The late Mr. Aldam's pattern.

Many fishermen have an idea that the Blue-winged Olive is a variety of the ordinary Olive Dun. This is an erroneous impression. The common Olives all belong to the genus *Baëtis*, while the Blue-winged Olive is the subimago stage of *Ephemerella ignita*, the Sherry Spinner being the imago of the same insect. The most casual observer can distinguish these two flies,

BLUE WINGED OLIVES AND SPINNERS

Magnified

30

Blue Winged Olive

33

Red Quill

39

Hackle Red Spinner, (Holland's pattern)

40

Detatched Badger

45

Jenny Spinner

as, apart from the darker colour of its wings, the Blue-winged Olive is far larger than the Olive Dun. The Blue-winged Olive has three tails, while the Olive Dun, like all other members of the genus *Baëtis* in the winged stages, has only two. On the Test and Itchen the Blue-winged Olive is essentially a late fly, seldom appearing in any number before the middle of June, and continuing to November, or possibly even later. On the Kennet it, however, puts in an appearance in the early spring, and at the opening of the season is nearly as plentiful as the Olive Dun.

Of the three dressings given, No. 30 is the best for the summer evenings, or for daytime in the autumn or early winter; while No. 31 has proved most successful on the Kennet in the spring. The old Rough Olive, No. 1 of "Floating Flies," which resembles No. 31, has been discarded. As an early spring fly and imitation of the darker Olive Dun, it has been superseded by the Dark Olive Quill and the Gold-ribbed Hare's Ear. No. 32, the late Mr. Aldam's celebrated Indian Yellow, has a great reputation, especially on the Itchen, but it certainly is not as good an imitation of the natural insect as either No. 30 or 31.

BLUE WINGED OLIVES AND SPINNERS

Magnified

30

Blue Winged Olive

33

Red Quill

39

Double Red Spinner, (Holland's pattern)

40

Pale Red Badger

45

Jenny Spinner

as, apart from the darker colour of its wings, the Blue-winged Olive is far larger than the Olive Dun. The Blue-winged Olive has three setæ, while the Olive Dun, like all other members of the genus *Baëtis* in the winged stages, has only two. On the Test and Itchen the Blue-winged Olive is essentially a late fly, seldom appearing in any number before the middle of June, and continuing to November, or possibly even later. On the Kennet it, however, puts in an appearance in the early spring, and at the opening of the season is almost as plentiful as the Olive Dun.

Of the three dressings given, No. 30 is the best for the summer evenings, or for daytime in the autumn or early winter; while No. 31 has proved most successful on the Kennet in the spring. The old Rough Olive, No. 1 of "Floating Flies," which resembles No. 31, has been discarded. As an early spring fly and imitation of the darker Olive Dun, it has been superseded by the Dark Olive Quill and the Gold-ribbed Hare's Ear. No. 32, the late Mr. Aldam's celebrated Indian Yellow, has a great reputation, especially on the Itchen, but it certainly is not as good an imitation of the natural insect as either No. 30 or 31.

SECTION V.—SPINNERS.

No. 33.—Red Quill.

Illustrated at Plate XXII.

Wings.—Pale or Medium starling.
Hackles.—Two red game cock hackles.
Body.—Peacock quill or condor dyed brown red.
Whisk.—Gallina dyed brown red.
Hook.—000 to 1.

No. 34.—Hackle Red Quill.

Head Hackle.—A medium blue dun hen hackle.
Shoulder Hackle.—A red game cock hackle.
Body and Whisk.—As No. 33.
Hook.—000 to 1.

No. 35.—Red Spinner (the late Mr. Marryat's Pattern).

Wings.—Two blue dun cock hackle points.
Hackles.—Two black butted red game cock hackles.
Body.—Adjutant quill dyed brown red. A very good alternative material, suggested by Mr. W. F. Brougham, is a strand of red macaw.
Whisk.—White Gallina.
Hook.—000 to 0.

No. 36.—Hackle Red Spinner.

Head Hackle.—Medium blue dun hen hackle.
Shoulder Hackle.—Black butted red game cock hackle.

Body and Whisk.—As No. 35.
Hook.—000 to 0.

No. 37.—Hackle Red Spinner (Mr. Skues' Pattern).

Hackles.—Ruddy, rusty, sandy, or honey dun cock, or badger, or smoky ginger cuckoo.
Body.—Flat tawsy end from hank of gut dyed brown red, and worked on the bare hook.
Whisk.—Blue or whitey cock's hackle.
Hook.—000 to 0.

No. 38.—Red Spinner (Holland's Pattern).

Wings.—Pale starling.
Hackles.—Two red game cock hackles.
Body.—White horsehair dyed brown red, and worked on bare hook.
Whisk.—White Gallina.
Hook.—000 to 0.

No. 39.—Hackle Red Spinner (Holland's Pattern).

Illustrated at Plate XXII.

Hackles.—Two badger cock hackles.
Body.—White horsehair dyed brown red, worked on bare hook, and ribbed with crimson silk.
Whisk.—White Gallina.
Hook.—000 to 0.

No. 40.—Detached Badger.

Illustrated at Plate XXII.

Hackles.—Two badger cock hackles.

Body and Whisk.—Detached, of white horsehair dyed brown red, worked over a foundation of doubled split bristle also dyed brown red, and ribbed with crimson silk. Three or four strands of white Gallina worked in for whisk.

Hook—000 to 1.

No. 41.—Orange Quill.

Wings.—Pale starling.

Hackles.—Two orange ginger cock hackles.

Body.—Peacock quill dyed orange.

Whisk.—Gallina dyed a faint brown red.

Hook.—000 to 0.

No. 42.—Brown Badger.

Hackles.—Two badger cock hackles.

Body.—Peacock quill dyed brown red.

Whisk.—White Gallina.

Hook.—000 to 0.

No. 43.—Cinnamon Quill.

Wings.—Pale starling.

Hackles.—Two pale sandy ginger cock hackles.

Body.—The root end of a strand of peacock tail, which, when stripped, is a pale cinnamon colour; or condor, dyed a faint brown red.

Whisk.—Gallina dyed a faint brown red.
Hook.—000 to 0.

Nos. 33-43 inclusive are imitations of the so-called Red Spinner, and are one and all excellent patterns. The term Red Spinner includes a considerable number of the Ephemeridæ in the imago, or perfect stage. The largest and darkest is the spinner of the Turkey Brown (*Leptophlebia submarginata*). Next in size comes the Sherry Spinner, or imago of *Ephemerella ignita.* The body of the spinner of the female Olive Dun (*Baëtis vernus* or *B. rhodani*) is a dead gold colour immediately after its metamorphosis, and becomes darker and browner, probably from exposure to the light. The body of the spinner of the female Pale Watery Dun (*Baëtis binoculatus, Centroptilum luteolum*, or *C. pennulatum*) is of a golden colour, becoming darker, probably from exposure to light. The body of the imago of the female Iron Blue (*Baëtis pumilus* or *B. niger*) is a full dark claret. The largest of all known British Red Spinners is the imago of the March Brown (*Ecdyurus venosus*), but it has never been my good fortune to find a single specimen of it on the Test, Itchen, Anton, Wiley, or Kennet. It will be seen from the foregoing that Red Spinners of different sizes and colours are most plentiful on the south country chalk streams, and hence the importance of the patterns imitating them can be appreciated.

No. 44.—Olive Badger.

Hackles.—Two badger cock hackles.

Body.—Peacock quill dyed brown olive, with flat gold tag.

Whisk.—White Gallina.

Hook.—000 to 0.

This is the imitation of the spinners of the female Olive Dun (*Baëtis vernus* or *B. rhodani*) at its last stage.

No. 45.—Jenny Spinner.

Illustrated at Plate XXII.

Hackles.—Two badger cock hackles.

Body and Whisk.—Detached, of white horsehair, worked on an undyed split doubled bristle, with four or five turns of crimson silk at the tail end, and the same number at the thorax. Three or four strands of white Gallina are worked in for whisk.

Hook.—000 or 00.

This is the imitation of the male imago of the Iron Blue (*Baëtis pumilus* or *B. niger*) which is known as the Jenny Spinner. The male imago of the Olive Dun (*Baëtis vernus* or *B. rhodani*) is similar in colouring, but is a larger fly than the Jenny Spinner, and the central segments of the body are distinctly a pale olive tint. To imitate it accordingly the horsehair for the body should be slightly dyed medium olive. The spinner

of the male Pale Watery Dun (*Baëtis binoculatus, Centroptilum luteolum*, or *C. pennulatum*) differs in colour from the Jenny Spinner only by the thorax and lower segments of the abdomen being a yellow orange, and to imitate it the silk turns at the tail end of the body and thorax should be of this colour.

No. 46.—Spent Olive

(Mr. E. J. Power's Pattern).

Wings.—Four dark blue dun cock hackle points set on flat.
Hackle.—White cock hackle with black centre.
Body.—White peacock dyed very palest yellow.
Whisk.—White cock hackle very short.
Hook.—000 or 00.

Mr. Power says that he also dresses this pattern with wings made of a shaving of whalebone dyed a pale slate to dark blue, but that he prefers the hackle point wings as more durable than the whalebone. He adds: "A killing fly in the morning during July and August, when fish rise like mad, and no fly seems to be on the water." Evidently it is taken by the trout when the female imagines of the Pale Watery Dun, having laid their eggs, lie flat and motionless on the surface of the stream, and altogether it is a fair imitation of the natural insect at this stage.

SECTION VI.—MAYFLIES.

No. 47.—Egyptian Goose Hackle.

Illustrated at Plate XXIII.

Hackles.—One or two well-marked darkish feathers from the breast of an Egyptian goose, undyed or slightly dyed according to Recipe No. V.

Body.—Pale maize floss silk ribbed with a strand of peacock, selecting one which is pale cinnamon at the root. It is worked with the pale portion at the shoulder, and the bronze portion showing about three turns or ribs at the tail end of the body.

Whisk.—Gallina dyed in Diamond dark brown.

Hook.—No. 3 long.

For a variety the body can be made of Rofia grass laid over white quill, and ribbed with flat gold, or red or olive silk. For trout bulging at the nymph this is the most successful pattern extant.

No. 48.—Summer Duck Hackle.

Head Hackle.—Canadian wood or summer duck. Feathers which are too long and narrow for wings can be used up for this pattern.

Shoulder Hackle.—Pale ginger cock hackle.

Body.—Rofia grass over white quill, ribbed with fine flat gold.

Whisk.—Gallina dyed in Diamond dark brown.

Hook.—3 long, 3, or 2.

MAYFLIES

Natural Size

47

Egyptian Goose Hackle

50

Summer Duck

51

Brown Champion

53

Dyed Gallina

55

Undyed Rouen Drake

56

Spent Gnat

No. 49.—Dyed Rouen Drake Hackle.

Wings.—Rouen drake dyed according to Recipe No. VII. Feathers too long and narrow for wings can be used.

Shoulder Hackle.—A large fine honey dun hen hackle.

Body and Whisk.—As No. 48.

Hook.—3 long, 5 or 6.

Nos. 48 and 49 are admirable hackle patterns, and can be varied by the use of hen golden pheasant, grey hen, hen pheasant, &c., for shoulder hackles. Bodies can be ribbed with crimson or olive silk, either with or without the flat gold ribbing.

No. 50.—Summer Duck.

Illustrated at Plate XXIII.

Wings.—Canadian summer duck.

Shoulder Hackles.—A hen golden pheasant hackle in front, and a pale ginger cock hackle close behind.

Ribbing Hackle.—A pale ginger cock hackle.

Body and Whisk.—As No. 48.

Hook.—No. 3 long.

An imitation of the female imago in the act of laying her eggs.

No. 51.—Brown Caddis.

Illustrated at Plate XXIII.

Wings.—Rouen drake dyed according to Recipe No. VI.

MAYFLIES

Natural Size

47

Ferdinand Comet Hackle

50

Summer Duck

51

Ruby Champion

53

Dyed Gallina

55

Dyed Green Drake

56

Spent Gnat

No. 49.—Dyed Rouen Drake Hackle.

Head Hackle.—Rouen drake dyed according to Recipe No. VII. Feathers too long and narrow for wings can be used.

Shoulder Hackle.—A large fine honey dun hen hackle.

Body and Whisk.—As No. 48.

Hook.—3 long, 3 or 2.

Nos. 48 and 49 are admirable hackle patterns, and can be varied by the use of hen golden pheasant, grey hen, hen pheasant, &c., for shoulder hackles. Bodies can be ribbed with crimson or olive silk, either with or without the flat gold ribbing.

No. 50.—Summer Duck.

Illustrated at Plate XXIII.

Wings.—Canadian summer duck.

Shoulder Hackles.—A hen golden pheasant hackle in front, and a pale ginger cock hackle close behind.

Ribbing Hackle.—A pale ginger cock hackle.

Body and Whisk.—As No. 48.

Hook.—No. 3 long.

An imitation of the female imago in the act of laying her eggs.

No. 51.—Brown Champion.

Illustrated at Plate XXIII.

Wings.—Rouen drake dyed according to Recipe No. VI.

Hackles.—A grey partridge dyed in strong tea, and a pale ginger cock hackle.

Body.—Of Rofia grass over white quill, ribbed with fine flat gold and red silk.

Whisk.—As No. 48.

Hook.—No. 2.

No. 52.—Green Champion.

Wings.—Rouen drake dyed according to Recipe No. VII. If the colour is not green enough, the feathers can be dyed again in very weak solution of Indigo.

Hackles.—As No. 51.

Body and Whisk.—As No. 48.

Hook.—No. 2.

No. 53.—Dyed Gallina.

Illustrated at Plate XXIII.

Wings.—Well-marked feathers from cock Gallina dyed as wings of No. 51 or 52, according to whether a brown or a green shade of wings is preferred.

Hackles.—A hen golden pheasant in front, and a pale ginger cock behind.

Ribbing Hackle.—A pale ginger cock.

Body and Whisk.—As No. 48.

Hook.—No. 2.

This fly is not an easy one to float, but the Gallina wings are so like the natural in appear-

ance, and the pattern is so deadly, that it is now considered quite equal to the old favourite Brown and Green Champions.

No. 54.—Dyed Rouen Drake (Holland's Pattern).

Wings.—Rouen drake dyed according to Recipe No. VIII.
Hackles.—As No. 51.
Body and Whisk.—As No. 48.
Hook.—No. 2.

The wings of this pattern match those of the natural insect very closely in colour.

No. 55.—Undyed Rouen Drake.

Illustrated at Plate XXIII.

Wings.—Well-marked dark Rouen drake.
Hackles.—As No. 51.
Body and Whisk.—As No. 48.
Hook.—No. 2.

A better imitation than No. 50 of the female imago laying her eggs.

No. 56.—Spent Gnat.

Illustrated at Plate XXIII.

Wings.—Four dark grizzled blue dun cock hackle points set on horizontally.
Hackles.—A grey partridge in front and a badger cock hackle close behind it.

Ribbing Hackle.—A badger cock hackle.

Body.—A strand of condor quill dark at point and white at root, the white part worked in at shoulder to show two or three turns of the dark colour at the tail end of the body. Body ribbed with fine silver wire.

Whisk.—Gallina dyed in Diamond dark brown.

Hook.—3 long.

This, the late Mr. Marryat's last improved dressing of his well-known pattern, is the only imitation of the Spent Gnat or imago of the Mayfly worthy of notice.

The flies in this section are known as *Ephemera danica*, *E. vulgata* or *E. lineata*, the first being the one usually found on the more rapid streams, and on sluggish streams or lakes the second. *E. lineata* is comparatively rare.

SECTION VII.—CURSES.

No. 57.—Fisherman's Curse (the late Mr. G. S. Marryat's Pattern).

Illustrated at Plate XXIV.

Wings.—Pale starling.

Hackles.—Two cock starling hackles.

Body.—A strand of cock golden pheasant tail or of brown turkey tail.

Hook.—000

CURSES

Magnified

57

Fisherman's Curse

58

Hackle Curse

59

Male Black Gnat

60

Female Black Gnat

62

Claret Smut

No. 58.—Hackle Curse (the late Sir M. Grant-Gordon's Pattern).

Illustrated at Plate XXIV.

Hackles—Two cock badger hackles and three turns of black ostrich worked at shoulder.
Tag—Black tying silk and flat silver tag.
Hook—[illegible]

No. 59.—Male Black Gnat.

Illustrated at Plate XXIV.

Wings—Pale starling.
Hackles—Two cock starling hackles.
Body—Peacock quill dyed black or black quill split from chaffinch tail feather.
Hook—[illegible]

No. 60.—Female Black Gnat.

Illustrated at Plate XXIV.

Wings—From starling tail, selecting the part of the feather with well-marked brown tip.
Hackles and Body—As No. 59.
Hook—[illegible]

No. 61.—Pale Scale Black Gnat.

Wings—[illegible] of pike scale cut to shape and [illegible] the upper side of hook.
Hackles and Body—As No. 59.
Hook—[illegible]

Mr. [illegible] Hall's favourite pattern.

CURSES

Magnified

57

Fisherman's Curse

58

Hackle Curse

59

Male Black Gnat

60

Female Black Gnat

62

Claret Smut

No. 58.—Hackle Curse (the late Sir M. Duff-Gordon's Pattern).

Illustrated at Plate XXIV.

Hackles.—Two cock badger hackles and three turns of black ostrich worked at shoulder.
Body.—Black tying silk and flat silver tag.
Hook.—000.

No. 59.—Male Black Gnat

Illustrated at Plate XXIV.

Wings.—Pale starling.
Hackles.—Two cock starling hackles.
Body.—Peacock quill dyed black or black quill split from chaffinch tail feather.
Hook.—00.

No. 60.—Female Black Gnat.

Illustrated at Plate XXIV.

Wings.—From starling tail, selecting the part of the feather with well-marked brown tip.
Hackles and Body.—As No. 59.
Hook.—00.

No. 61.—Pike Scale Black Gnat.

Wings.—One strip of pike scale cut to shape and laid flat along the upper side of hook.
Hackles and Body.—As No. 59.
Hook.—00.

Mr. H. S. Hall's favourite pattern.

No. 62.—Claret Smut (Mr. E. J. Power's Pattern).

Illustrated at Plate XXIV.

Wings.—Pale starling.
Hackle.—Black cock hackle.
Body.—Peacock quill dyed claret.
Hook.—00 or 000.

Very successful with smutting fish on the Upper Test.

The flies in this section are imitations of the so-called "Fisherman's Curse," or other small Diptera of different genera and species, plentiful on the chalk streams throughout the season. All the patterns given are excellent, and the best advice to the angler is to try them in succession, unless, like some of the most experienced dry-fly fishermen, he prefers to use fancy patterns or certain imitations of natural insects which are usually successful for smutting fish. Such fancy patterns are dealt with in Group II., and of the imitations of natural insects, red quill, detached badger, red ant, black ant, and very small silver sedge will be found the most suitable.

SECTION VIII.—CADDIS FLIES.

No. 63.—Silver Sedge.

Illustrated at Plate XXV.

Wings.—Landrail.
Hackles.—Two pale sandy ginger cock hackles at shoulder.

CADDIS FLIES

Natural Size

63

Silver Sedge

65

Hare's Ear Sedge

67

Kimbridge

69

Hackle Sedge

71

Grannom

72

Welshman's Button

Ribbing Hackle.—Pale sandy ginger cock hackle.

Body.—White condor quill ribbed with fine silver wire.

Hook.—No. 4.

Dressed on a 00 hook, this is a good pattern for running fish.

No. 64.—Orange Sedge.

Wings.—Lovebird.

Hackles.—Two brown ginger cock hackles at shoulder.

Turning Hackle.—Brown ginger cock hackle.

Body.—Orange floss silk ribbed with fine gold wire.

Hook.—No. 6 a.

No. 65.—Hare's-Ear Sedge.

Illustrated at Plate XXV.

Wings, Shoulder and Ribbing Hackles.—As No. 64.

Body.—Brown fur from hare's face ribbed with fine gold wire.

Hook.—No. 4.

A fly which has proved uniformly successful on all Irish waters; in fact, the best of the landrail-winged patterns.

No. 66.—Dark Sedge.

Wings.—Speckled rock pheasant wing.

Hackles.—Two early Coch-y-Bonddhu cock hackles at shoulder.

CADDIS FLIES

Natural Size

63

Silver Sedge

65

Hare's Ear Sedge

67

Cambridge

69

Hackle Sedge

71

Cappum

72

Welshman's Button

Ribbing Hackle.—Pale sandy ginger cock hackle.
Body.—White condor quill ribbed with fine silver wire.
Hook.—00 to 4.

Dressed on a 00 hook, this is a good pattern for *smutting* fish.

No. 64.—Orange Sedge.

Wings.—Landrail.
Hackles.—Two brown ginger cock hackles at shoulder.
Ribbing Hackle.—Brown ginger cock hackle.
Body.—Orange floss silk ribbed with fine gold wire.
Hook.—0 to 4.

No. 65.—Hare's-Ear Sedge.

Illustrated at Plate XXV.

Wings, Shoulder and Ribbing Hackles. — As No. 64.
Body.—Brown fur from hare's face ribbed with fine gold wire.
Hook.—0 to 4.

A fly which has proved uniformly successful on all chalk streams—in fact, the best of the landrail-winged patterns.

No. 66.—Dark Sedge.

Wings.—Speckled cock pheasant wing.
Hackles. — Two rusty Coch-y-Bonddhu cock hackles at shoulder.

Ribbing Hackle.—A rusty Coch-y-Bonddhu cock hackle.

Body.—Dubbing of cream-coloured crewel ribbed with fine gold wire.

Hook.—1 to 5.

No. 67.—Kimbridge.

Illustrated at Plate XXV.

Wings.—Woodcock.

Hackles.—Two pale sandy ginger cock hackles at shoulder.

Ribbing Hackle.—Pale sandy ginger cock hackle.

Body.—White condor ribbed with fine silver wire.

Hook.—2 to 5.

This fly is often taken better than the Mayfly itself, even in daytime, during the hatch of Green Drake, and it is at all times a useful pattern for evening fishing.

No. 68.—Hackle Kimbridge.

Head Hackle.—A well-marked woodcock hackle.

Shoulder Hackle.—A pale sandy ginger cock hackle.

Ribbing Hackle.—A pale sandy ginger cock hackle.

Body and Size of Hook.—As No. 67.

No. 69.—Hackle Sedge.

Illustrated at Plate XXV.

Head Hackle.—A landrail or brown hen's neck hackle.

Shoulder Hackle.—A sandy ginger cock hackle.
Body.—Central quill of partridge tail feather, with plumes cut away close on both sides, ribbed with gold twist.
Hook.—0 to 4.

Patterns Nos. 63 to 69 are imitations of different species of *Trichoptera*, called by anglers Sedges, Caperers, Brown Silver-horns, &c. The natural insects are all very similar in colouring, being generally of a lighter or darker ruddy brown or cinnamon colour. Those with self-coloured wings are best imitated by landrail, the speckled wings by cock pheasant, and the mottled wings by woodcock.

No. 70.—Grannom Pupa.

Wing.—A small piece of the point of a brown partridge hackle.
Hackle.—A rusty dun cock hackle.
Body.—Peacock or grey condor quill dyed blue green.
Hook.—1 to 2.

No. 71.—Grannom.

Illustrated at Plate XXV.

Wings.—Palest hen partridge wing.
Hackles.—Two rusty dun cock hackles.
Body.—A strand of condor, very pale grey at point and dark at root; the root part only is

stripped, and the entire strand dyed blue-green. The root portion is worked on at shoulder, and the unstripped portion at the point forms the bunch of green eggs at the tail end of the body.

Hook.—1 to 3.

Nos. 70 and 71 are imitations of the Grannom in the pupa and mature or imago stage respectively, the scientific name of this insect being *Brachycentrus subnubilus.*

No. 72.—Welshman's Button.

Illustrated at Plate XXV.

Wings.—Brown pink feather from underwing of peacock. There is an Indian pheasant with wings of a similar colour.

Hackles.—Two rusty black cock hackles.

Body.—Copper peacock herl (*i.e.*, dyed Magenta). For a variety, cover the herl with gutta-percha tissue or thin india-rubber. The central quill of one of the smaller tail feathers of a hen pheasant is another material for the body of this fly.

Hook.—1 to 4.

The natura insect is known as *Sericostoma personatum* or *Spencii.*

VARIOUS

Magnified

73

Alder
Natural Size

76

Red Ant

78

Black Ant

79

Willow Fly

80

Coch-y-Bonddhu

SECTION IX.—VARIOUS.

No. 73.—Alder.

Illustrated at Plate XXVI.

Wings.—[illegible] pheasant tail, bustard, or wood-[illegible] variety.
Hackle and Body.—As No. 72.
Hook.—[illegible] to 3.

No. 74.—Hackle Alder.

Head Hackle.—Woodcock.
Shoulder Hackle.—Coch-y-Bonddhu.
Body.—As No. 72.
Hook.—1 to 3.

Nos. 73 and 74 are imitations of the Alder which is known to scientists as *Sialis lutaria.*

No. 75.—Cowdung.

Wings.—Landrail.
Hackle.—Two ginger cock hackles.
Body.—Dubbing of pale buff or brown yellow [illegible].
Hook.—[illegible] or 2.

No. 76.—Red Ant.

Illustrated at Plate XXVII.

Wings.—Pale starling.
Hackle.—Two red game cock hackles.
Body.—Dubbing to match [illegible] red. The root

VARIOUS

Magnified

75

Alder

Natural Size

76

Red Ant

78

Black Ant

79

Willow Fly

80

Coch-y-Bonddhu

SECTION IX.—VARIOUS.

No. 73.—Alder.

Illustrated at Plate XXVI.

Wings.—Hen pheasant tail, bustard, or woodcock for a variety.
Hackles and Body.—As No. 72.
Hook.—0 to 2.

No. 74.—Hackle Alder.

Head Hackle.—Woodcock.
Shoulder Hackle.—Coch-y-Bonddhu.
Body.—As No. 72.
Hook.—1 to 3.

Nos. 73 and 74 are imitations of the Alder which is known to scientists as *Sialis lutaria.*

No. 75.—Cowdung.

Wings.—Landrail.
Hackles.—Two ginger cock hackles.
Body.—Dubbing of pale buff or brown yellow crewel.
Hook.—1 or 2.

No. 76.—Red Ant.

Illustrated at Plate XXVI.

Wings.—Pale starling.
Hackles.—Two red game cock hackles.
Body.—Grey condor dyed brown red. The root

of the strand only is stripped, and the point worked on close to form butt.

Hook.—0 to 00.

No. 77.—Hackle Red Ant.

Head Hackle.—A honey dun hen hackle.

Shoulder Hackle.—A red game cock hackle.

Body.—As No. 76.

Hook.—00 to 1.

No. 78—Black Ant.

Illustrated at Plate XXVI.

Wings.—Pale starling.

Hackles.—Two cock starling hackles.

Body.—Peacock dyed black or quill of chaffinch tail feather.

Butt.—Black ostrich.

Hook.—0 or 00.

Nos. 76, 77, and 78, imitations of the winged ants, are useful patterns for smutting fish.

No. 79.—Willow Fly.

Illustrated at Plate XXVI.

Head Hackle.—A dark honey dun hen hackle.

Shoulder Hackle. — An orange ginger cock hackle.

Body.—Grey condor or peacock dyed in Diamond orange.

Tag.—Primrose floss silk.
Hook.—00 long or 0.

This is the Willow *(Leuctra geniculata)* in the act of laying its eggs.

No. 80.—Coch-y-Bonddhu.

Illustrated at Plate XXVI.

Hackles.—Two cock Coch-y-Bonddhu hackles.
Body.—Two or three strands of copper peacock herl twisted together, ribbed with fine gold wire for small sizes, or with fine flat gold for larger sizes.
Hook.—00 to 2.

According to Ronalds, this, the last pattern of Group I., is the imitation of one of the *Coleoptera*, or beetles called *Chrysomela populi*. The modern scientific name of this insect is *Lina populi*.

GROUP II.—FANCY FLIES.

SECTION I.—UPRIGHT WINGED PATTERNS.

No. 81.—Wickham.

Illustrated at Plate XXVII.

Wings.—Medium or light starling.
Hackles. — Two red game cock hackles at shoulder.
Ribbing Hackle.—Red game cock hackle.
Body.—Flat gold ribbed with fine gold wire.
Whisk.—Gallina dyed brown red.
Hook.—000 to 1.

No. 82.—Pink Wickham.

Wings.—Landrail.

Body, Hackles, Whisk, and Sizes of Hook.—As No. 81.

Two of the best fancy patterns known, and most efficacious in some rivers for smutting fish, for which purpose, of course, the smallest sizes should be used. Some professional fly-dressers omit the ribbing of gold wire. This effects some saving in time when dressing the flies, but in use those without the ribbing over the hackle do not stand the wear and tear of drying, and should therefore be rejected.

No. 83 —Golden Dun.

Illustrated at Plate XXVII.

Wings.—Pale starling.

Hackle.—Hare fleck worked on at shoulder as a hackle.

Body.—Flat gold.

Whisk.—Gallina dyed a faint brown red.

Hook.—000 to 0.

An improvement suggested by the late Mr. J. A. Day on the pattern given under the same name in "Floating Flies," and one which is often successful in hot, calm weather.

FANCY FLIES, UPRIGHT WINGED PATTERNS

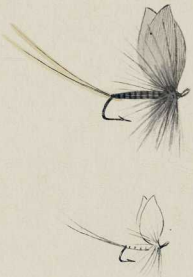
Magnified

81

Wickham

83

Golden Dun



85

Badger Quill

86

Saltoun

87

Apple Green

No. 84.—Mr. J. WHITCHURCH.

Wings.—Pale starling.
Hackles.—Two pale ginger cock hackles.
Body.—Orange floss silk.
Whisk.—Golden dyed a dark brown red.
Hook.—000 to 0.

No. 85.—BADGER QUILL.

Illustrated at Plate XXVII.

Wings.—Pale starling.
Hackles.—Two badger cock hackles.
Body.—Peacock dyed black or quill from chaffinch's nest.
Whisk.—Very pale Guinea.
Hook.—000 to 0.

No. 86.—SALTCOCK.

Illustrated at Plate XXVII.

Wings.—Pale starling.
Hackles.—Two pale ginger cock hackles.
Body.—Black silk, ribbed with fine silver wire.
Whisk.—Golden dyed a dark brown red.
Hook.—000 to 0.

Nos. 84, 85, 86 are old patterns which have been somewhat neglected of late years, but are useful flies, and well worth trying when the fish are coming short at other artificials.

FANCY FLIES. UPRIGHT WINGED PATTERNS

Magnified

Wickham

Golden Dun

Badger Quill

Apple Green

No. 84.—No. I. Whitchurch.

Wings.—Pale starling.
Hackles.—Two pale ginger cock hackles.
Body.—Primrose floss silk.
Whisk.—Gallina dyed a faint brown red.
Hook.—000 to 0.

No. 85.—Badger Quill.

Illustrated at Plate XXVII.

Wings.—Pale starling.
Hackles.—Two badger cock hackles.
Body.—Peacock dyed black or quill from chaffinch tail.
Whisk.—Very pale Gallina.
Hook.—000 to 0.

No. 86.—Saltoun.

Illustrated at Plate XXVII.

Wings.—Palest starling.
Hackles.—Two pale ginger cock hackles.
Body.—Black silk ribbed with fine silver wire.
Whisk.—Gallina dyed a faint brown red.
Hook.—000 to 0.

Nos. 84, 85, 86 are old patterns which have been somewhat neglected of late years, but are useful flies, and well worth trying when the fish are coming short at other artificials.

No. 87.—Apple Green (Holland's Pattern).

Illustrated at Plate XXVII.

Wings.—Medium starling.
Hackles.—Two red game cock hackles.
Body.—Condor dyed light green.
Whisk.—Gallina dyed brown red.
Hook.—000 to 0

A good fly in the summer and early autumn.

No. 88.—Greenwell's Glory.

Wings.—Hen blackbird wing.
Hackles.—Two Coch-y-Bonddhu cock hackles.
Body.—Olive silk, ribbed closely with fine gold wire.
Whisk.—Gallina dyed brown olive.
Hook.—000 to 0.

An old and well-known pattern, probably originally intended to represent one of the Olive Duns.

SECTION II.—FLAT-WINGED PATTERNS.

No. 89.—Hammond's Adopted.

Illustrated at Plate XXVIII.

Wings.—Woodcock wing.
Hackles.—Two brown ginger cock hackles.
Ribbing Hackle.—A brown ginger cock hackle.
Body.—Dubbing of ruddy brown crewel, ribbed with fine gold wire.
Hook.—1 to 4.

No. 90.—Artful Dodger.

Illustrated at Plate XXVIII.

Wings.—Cock pheasant wing.
Hackles.—Two blood-red cock hackles.
Ribbing Hackles.—A blood-red cock hackle.
Body.—Dubbing of purple crewel (or, for a variety, of dark sage-green crewel) ribbed with fine gold wire.
Hook.—1 to 4.

No. 91.—Coachman.

Wings.—White swan or duck.
Hackles.—Two red game cock hackles.
Body.—Copper peacock herl.
Hook.—1 to 4.

No. 92.—Governor.

Illustrated at Plate XXVIII.

Wings.—Woodcock.
Hackles.—Two ginger cock hackles.
Body.—Copper peacock herl.
Butt.—Primrose floss silk, or flat gold for a variety.
Hook.—0 to 4.

Nos. 89, 90, 91, and 92 are useful evening flies, and No. 90 is also at times successful during the day, especially in the Green Drake season. No. 92, dressed on hook No. 0 or 1, is a great favourite on some rivers in the summer on hot, still days.

SECTION III.—HACKLE PATTERNS.

No. 93.—Hackle Wickham.

Illustrated at Plate XXVIII.

Head Hackle.—A honey dun hen hackle.
Shoulder Hackle.—Red game cock hackle.
Ribbing Hackle.—Red game cock hackle.
Body.—Flat gold ribbed with fine gold wire.
Whisk.—Gallina dyed brown red.
Hook.—000 to 1.

No. 94.—Orange Bumble.

Head Hackle.—Honey dun hen hackle.
Shoulder Hackle.—Honey dun cock hackle.
Ribbing Hackle.—Honey dun cock hackle.
Body.—Condor or peacock dyed orange and ribbed flat gold.
Hook.—00 to 1.

No. 95.—Furnace Bumble.

Illustrated at Plate XXVIII.

Substitute furnace hackles for the honey dun hackles, but in other respects dress exactly as No. 94.

No. 96.—Corkscrew.

Head Hackle.—A brown ginger hen hackle.
Shoulder Hackle.—A brown ginger cock hackle.
Body.—Central quill of a brown partridge tail feather, from which the plumes have been cut away on either side.
Hook.—00 to 1.

FANCY FLIES, FLAT WINGED PATTERNS.

Natural Size

89

Hammond's Adopted

90

Artful Dodger

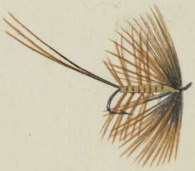
92

Governor

HACKLE PATTERNS

Magnified

93



95

Furnace Bumble

Hackle Wickham

99

Macaw Tag

Nos. 93, 94, 95, and 96 are all good summer and early autumn flies, and worth trying in hot weather whenever the fisherman has failed to rise feeding fish, whether trout or grayling. If dressed on 000 hooks the shoulder hackle should be omitted in the patterns Nos. 93, 94, and 95, or in fact in any very small hackle fly ribbed down the body.

No. 97.—Red Tag.

Hackles.—Two blood-red cock hackles.
Body.—Copper peacock herl.
Tag.—Ibis.
Hook.—00 to 1.

In the absence of Ibis, a tuft of scarlet wool, though much inferior in appearance, can be substituted. A fly precisely similar in other respects, but with a flat gold body, is called the "Golden Tag."

No. 98.—Orange Tag.

Hackles.—Two red game cock hackles.
Body.—Green peacock herl from the sword feather, two or three strands twisted together, ribbed with fine flat gold.
Tag.—A feather from the ruff of the Indian crow.
Hook.—00 to 1.

If Indian crow for the tag is not procurable, orange wool may be used in its place, but the Indian crow feather is preferable.

FANCY FLIES, FLAT WINGED PATTERNS.

Natural Size

89

Hammonds Adopted

90

Artful Dodger

92

Governor

HACKLE PATTERNS

Magnified

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No. 98.—Orange Tag.

Hackles.—Two red game cock hackles.
Body.—Green peacock herl from the sword feather, two or three strands twisted together, ribbed with fine flat gold.
Tag.—A feather from the ruff of the Indian crow.
Hook.—00 to 1.

If Indian crow for the tag is not procurable, orange wool may be used in its place, but the Indian crow feather is preferable.

No. 99.—Macaw Tag.

Illustrated at Plate XXVIII.

Body.—Of a strand of yellow macaw tail feather.
Hackles and Tag.—As No. 97.
Hook.—00 to 1.

If dressed with body of a strand of red macaw tail feather, this pattern is called the "Beefsteak."

Nos. 97, 98, and 99, and their varieties, are the best standard patterns known for grayling from July to November; in fact, some of the most experienced grayling fishermen are in the habit of fishing these tags to the exclusion of other artificial flies. Sometimes and in some rivers trout take the tags, but they should be considered as essentially grayling flies.

No. 100.—Half Stone.

Head Hackle.—A honey dun hen hackle.
Shoulder Hackle.—A honey dun cock hackle worked in behind the head hackle and carried down to the end of the mole fur dubbing.
Body.—Upper half of pale mole fur, and lower half of white condor dyed canary.
Hook.—0 to 4.

An improvement on the old standard pattern, and killing at times.

PART III.

DRY-FLY DRESSING.

CHAPTER I.

MATERIALS AND IMPLEMENTS.

THE hook is the foundation on which the entire structure of the artificial fly is raised; as it may therefore be considered of primary importance, no apology is needed for placing it first on the list of materials. It is also one of the links connecting the fish with the fisherman, and any inherent flaw or fault in the metal of which it is made is fatal to its efficacy. The form of the hook, the thickness of the wire, the shape and rake of the barb, and above all, the hardening and tempering of the steel, are matters requiring careful and intelligent study by the manufacturer. Hooks.

From time immemorial angling writers have held forth at length on these points, and every possible shade of opinion has been freely venti-

lated. Some have striven to prove by mathematical formulæ that the relative direction of the eye and the shank—involving the problem whether the hook should be made with turned-up or turned-down eye—is of grave import. Some have advanced the theory that patterns with very short shanks will hook fish better than longer ones. Some have laid stress on the knot used to attach the eyed hook to the cast, and others, again, have dismissed the subject with the *dictum* that the old-fashioned arrangement of whipping the hook to gut is after all the best.

Eyed Hooks.

To sum up the question, however, as far as the dry-fly fisherman is concerned, the great majority are agreed that the fly on an eyed hook is better than one on a shank whipped to gut. The turned-up eye is far more popular with trout fishermen than the turned-down eye. This is not due to any palpable defect in the form of the latter, nor to any real advantage to be derived from the shape of the former. It is, however, directly traceable to the absurdity that the eye in the turned-down form is made so small as to be an inconvenience to the majority, and an impossibility to those whose sight, either from age or other cause, is impaired.

There have been loud, frequent, and it must be admitted, just complaints on two points connected with the manufacture of hooks. They are, firstly, the frequent variation

of size, whether in the gauge of the wire, the length of the shank, or the gape of the hook as marked ; and secondly, the large proportion of badly tempered hooks among them. On the question of size, it seems incomprehensible that the manufacturers should have strayed so far from their original patterns. The old 000 Hall's eyed hook has apparently been discarded, and in place of it a very short shanked 00 made of the same wire as the old 000 has been substituted. All the other sizes from 00 to 5 or 6 are made of wire of far smaller gauge than the original hooks of the series.

It is said that the makers have been urged from time to time to reduce the gauge so as to give the dry-fly fisherman a lighter hook, and thus save his wrist from part of the exertion of drying. This may be so, but it appears inconceivable that a practical hook maker should allow his careful calculations of the relative thickness of wire required for the various sizes of hooks to be set aside by the caprice or laziness of the *dilettanti.*

Then, with regard to the mania for extra short shanks, and the complicated scientific arguments to prove that they are more effective in hooking fish than the longer. Has any practical fisherman a genuine belief in this theory? Can anyone from his own experience say that he honestly believes that this clumsy-

looking short hook is more successful than the old shape? The collective opinions of the first fishermen of the day are certainly in favour of the original form of eyed hook. In appearance the fly on the extra short hook with its stunted, dumpy body cannot for a moment be compared to one dressed on a shank of the original length as designed by Mr. Hall.

Faulty Tempering.

The second ground of complaint, viz., the excessive percentage of badly-tempered hooks, is, unfortunately, but too well founded, and to persuade the hook makers to remedy this fault appears hopeless. They advance, possibly with some show of reason, the very low price paid for hooks, and urge that, with the present rage on the part of the public for buying cheap rubbish, any increase of price would prejudicially affect the extent of the trade. No sane man would suggest that the hooks, like the old hand-made Limericks, should be tempered singly, as such an alteration of the method of manufacture heretofore adopted would entail a large increase of cost. The cost, however, of testing and rejecting all that were either too soft or too brittle would be inconsiderable. Besides, once establish the principle that each hook is to be tested, and only those properly tempered sold, and there must of necessity and within a short time be devised a machine for carrying out this testing, and the cost of such testing by machinery would be insignificant.

It is darkly hinted that many of the cheaper hooks are made of steel so inferior in quality that it is not possible to temper them properly. This may be the case, but the policy of saving a few pounds on a ton of steel which would probably make millions of hooks, appears to be suicidal on the part of the manufacturers. If true, however, this would account in a degree for a considerable proportion of the inferior hooks sold to anglers at the shops.

Blue Hooks and Bronzed Hooks.

Personally I have always found blue hooks less liable to rust than bronzed ones. On this point, however, I am contradicted by Mr. S. Allcock, of Redditch, whose experience of fifty years has convinced him that "blue hooks rust sooner than either bright, bronzed, or japanned." This opinion, too, is corroborated by an amateur friend, a fly fisherman and fly-dresser of great knowledge and experience, who writes: "I took a box of floating flies to the seaside in the West of Scotland some years since. The box was only taken out and opened once during a week's visit. On my return to London an examination of the flies showed that some twenty-four dozen of blued hooks were all thickly covered with rust, while the dozen or two brown hooks in the box were perfectly free from anything of the kind."

As to the special knot to be used for fastening the hook to the cast, Mr. Hall's original

one is the most secure, and for the information of any not already cognisant of his method, the full directions are appended in his own words, as given in "The Fishing Gazette" of April 12th, 1884, viz. :—

"*Directions.*

Hall knot.

"Take the hook between finger and thumb of the left hand, and push the gut through the eye (as shown by the arrow), take a turn round the shank and back again through the eye (fig. 13.) The end A, which should not be

FIG. 13.

less than $1\frac{1}{4}$ in. long, is then tied in a single knot *round* the long end of the gut. If the gut is well wetted and a gentle pull given, the single knot will slide down to the eye and form a perfectly secure and rigid fastening, and the gut will stand out in the direction of the shank of the hook. The superfluous end of A may be cut off quite close to the eye."

Some anglers may point out the difficulty, especially to those whose sight is not very

good, of passing the end of the gut cast *twice* through the eye of the hook, and in the case of the very smallest flies dressed on 00 and 000 hooks, I must confess that this is a feat occasionally almost impossible to accomplish. Others may complain of the unpleasant manner in which many professional fly-dressers fill the eye up with varnish. The latter fault is due either to the ignorance or to the carelessness of the workman, and the remedy is a very simple one, viz., to return or refuse to purchase any flies so finished.

Turle knot.

The following method of attaching eyed-hooks, the invention of Major Turle, will obviate the former objection raised. The advantages of this method over all others are that the end of the gut is passed only once through the eye; the knot is a perfectly simple one, and yet quite secure; and while tying it the fly, being pushed well up the cast, is entirely out of the way of the operator's fingers, and cannot be dropped.

Pass the end of the gut cast A, previously well soaked, upwards through the eye, and draw the fly well up the cast, so as to be out of the way. Carry the end of the gut round itself to form an open loop as shown (fig. 14).

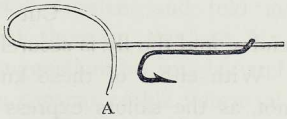

FIG. 14.

With the end A make an open turn round the gut and end of the loop (fig. 15).

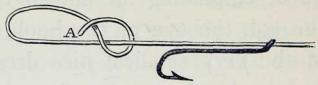

FIG. 15.

Pass the end A through the open turn just made (fig 16).

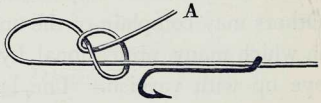

FIG. 16.

Draw the knot thus made nearly tight; if drawn quite tight it is apt to fray the gut in the subsequent operations. Pass the fly through the loop, and place the knot on top of the neck of the eye (fig. 17).

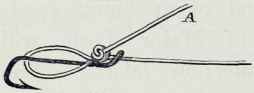

FIG. 17.

Bend the loop downwards, at the same time carefully drawing the fibres of the hackle clear of it; and, holding the fly between the thumb and forefinger of the left hand, draw the loop up close with the upper part of the cast. Pull the knot quite tight with the end A (fig. 18).

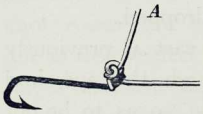

FIG. 18.

Cut off the projecting end A, and the fly is securely fastened.

With either of these knots the gut cast is not, as the sailors express it, *short turned*, as it leaves the hook, and, when properly tied,

the fly is firmly and rigidly attached to the end of the cast.

Hackles.

The hackle, in winged patterns, represents the legs of the natural insect, and in hackle patterns the wings and legs, and is the most important of the materials used. There has always been a standing controversy on the comparative advantages of using cock or hen hackles. The cock hackles have a superior gloss, are more transparent, and are more easily freed from moisture, but on the other hand, are much stiffer and coarser than hen hackles. They were formerly generally preferred for floating flies, and universally used in dressing them.

Paraffin for waterproofing flies.

Since then, however, the use of the paraffin bottle has appreciably altered the aspect of the question by effecting a vast saving in the labour of drying the fly. Anglers should know that this discovery was first made public by the late Mr. Thomas Andrews, of Guildford. Painting a fly with paraffin before use renders the materials of which it is composed waterproof. The use of paraffin for this purpose was known and practised for years by a few of the Upper Test fishermen, and told in confidence by one of them to the late Mr. Andrews. At my suggestion he sought, and at once obtained, the consent of his informant to divulge this secret for the benefit of all dry-

fly fishermen. One result of this has been that hen hackles, except for their want of sheen, are now almost as good as cock hackles.

Latterly some new and very promising wingless patterns, in which two hackles are used, have been introduced. The use of two cock hackles tends to make the flies too bulky and too stiff; hence the plan adopted is to dress them with a hen hackle at the head and a cock hackle at the throat. The use of the paraffin not only waterproofs both the cock and hen hackles, but also seems to increase the gloss of the latter. Then, too, in the case of such colours and shades as honey duns, pale blue duns, natural yellow duns, dark slaty blue duns, &c., it is almost impossible, except at very heavy expense and with extreme difficulty, to accumulate a stock of cock hackles, and in these dilemmas hen hackles can now be substituted without serious depreciation in the flies dressed.

Keeping Feathers, &c., free from Moth.

For keeping hackles, other feathers, and fur, safe from the ravages of moth, neither pepper, tobacco, camphor, cedar chips, nor colocynth, are of much avail. Naphthaline in crystals, or a similar substance sold under the name of albo-carbon, is moderately efficacious; but the only certain preventive is immersion in a weak alcoholic solution, say one in a thousand, of corrosive sublimate (mercury

perchloride). Care, however, is needed in handling this compound, especially if there are abrasions, cracks or cuts in the skin, as it is a deadly poison.

It may be noted that, as a rule, dyed feathers and fur are not as attractive to moth as natural ones. If there is any suspicion of moth or moth eggs, the materials should be thoroughly baked in a cool oven, and, when cold, sprinkled plentifully with benzole. In fact, with a large collection of valuable materials subject to moth, it is a good plan to take them out of their boxes, packets, or other receptacles once a year and subject them to the above treatment. All hackles before use require to have the downy portion at the root end stripped off, and it is well to do this to all hackles before putting them away in any receptacle, as the first indication of the presence of moth is usually visible on this flue.

Close plumed Feathers as Hackles.

When any close-plumed feathers, such as those from the neck or rump of pheasant, partridge, grouse, grey hen, &c., are used as hackles, after stripping off the downy part at the root end of the quill, take the extreme point between the thumb and forefinger of the left hand, and with the right thumb and forefinger, slightly moistened, stroke back the whole of the plume except the small portion

held between the left thumb and forefinger, as shown by the sketch (fig. 19).

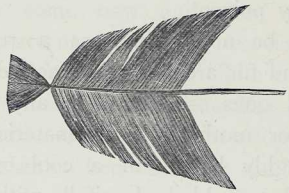

FIG. 19.

Use of Dubbing as Hackle.

For the legs and bodies of some flies the hair or fur of certain animals (dubbing) is used in place of ordinary hackles; and in such cases the plan adopted is to spin or twist it on the tying-silk for the body of the fly, taking care to put an extra thickness on to the shoulder-end of the body, tapering it to the tail, and after the fly is completed to pick out with the dubbing-needle a few fibres to form the legs.

There are, however, patterns in which the body is of plain silk or quill, and the legs only of dubbing, and in these instances a somewhat more complicated procedure is necessary, viz.: Thoroughly wax a short length of tying-silk and double it over the dubbing-needle, the point of which is firmly stuck into the edge of the working table. Separate the fibres of the hair or fur to be

used, and lay them as much as possible horizontally across one end of the tying-silk A (fig. 20); place the other end of the silk over and press it closely down on the fur (fig. 21); then, taking the two ends of the silk between the thumb and forefinger of the right hand, twist up tightly. The effect of this will be to twist up the silk and fur

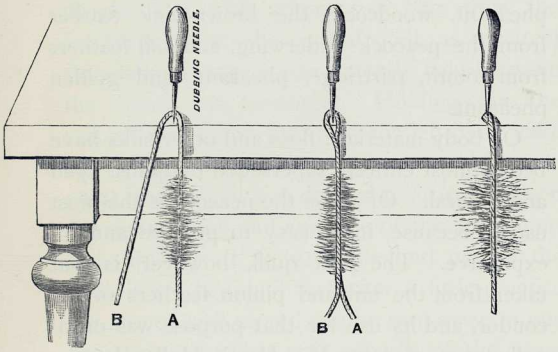

FIG. 20. FIG. 21. FIG. 22.

between the two ends, as shown in fig. 22, into a rough-looking hackle, which is used exactly like an ordinary one, the silk representing the central quill, and the fur the fibres of the hackle. By the same method, having a hackle of the right colour, but too long in the fibre for the size of the hook, the dresser can, by detaching the separate strands,

laying them horizontally across a length of thoroughly waxed doubled tying-silk and twisting them up as above, produce an imitation hackle with fibres only half the length of the natural one from which they were taken.

The following list will comprise nearly all the other feathers required : Wings of starling, young and old, of coot, snipe, landrail, partridge, pheasant, woodcock, the brown-pink feather from the peacock underwing, and tail feathers from tomtit, partridge, pheasant, and golden pheasant.

Body Materials.

Of body materials, floss and other silks have been almost entirely superseded by quills, dyed and natural. Of these the peacock is the most usual, because it is easy to procure and inexpensive. The best quill, however, is that taken from the tail and pinion feathers of the condor, and its use for that purpose was originally suggested by Mr. H. S. Hall. In the natural state it varies in shade from almost pure white to dark slate.

Some feathers have light points and dark butts, and others are dark slate at the points, shading into light grey or white butts, so that a great variety of bodies can be made from the natural undyed feather. It takes all the ordinary dyes well, and each strand has two flues, so that if used unstripped it will make a rough

body ; with one flue only stripped off, a smooth body with a rib formed by the second flue ; and if stripped of both flues, a perfectly smooth body. Whether stripped or unstripped the quill is very strong ; in fact, it is difficult to break a single strand by a fair pull between the fingers.

Stripping Condor.

The difficulty is to strip condor, and the following plan will be found efficacious and simple : Cut with scissors, or tear from the feather close to the central quill, as much of the plume as can be conveniently held between the thumb and forefinger. Holding the fine end of the plume firmly in the left hand, take the longer flue of the nearest strand, at the point from which it is desired to strip, between the right thumb nail and side of the forefinger, and, drawing it towards the butt end of the quill, it will be found that after a little practice the flue of each strand can be torn away in one operation. In this way enough of the stout end of the strand can be divested of the longer flue to make the body of any ordinary trout-fly.

Sometimes the second or shorter flue can be torn off in the same way, but more frequently the effect of attempting this is to split and spoil the quill. When, therefore, it is desired to make a perfectly smooth body, the strand of quill should be held firmly

flat on a table between the thumb and forefinger of the left hand, and the back of a penknife drawn five or six times in succession towards the stout or butt end, thus scraping off the second or shorter flue and leaving a smooth strand of quill.

Other Quills for Bodies.

Adjutant quill, which is stripped in the same way as condor, in its natural state makes a very good blue dun body, and, when dyed, is useful for red spinner, dark olives, &c. It is much stronger than peacock, but not nearly as strong as condor. Condor or adjutant quills should be stripped before being dyed; otherwise it is not easy to predict what the colour of the body will be when finished. Quills for bodies are also made by cutting away as closely as possible from both sides of the central quill of the plume of tail or wing feathers of starling, coot, chaffinch, partridge, pheasant, &c. The central quill is then flattened between the back of the scissor blades and the right forefinger, the right thumb being placed over the scissors to exert the necessary pressure. The short ends of the plume which are left on the quill make an effective rib on the body of the fly. Smooth quills can also be obtained by splitting off the surface of the central quill of the same feathers with a sharp knife.

Bleaching Quills.

Immersion in hydrogen peroxide will lighten

the colour of any feather, and in time bleach it to a pure white. When bleaching quills or other feathers, the addition of about 5 per cent. of strong liquid ammonia to the hydrogen peroxide is recommended as rendering the action of the bleach more rapid. Some amateurs have expressed doubt as to the bleaching action of hydrogen peroxide, and the reason of this is quite simple. Hydrogen peroxide being a combination of two atoms of hydrogen with two of oxygen (H_2O_2), is a very unstable compound. Hence, if the chemist from whom it has been purchased has kept it in stock for any time it has decomposed, given off one atom of oxygen, and become H_2O, or pure water.

Gut or Horsehair for Bodies.

The refuse ends of the hanks of silkworm gut are dyed and used for bodies. They take the dyes well, but in use soon get sodden, and will not float. Horsehair is preferable to gut for this purpose, and, although it does not take the dyes as readily, floats much better. Another advantage of hair over gut is that the former can be used dry, whilst the latter must be thoroughly soaked before working it on as a body.

Dubbing Bodies.

It is, however, quite possible that in the near future quill, gut, and hair for bodies will have been abandoned in favour of dubbing. This statement may give the idea of a retrograde step, seeing that fur and wool were

probably the first materials used for the bodies of artificial flies. For sunk flies they have always been the most suitable materials, from their transparent, watery, and life-like appearance, but, when once thoroughly soaked, the exertion of drying has been too great to recommend them to the dry-fly fisherman; the use of the paraffin bottle has, however, appreciably remedied this defect.

For dubbing bodies the materials used are—fur from the hare's ear, hare's face, hare's fleck or hair outside the shoulder, the palest buff-coloured fur from the flanks and belly of the opossum, mole, water-rat, and common mouse, with odds and ends of cuttings from any light blue, yellow, or brown refuse furs in a furrier's shop. These, with various coloured crewels torn to shreds, will, when properly blended, produce almost any tint required; the blending merely consisting in tearing the separate threads into shreds with the fingers, mixing them and tearing them up together, until the various shades and colours are thoroughly incorporated. A little practice will enable an amateur naturally gifted with an eye for colour to match almost any shade or tint with dubbing.

Rofia Grass for Bodies.

Rofia grass laid over white quill is the modern substitute for wheaten or maize straw formerly used for Mayfly bodies. Ordinary shoemakers' bristles are required for the foundation of detached bodies.

For Mayfly wings use the saddle or breast feathers from the Canadian Wood or Summer duck, Egyptian goose, Rouen drake, either dyed or natural, and pintail or teal. Latterly, well-marked mottled feathers from the Gallina breast have been used when dyed for Mayfly wings, and although difficult to dry have given satisfaction to the fisherman and proved acceptable to the fish. The little scarlet feathers on the neck of the ibis, the orange of the Indian crow, or the blue and yellow tail feathers of the macaw, are occasionally useful for grayling flies. **Mayfly Wings.**

For whisks or tails, in addition to the ordinary cock beard hackles, tail feathers from the Bird of Paradise, brown mallard wing, fibres from partridge or pheasant tail, and small rabbit's or rat's whiskers, should be included in a fly-dresser's collection. The late Mr. Marryat's opinion that cock Gallina or guinea-fowl neck feathers, dyed or natural, are tougher and less liable to break in use than ordinary cock hackles, has been fully confirmed. As they take all dyes, and are obtainable in all shades, from pure white to a deep puce grey, plain, or mottled, they can be used for any pattern. **Whisks.**

Gold or silver wire, twist or flat tinsel of various width and thickness should be procured from the manufacturers of military lace, badges, &c.

Tying silk.

For tying silk, when making small flies, nothing I have yet seen can compare for quality with Messrs. Pearsall's reels of gossamer silk made for the purpose. The pale colours should be generally used, such as the white, cream, yellow, orange, and red, always selecting a paler shade, but similar in tone, to that of the body of the fly. As an example, use cream-coloured tying-silk for the palest olives, and for the darker olives the shades of yellow.

Transparent wax.

The numerous recipes given in general angling books for preparing transparent or white wax are generally unsatisfactory, but latterly a friend gave me a small quantity of white wax prepared by Mr. M. Gibson, 72, Castle Street, Inverness, N.B., which, after two years' experience, has proved successful. Ordinary rod-maker's wax is always procurable, and in dressing flies with delicate-coloured bodies it should be rendered as nearly colourless as possible by continually pulling it out into thin strips and working them up together. A small bottle of varnish, made by dissolving pure shellac in spirits of wine, will practically complete the list of materials.

IMPLEMENTS.

As to the implements required, although not an absolute necessity, a vice is a great help,

especially in making the very small flies. "No one, amateur or professional, after once experiencing the advantages of having the hook rigidly held by a process which leaves both hands free would ever revert to the old and uncomfortable plan of holding the bend of the hook between the thumb and forefinger of the left hand throughout the operation of tying." These words were written in 1886, and may now be repeated in 1902.

Some discussion has from time to time been carried on in the sporting press on this question. One writer went so far as to affirm that no professional trout-fly dresser would dream of using a vice, and it has even been said that an expert tyer could take the hook in his fingers and dress the fly completely in the time required by the ordinary amateur to fix the hook firmly in the jaws of the vice. This may be a smart saying, but it is a great exaggeration. With a view of ascertaining, however, beyond doubt whether the vice is generally used or not, an inquiry on the subject was addressed to Messrs. S. Allcock & Co., of Redditch, the largest wholesale house in the fishing tackle trade. Their answer was to the effect that, out of the large number of trout-fly dressers employed by them, about 90 per cent. use the vice and 10 per cent. dress with their fingers. They add, too, of the

users of the vice, that "they say they can tie both a neater and a stronger fly with the

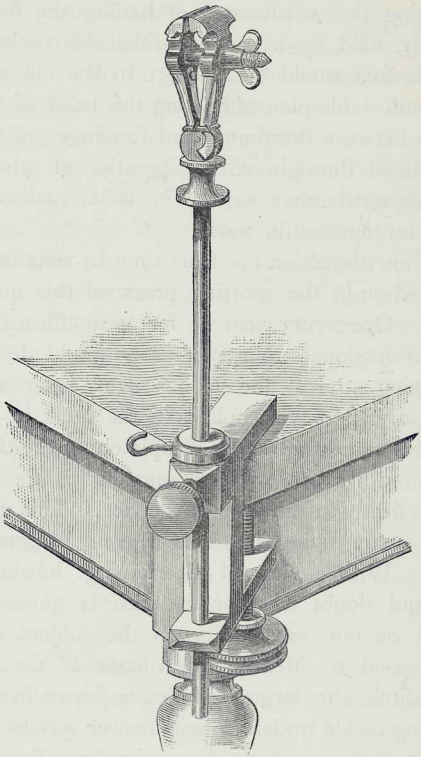

FIG. 23.

vice than without, as both hands are free for the work." This authoritative statement should settle the question once for all.

Vice for fly-dressing.

A really serviceable vice, however, is not easily procured, as those usually made and sold for the purpose are faulty in design, and inferior in construction and material; the jaws, instead of being made of the finest and hardest cast steel, are of case-hardened iron or some such unreliable metal; the screw to compress them is of soft iron, is placed much too far from the holding faces of the jaws, is usually made with a clumsy head, and the point projects beyond the vice, so as to be in the way of the fly-dresser at every turn of the silk. Messrs. Holtzapffel & Co., 13 & 14, New Bond Street, W., now keep vices specially made for the amateur fly-dresser's use, in accordance with the author's views, as illustrated (fig. 23), and although the prime cost is necessarily somewhat higher, yet in this, as in most other mechanical apparatus, the comparatively costly, but properly-made and well-finished, article will, in the end, prove the cheapest. The loose hook immediately above the clamp is intended to be used when waxing the doubled silk.

New form of vice.

The form of vice invented by my good friend, Mr. T. P. Hawksley, now also kept in stock by Messrs. Holtzapffel, is to my mind a very great improvement, and a boon to all fly-dressers, whether professional or amateur.

On reference to the accompanying diagram (fig. 24) it will be seen that the vice consists of the vertical stem (A), the upper part of which is bent to the right at an angle of 150°, and the jaws of the vice are again bent to the right at an angle of 120°, so that they are in a horizontal position. A rectangular loose steel collar (B) fitted over the base of the jaws, slides up and down the wedge-shaped tail-piece (C) of the jaw, for relaxing or tightening the hold of the vice; and the jaws are kept apart by a short length of strong clock spring (D). To fix the hook in the vice take the eye between the thumb and forefinger of the right hand, and place the bend of the hook between the open jaws, with the shank horizontal. By pressing the lower part of the wedge-shaped tail-piece against the stem with

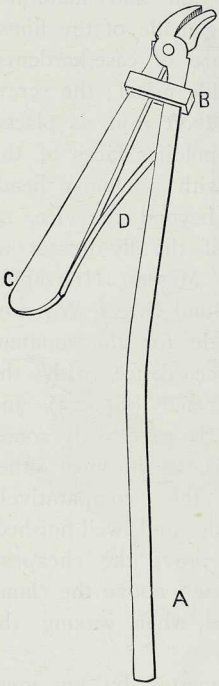

FIG. 24.

the left hand, the collar will fall by its own weight and secure the hook in position.

Advantages of improved vice.

The advantages of this improved vice are: firstly, the saving of labour in having only to slide the collar up or down the wedge to release the hook from or secure it in the jaws, as compared with the screwing or unscrewing of the fly nut in the old form of vice; secondly, that the hook being affixed to the extreme right of the jaws, the jaws being inclined to the right, and the upper part of the vertical stem also inclined to the right, the operator's fingers are not hampered by the head, stem, or fly nut, as in the old-fashioned vice.

For a left-handed worker, the vice would have to be made with the inclination of the upper part of the stem and the jaws respectively at the same angles towards the left, unless the operator would put up with the comparatively slight inconvenience of having the wedge projecting towards him, in which case he would only have to turn the right-handed vice round to the left. From a mechanical point of view there is theoreticaly a fault in the design. The principle laid down in reference to any vice is that, whether opened or closed, the jaws should be as nearly parallel as possible, and the old screw vice is made in accordance with this principle. As, however, the jaws of the Hawksley vice work on a pin

from the left hand side and the joint is close to the angle of the jaws, when open they are less parallel than those of the old pattern. It is fair to point out this apparent defect, but in practice it is not found to impair the efficiency of the implement.

The vertical portion of the stem slides up and down in a solid brass clamp, so as to regulate the height according to the convenience of the operator. The clamp can be fixed to any ordinary table, and in this form the vice is convenient and portable. For home use, however, a better arrangement is to discard the clamp and fit a brass socket, passing through the working table, bored to take the stem. A small set screw fitted to the lower part of the socket, under the table, is used to secure the vice in the desired position.

Tools for fly-dressing.

The tools required for fly-dressing are few and simple, and comprise a thick blunted needle fixed in a handle for picking out dubbing, &c., a pair of hackle pliers, a pair of smooth-pointed forceps, a pair of long bull-dog pliers as illustrated on page 275, and a pair of oculists' curved scissors. It may be noted, to prevent mistakes, that two sorts of curved oculists' scissors are made; one in which, when the scissors are laid flat on a table, the blades are curved laterally, and the other in which they are curved upwards. The form

recommended for fly-tying is the latter. The blades of scissors after use often grate when opened and closed; this can be remedied by placing each blade separately flat between the thumb and forefinger of the left hand, and, while pressing on the blade, drawing the thumb and forefinger three or four times down towards the point. This is a plan which should be followed by everyone using scissors, as it keeps them lubricated and in good order.

The materials required are usually kept in a leather-bound book, with leaves containing divisions of various sizes and shapes, the feathers, &c., being enclosed in parchment pockets. A more modern and improved arrangement, however, is a japanned tin box, with compartments for the various materials and implements.

Fly-dressing by artificial light.

Many fly-fishermen are loth to take the trouble of learning to dress their own flies, or, having acquired the art, do not keep their hands in practice because of the difficulty, or, as they allege, impossibility, of working by night without unduly straining their eyes. They argue, and from their hypothesis it is quite reasonable, that a man engaged in his profession or business, cannot spare the time during the brief hours of daylight in the winter or close season, and that in the spring or summer he is more agreeably employed, and

with greater benefit to his health, pursuing his favourite sport in the open air. Having devoted some considerable attention to the subject and having, I believe, fairly mastered the difficulty, it would probably be of interest to fly-dressers to give them the benefit of the experience gained.

It is well to determine the exact conditions under which the work has to be done before attempting to devise or adopt the form and arrangement of illuminant and lamp to be used. It is required as the first condition that the light should be sufficient to illuminate the object, and yet be placed at such a distance as to be clear of the fingers when tying. If the paramount importance of preserving one's sight is considered, the source of light itself must not be visible when working and no ray from it must approach the fly-dresser's eyes. Evidently no ordinary form of gaslight, candle or lamp will fulfil all these conditions.

In the earlier attempts I used a gas lamp, then a paraffin, and later a colza lamp as giving a much softer light and far less heat. With either of the illuminants the rays of light were directed upon the fly in the jaws of the vice by an ordinary engraver's bottle or globe. This was filled with a solution of sulphate of copper, 5 grains to the pint, with the addition of a small quantity of liquid ammonia, and the

blue fluid, acting as an absorbent of some of the coloured rays, tempered the light so as to render it less trying than when taken through a colourless medium.

Fluid for Monochromatic Light.

Since then, as the outcome of numerous microscopical experiments, undertaken with a view of producing, at moderate cost and without complicated apparatus, a light which is practically monochromatic, it was found that this result could be obtained by filtering the light of an ordinary lamp through a solution consisting of 160 grammes of pure dry nitrate of copper, 14 grammes of chromic acid, and water added to make it up to 250 cc. The liquid is held in a flat bottle or cell, of which the sides are parallel and ½ inch apart. This solution, reduced by the addition of water in proportion to the increased thickness of the medium in the engraver's globe, will be found preferable to the old solution of sulphate of copper and liquid ammonia. With this form of apparatus the illumination, with diffused light directed upon the object, was fairly well attained.

The system had, however, the grave fault of subjecting the eyes to a continual glare. After trying various forms of shades worn over the eyes, all of which were more or less inconvenient, I eventually made a large opaque screen of brown pasteboard, with a round hole

to admit only sufficient light to illuminate the object. This arrangement was moderately successful, but had the disadvantage of leaving the greater part of the working table in darkness, so that it was not easy to find the wax, feathers, scissors, &c., when required for use.

Electric lamp.

Later, however, when removing to another house, I fitted up a room in accordance with my own designs, providing, among other things, a convenient working table fixed in a bay window facing nearly due west, so that, as far as daylight was concerned, there was all that could be desired. Having adopted electric lighting throughout the house, I had the wires carried to two ordinary concentric wall plugs, one on each side, and just above the level of the table. After exhaustive consultation, a good friend, an engineer by profession, with a thorough knowledge of optics, designed a lamp which, having stood the test of some nine years' use, may be deemed fairly serviceable for the purpose.

It consists of a heavy metal foot, on which is raised a pillar, 18 inches in height. The fitting to hold the lamp and reflector slides up and down on the pillar, and is secured at the desired height by a thumbscrew. The carrier of the lamp and reflector is attached to this fitting by a knuckle-joint, by which it can be

inclined to the angle required for directing the light on to the object. Another thumb-screw tightens and fixes this joint when the angle is once adjusted. The wire from the fitting of the wall plug is carried to the lamp in the ordinary way, and is of sufficient length to enable the stand to be moved on the table as required.

The source of light is an ordinary eight-candle incandescent ground glass lamp, and, for convenience of lighting or extinguishing without disconnecting from the wall plug, has an independent switch fixed to the carrier. The reflector, also of bronze, with the interior or reflecting surface heavily plated and polished, has a true parabolic figure. The eight-candle lamp is placed in the carrier, so that, approximately, the source of light is at the focal point of the paraboloid. Scientifically, a light thus placed is reflected in parallel rays of equal intensity in the direction of the axis of the paraboloid, but this would only be possible if the source of light was a geometrical point; and any increase of the area of the light produces bundles of rays originating at various angles, diverging and converging. This is mentioned to prevent confusion, as it is impossible for an apparatus of this description to be made so that all the rays are parallel and the disc of light of equal intensity throughout.

The arrangement carries out all the requirements laid down in a foregoing paragraph. The light is ample for illumination, and is yet sufficiently modified by the ground glass of the bulb to be pleasant. By raising or lowering, and inclining to the requisite angle, the light can be directed on to the object with the reflector at such a distance from the vice as to be quite out of the way. If all is properly adjusted, the light itself is invisible to the worker, and none of the rays reflected into his eyes. The area of the table illuminated is also sufficient to enable him to find any materials or implements he may require for his work. The heat given off by electric light is much less than by any other illuminant known, and is certainly not enough to cause any serious inconvenience to the operator.

Some readers may inquire what substitute can be suggested where the modern improvement of electric light is not available. The answer is that a paraffin or colza lamp, or an ordinary candle, can be fitted in a somewhat similar manner, but the distance of the lamp from the vice must be determined, and the angle at which the axis of the paraboloid should be inclined from the perpendicular calculated, and the reflector fixed accordingly. The reflector could not be fitted on the knuckle-joint, as, when the inclination was

varied, the lamp or candle would not be perpendicular, and would not burn satisfactorily. If the light from the lamp or candle should be too intense, it could be modified by the interposition of ground or coloured glass, or of a bottle containing the monochromatic fluid before described, between the reflector and the object.

CHAPTER III.

DYEING.

ONE of the most difficult problems for the amateur fly-dresser is that of dyeing the materials to the various shades required. Nothing but experience can make him certain of being able to match the tints, and even then his power of matching accurately is bounded by his natural capacity of appreciating delicate gradations. Without being in any way colour-blind, a vast proportion of human beings have no very keen preception of slight differences of colour. In every case, however, careful attention to details, great patience, working in very dilute solutions of the dyes, and continual comparisons of the dyed material with the original pattern, are the only known means of attaining success.

Apparatus required.

It is proposed here to describe the process of dyeing the colours and shades required for the series of patterns in Part II., and in all probability this range of tints will suffice for any amateur, and possibly professional, fly-

dresser. The necessary apparatus consists of a few common glazed earthenware pipkins, a small deep china colander to fit into them, a few glass stirring-rods, and a spirit lamp or gas apparatus to boil the ingredients and keep them at the required heat. The best gas arrangement is a Fletcher's Safety Bunsen, which is superior to the ordinary form of atmospheric burner, as it can be turned down to a mere flicker without risk of lighting back and sooting up the burner. It is also a convenience to have a sink with hot and cold water laid on in the room where the dyeing is carried on.

The amateur must not expect to be successful in dyeing silks, crewels or other yarns, and in fact, considering how great is the variety of colours in which they can be obtained, it is scarcely worth while to attempt it. When dealing, however, with hackles, quills, feathers, or other animal matter, and with most dyes, it is necessary, as a preliminary, to soak them in a solution of potash or soda, about one ounce to the quart. The object is to remove sufficient of the natural grease from the fibres to enable the colour to strike. The feathers, &c., should then be thoroughly washed in hot water. In the recipes for dyeing given in this chapter, it may be inferred that this preparation is necessary in all cases, except where especially notified to the contrary.

Packet Dyes.

A number of firms make inexpensive packets or bottles of prepared dyes, which have been used for many years by fly-dressers, such as: Messrs. Crawshaw & Co., Messrs. Judson, the Diamond Dyes, &c. Although the use of these packets is much less troublesome than the preparation of decoctions of vegetable and other products, it will yet be found that the recipes here offered are more satisfactory and reliable for the particular colours indicated than any of the made-up dyes. Where no recipe is given for a particular colour, it may be inferred that the packet dye has been found satisfactory. The weak point of the packet dyes is that using the same dye of the same strength with the same material will not always produce the same shade of colour. Whether it is due to the dyes themselves not being always uniform, or whether the ingredients of which they are concocted are not always intimately mixed, or whether the fault is in the worker himself, is not easy to determine.

Directions for Use of Packet Dyes.

If the packets are used, a small quantity of the dye should be placed in a teacup and sufficient boiling water poured on to dissolve it. One of the pipkins filled with hot water should be kept simmering over the lamp or Bunsen. The materials to be dyed should be placed in the colander, and the colander in the pipkin.

A few drops of the strong solution of dye should be poured from the teacup into the pipkin and stirred to mix properly. When all the colour has been absorbed by the material more of the strong solution can be added until it is thought that the colour is sufficiently dark. The colander should be withdrawn, placed under a tap of cold water and thoroughly washed. A single feather should then be dried and examined. If not dark enough it must go back into the pipkin, and the operation of dyeing be continued until the colour is right; then the colander must be removed and again washed under the cold water tap. With all packet dyes except Canary, the addition to the dye bath of a small quantity of vinegar, acetic or other acid, is recommended to bring the colour out fully.

Mordant.

The prepared packet dyes, and all decoctions except such as are specially noted here as not requiring a mordant, should, after the dyeing and washing, be immersed in a solution of alum for a few minutes; this fixes the colour and discharges any superfluous dye. The alum solution should be prepared by dissolving half an ounce of alum in a quart of boiling water, but should not be used until cold. After mordanting, the material should be thoroughly washed in cold water.

Drying Feathers after Dyeing.

To dry the feathers, shake out as much

water as possible, place them in a hat-box or large cigar-box in front of a bright fire, and keep shaking the box about. The effect of this is not only to dry the feathers effectually, but, in drying, each fibre arranges itself in its natural position. Feathers which have been crushed or disarranged can be restored to their natural shape by a thorough soaking in boiling water, followed by the same drying process. Single feathers that have been crumpled can be put right by holding them in the steam issuing from the spout of a kettle.

In respect to the infusions enumerated in the following recipes, there is no reason why they should not be prepared in quantity and kept in bottles ready for use. To preserve them from decomposition or the formation of confervoid or other growth, it would only be necessary to add a few drops of a weak solution of Corrosive Sublimate, say 1 in 1,000.

Recipe No. I.—Green Olive.

(Mr. G. Holland's.)

Boil a teacup of ebony chips in a quart of water, adding a piece of chrome potash about the size of a pea; boil down to a pint, fill up to a quart, and again boil down to a pint. Pour the clear solution off into another

vessel, and add three drops of muriate of tin. Crawshaw's Green Olive, or Diamond Olive Green, dyes a similar colour to this.

Recipe No. II.—Lemon Green Olive.

(Mr. G. Holland's.)

First dye the material a fine yellow in an infusion of barberry bark ; then make it olive in an infusion of camwood, to which a very small crystal of copperas has been added.

Recipe No. III.—Medium Olive.

Boil for two or three hours two good handfuls of the outside brown leaves or coating of an onion root in a quart of vinegar and water in equal parts. Pour off the clear liquid into another vessel, and immerse the materials to be dyed. After the feathers have been in some time, add a crystal of alum about the size of a horse bean. If the colour be too pale and yellow, the addition of the smallest possible crystal of copperas will produce a browner and darker shade. No preparation in soda or potash is required with this dye, and no mordant.

Crawshaw's Medium Olive dyes a similar colour.

Recipe No. IV.—Brown Olive.

The addition of a small quantity of black tea and a small crystal of copperas to the preparation for No. III. will produce the mixture necessary for Brown Olive; the more copperas is added the browner and darker the colour becomes.

Crawshaw's Brown Olive and Judson's Olive Brown produce a similar colour.

Recipe No. V.—Green Drake Wings.

(The late Mr. G. S. Marryat's.)

Soak the feathers for at least twenty-four hours in solution of alum, then rinse out in cold water; make a decoction of a handful of outside onion leaves to a pint of boiling water. Dye the feathers in this until they are a distinctly orange olive tint, wash out thoroughly, and then finish in a solution of a quart of boiling water to a small quantity of Judson's "slate," a few drops of Stephens' blue black ink, and two or three grains of Crawshaw's "green." If the colour produced is in any way bright it is wrong, and the feathers must be taken out just as the latter dye is driving off the former. By the use of this recipe, the green drake wings are dyed of the subdued blue green tint of the natural fly.

RECIPE No. VI.—BROWN CHAMPION WINGS. (Mr. G. Holland's.)

(1) In a quart of soft water put half a teacup of ebony chips, a quarter of a teacup of logwood chips, and a piece of chrome potash the size of a pea; boil to rather over a pint; put in the feathers and dye to a dirty blue brown.

(2) In a fresh vessel put a piece of extract of fustic with a quart of soft water, simmer, and pour over the feathers already taken out of No. I. dye; let them remain fifteen minutes, then add five drops of double muriate of tin, and simmer to shade, which should be that of Hammond's "Champion," a decidedly dark brown olive tint.

RECIPE No. VII.—GREEN CHAMPION WINGS. (Mr. G. Holland's.)

Dye the feathers in an infusion of onion, two good handfuls to half a pint of water and a pint of vinegar, and get them as brown as possible. Then dye in a fresh bath, consisting of a tablespoonful of extract of indigo dissolved in hot water, until the feathers are sufficiently green.

RECIPE No. VIII.—BLUE GREEN MAYFLY WINGS. (Mr. G. Holland's.)

Dye the feathers first in extract of fustic and

infusion of camwood, and then in Brown Olive, Recipe No. IV., or Crawshaw's Brown Olive; wash and dip in weak solution of Judson's slate.

Recipe No. IX.—To Dye Wings for Iron Blue. (Mr. G. Holland's.)

Select dark starling wing feathers; steep in a teaspoonful of solution of potash to a quart of boiling water. Wash thoroughly in hot water.

Dye for first stage in Judson's slate dissolved in boiling water, until a rather deep shade is produced. In a quart of boiling water dissolve sufficient extract of indigo to colour a pale sky blue, and, for the second stage, steep the feathers until they are of the desired shade.

To dye Brown Red use Crawshaw's Red Spinner or Judson's Light Brown. For Orange the best dye is the Diamond Orange; for Claret, the Diamond Dark Wine; for Blue Green, Crawshaw's Grannom Green; for a light Green, Diamond or Crawshaw's of the same name, and for Canary, either Judson's or Crawshaw's Canary, or a solution of Picric Acid. With the Canary, no vinegar or other acid should be added.

CHAPTER III.

MANIPULATION.

TO describe the improvements effected during the last decade in the manipulation of trout-fly dressing, by merely enumerating them, would occupy considerable space, and would, at the same time, entail on the careful student continual reference to enable him to compare the modern with the new methods, and correctly estimate the value of such improvements. To obviate this frequent application to earlier writings, it is proposed in this chapter to treat somewhat briefly of the general characteristics, and then give in detail the *modus operandi* with one particular type of flies, and a supplementary description of such modifications as are necessary when dressing other types or other patterns.

Although for a tyro it is necessary to follow each step in accordance with the rules laid down, yet every fly-dresser, as he gains experience, is certain to modify in some degree, or improve, according to his lights, the details of procedure. With a view of presenting to

the reader the opinions of others besides the author, I will set forth in their own words the methods adopted in dressing the same type or types by two of the best amateur fly-dressers of the day, who, at my invitation, kindly consented to give the benefit of their experience. The first is Mr. G. E. M. Skues, who dresses with the vice, and the second is Mr. W. F. Brougham, a strong and consistent member of the school who condemn the use of the vice and work with their fingers only.

General instructions.

The majority of modern trout-fly dressers adopt the order of procedure to be presently described, commencing by tying on the wings. As a general rule, professional fly-dressers are short of work during the close time, and, from the latter part of October, when grayling fishing is nearly over, to the commencement or middle of March, when some of the keener fishermen commence placing their orders for the coming season, they have difficulty in keeping their assistants fully occupied. Some few have tried the experiment of dressing for stock, but, as the fashion and fancy of anglers for particular patterns are liable to change, the result has often been the reverse of profitable.

Hence some of the thoughtful employers have set their hands, during the slack months, to the special work of testing and winging

hooks. They know that if they have in stock 000, 00, and 0 hooks winged with starling or coot, and 0, 2, 3 and 4 hooks winged with land-rail, they will be able to execute their orders more promptly, and save their customers from disappointment during the busy season. There is a second advantage in this method, viz., that, from the operators having continual practice from day to day in winging, this most important part of the process is better and more securely carried out. Amateurs are recommended to follow this example, and keep a stock of winged hooks, which can, when required, be finished by the addition of the hackles, whisk, body, &c., necessary for the patterns upon which they determine.

Experience has shown that an upright-winged fly, with hackle at shoulder only, will float more easily if dressed with two hackles instead of one. The adoption of this plan will, it is hoped, cure professionals of their present bad habit of using one very long hackle, with fibres out of all proportion to the hook, and then cutting or breaking the fibres, leaving them with thick and unsightly points. With patterns hackled down the body, three hackles —two shoulder and one ribbing—are required; and, with some of the large, full-bodied flies, two ribbing hackles, besides the two shoulder hackles, are of advantage.

The plan of working the tying silk or wire the reverse way through and over each turn of a hackle is essential if a really strong and durable fly is desired, and the whip finish is the only safe and reliable one to use. Some professional dressers are seriously injuring their reputations by neglecting or refusing to adopt these manifest improvements. In respect to securing the turns of the hackles with the tying silk or wire, and using the whip finish instead of the old-fashioned plan of two half hitches, their inaction is simply suicidal. No one can urge that the few extra seconds occupied in carrying out these methods can for a moment be weighed in the balance against the advantage derived from making the work secure.

Preliminary work.

For dressing all trout flies on eyed hooks, winged or hackled, the preliminary work is identical. The vice must be securely clamped or otherwise fixed to the working table. The table itself should in daylight be placed opposite and close to a window in a good light, preferably facing north or west. When working by artificial light the lamp must be placed so as to fully illuminate the head of the vice, while no portion of the flame or source of light should be visible to the worker.

The vice is arranged so that the head is at a convenient height, and the height of the dresser's chair should also be adjusted so as

to be comfortable for the worker. There is a convenient and inexpensive music stool made of Austrian bent wood, the seat of which is raised or lowered by rotating on a vertical screw, admirably adapted for the purpose. The materials for dressing the particular pattern are selected and laid out on the table, and the various implements required, the scissors, dubbing needle, hackle pliers, a pair of ordinary smooth forceps, as well as the wax, tying silk, and varnish, are arranged ready for use.

Fixing and testing the hook.

The hook is then taken in the right hand and fixed in the vice. Until some proper method is adopted by the manufacturers it is necessary for the operator to test the hook at this stage, and, to make sure that it has not been crippled in the process of dressing, it is also advisable to test it a second time after the fly is completed. To test the hook the eye should be pulled sharply upwards by the right thumb and forefinger. If the hook springs back to its original form it may be considered properly tempered; if it remains out of shape it is too soft, and if it breaks off short it is too hard.

Break off the reel from eight to ten inches of Pearsall's gossamer silk. This should be sufficient to dress two ordinary flies.

Waxing the silk.

Double the silk round the stem of the vice, and hold the two ends together between the

left thumb and forefinger. A small piece of the transparent wax is held between the thumb and forefinger of the right hand, and the two ends of the silk are pressed together and held tightly extended from the stem of the vice by the left thumb and forefinger. The wax is then worked up and down the silk until it is thoroughly coated, and the silk is then removed from the stem of the vice and opened out at length. Some fly-dressers use the silk doubled for large flies, but this is a mistake, as it tends to make the work bulky and clumsy without materially adding to the strength.

Foundation for wings.

Hold one end of the silk firmly between the left thumb and forefinger on the far side of the hook, and, taking the silk in the right hand, about three or four inches from the same end, commence lapping at the neck immediately behind the eye. Take four or five turns, each close behind its predecessor, pulling the silk down tightly at each turn, to form a solid and smooth foundation. Cut the short end off close to the hook shank. When lapping be careful not to let the right thumb and forefinger slip down the tying silk, and thus remove the coating of wax. Always keep the silk well waxed, although, if thoroughly waxed at first, it should not, as a rule, require a further application of the wax while

dressing the fly. If at any time the silk breaks, it can, after being waxed once more, either be scarfed by twisting it on to the broken end, or simply lapped over the last two or three turns. To this point the manipulation is identical for every sort or pattern of fly.

In the diagrams of fly-dressing it may be noticed that the tying silk is lapped in the opposite (or what some might call *left-handed*) direction to that adopted by the majority of professionals and amateurs. With the extreme end held in the left hand above the hook shank, I commence winding the silk with the right hand towards me. By proceeding in this way there was a natural inclination to pause and draw the silk taut when the hand is below the hook, and this is less likely to obscure the view of the work than would be the more usual plan of winding the silk away from the operator.

TO DRESS AN UPRIGHT-WINGED QUILL-BODIED DUN.

From each of a pair of wings of the same starling take one right and one left feather, for a ooo hook the second, and for a larger hook, preferably the third or fourth primary quill feather. For a beginner the easiest plan, perhaps, is to split the central quill

longitudinally with a sharp penknife, and discard the shorter plume altogether. Then pare down the quill as thin as possible with the scissors, and cut it transversely through at regular intervals into sections, each consisting of a portion of the central quill with the longer plume attached, and of the width required for a wing (fig. 25). A professional

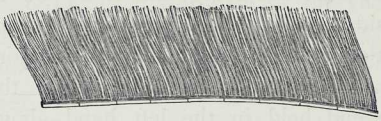

FIG. 25.

or experienced amateur usually cuts or tears the longer plume from the feather, and separates it by means of the dubbing needle into the requisite sections. If the entire plume is cut or torn from the central quill, the use of the long bull-dog pliers, illustrated on page 275, is recommended. Whichever plan is adopted, the remaining details of winging are identical.

Preparing the wings.

When dressing with double wings, two sections from the right feather are laid on the table, one on the other, with their points even, and the darker side of the feather downwards; and two sections from the left feather are similarly treated. It may be noted that the darker side of the feather is the outer side

of the bird's wings. The operator then proceeds to build up the wings by lifting the two sections with his forceps from the right wing of the bird as arranged, and laying them on the table with the darker side of the feathers downwards, the stump ends towards him, and the natural inclination of the fibres to the left or tail end of the fly. These form the left wing of the fly, or that on the further side of the vice.

He then takes the two sections from the left wing of the bird to form the right wing of the fly, and lays them with their points evenly on the points of the sections forming the left wing of the fly, with the darker sides of the feathers upwards, the stump ends towards him, and the natural inclination of the fibres to the left or tail end of the fly. The four sections thus arranged form the pair of double wings, and if taken up and viewed edgewise they should be in the form of the letter V, the sides each of two thicknesses, the stumps together at the base and the points diverging. For single wings the procedure is identical, except that each wing is composed of one section only.

Applying and tying on the wings.

Pass the forceps under the set of wings as arranged, and, lifting them from the table, take them by the points between the left thumb and forefinger. Holding them firmly by the stump

ends between the right thumb and forefinger, carefully stroke any disarranged fibres into their proper position with the left hand. Transfer the wings back to the left hand, holding them between the thumb and forefinger at the point where the tying silk is to pass when they are tied on. The length of the wings is regulated by the position of the left thumb and forefinger, and should be about equal to the length of the hook shank. The tendency of amateurs is to make wings too long, and nothing but continual practice will cure this.

The wings are then placed on top of the hook shank, close down to and immediately behind the last turn of the tying silk at the neck of the eye. The wings being held in position, and the thumb and forefinger of the left hand being momentarily separated sufficiently to allow the waxed silk to pass between them and the outside of the wings, the tying silk is carried over the wings and down again. The wings are then gripped tightly between the left thumb and forefinger while the tying silk is pulled down quite taut by the right hand. This is repeated two or three times, and the tying silk is passed once behind the wings and over the hook shank, and pulled forwards to make all secure (fig. 26).

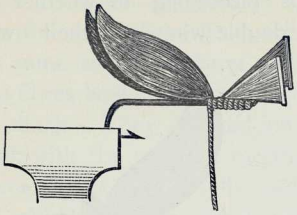

FIG. 26.

Unless the grip of the left thumb and forefinger on the wings is very firm, the action of lapping is likely to break the wings—that is, separate or disarrange the fibres. If the pressure exerted in lapping is insufficient, the wings will not be firmly secured in place, and of course, excessive pressure in lapping will break the silk and necessitate a fresh start. If examined at this stage the wings, if properly set on, should be at an angle of about 60° to the shank, sloping to the left or towards the tail end of the fly. The stumps should be on top of the hook shank, projecting to the right or over the eye. When viewed on end the wings should be in the V-shape, and stand up on the centre of the hook shank. If they should incline slightly to one side it is often possible at this stage to twist them sufficiently to correct the fault.

Setting out the wing stumps.

Set the stumps out horizontally at right angles to the hook shank, each stump or pair

of stumps (according to whether they are single or double wings) on their own side, as shown in fig. 27.

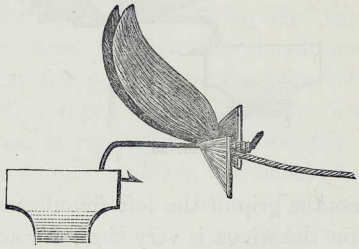

FIG. 27.

Setting back the wing stumps.

With the right hand draw the tying silk forward between the stumps, and at the same time with the left press the stumps back against the hook shank, and holding them in this position, work two or three turns of the tying silk over them and the hook shank. Cut away the stumps at an angle to form a foundation for the body, and taper it towards the tail end of the fly (fig. 28).

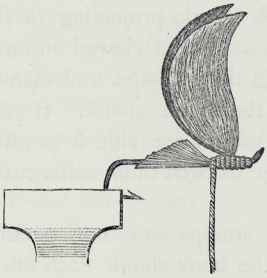

FIG. 28.

Fastening in the hackles.

As before remarked, two hackles are necessary for a fly intended to float well; two of about the same size and shape are selected, the longest fibres being somewhat shorter than the hook shank. They are laid on the wire of the hook with the points projecting to the right or over the head of the fly, and the root ends, from which the downy flue has been previously removed, to the left. They are secured in position by two or three turns of the tying silk, and the projecting ends cut off closely. The tying silk is then lapped down nearly to the bend of the hook.

Forming the tail.

The whisks or tails of three or four strands of Gallina are held by the left thumb and fore-

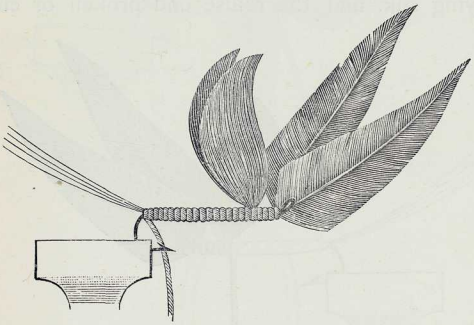

FIG. 29.

finger on top of the shank, secured by two or three turns of the tying silk, and a single turn is passed under the tail and over the

hook shank and pulled tight to set the tail up. This last turn of the tying silk should be just at the place where the shank of the hook commences to turn down to form the bend of the hook (fig. 29).

Fastening in and forming the body.

The strand of quill for the body is then laid in position on the hook, with the point projecting to the left or over the vice head, and the root end is secured in place by two or three turns of the tying silk, which is then carried in open laps to the shoulder or close behind the wings. The refuse ends of the quill and whisks are cut off close. The quill is then (taking care not to twist it) wound smoothly up, fastened at the shoulder by two turns of the tying silk, and the refuse end broken or cut

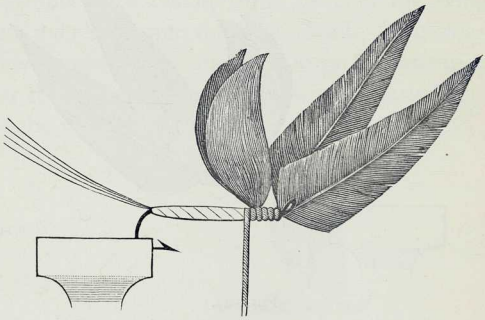

FIG. 30.

off. If the lapping of the foundation is smooth the body will also be smooth, but a slight

irregularity can often be remedied after the body is finished by the application of pressure with the forceps. The appearance of the fly at this stage is shown in fig. 30.

Turning the hackles.

The point of the hinder hackle is fixed in the hackle pliers, and the hackle passed round the hook shank close behind the wings, keeping it on edge and, preferably, with the glossy side towards the head of the fly (fig. 31).

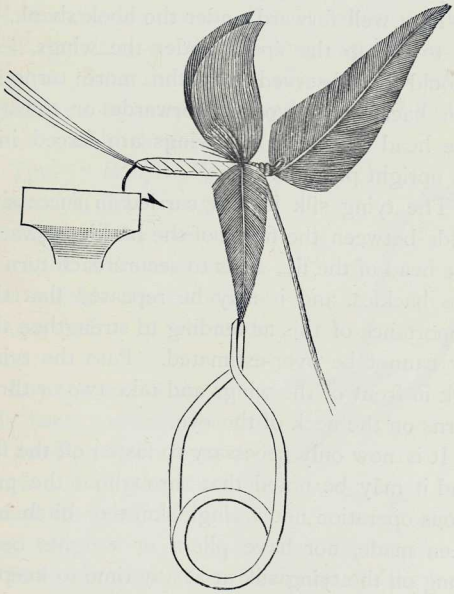

FIG. 31.

The right forefinger is kept in the ring of the pliers to prevent twisting, and the successive turns of the hackle are worked close in front of each other until the wings are forced into an upright position. When all but the extreme point of the hackle has been wound on, it is secured by two turns of the tying silk and the refuse point cut off. The second or front hackle is treated in the same way. When turning a hackle the pliers should be kept well forward under the hook shank, so as to fill up the space under the wings. It should be observed that the more turns of the hackle are worked forwards or towards the head the more the wings are forced into an upright position.

The tying silk is now carried in successive folds between the fibres of the hackles towards the head of the fly, so as to secure each turn of the hackles, and it may be repeated that the importance of this as tending to strengthen the fly cannot be over-estimated. Pass the tying silk in front of the wings and take two or three turns on the neck of the eye.

It is now only necessary to fasten off the fly, and it may be noted that throughout the previous operation not a single knot or hitch has been made, nor have pliers or weights been hung on the tying silk at at any time to keep it taut. If the silk is kept properly waxed, and

the folds are drawn down quite tightly, the fly will remain secure at any stage ; the continual half-hitches recommended by the old school of tiers are useless, and give an uneven and lumpy appearance to the work.

The whip finish.

I cannot too strongly impress on professionals as well as amateurs the necessity of abandoning the old system of finishing off a fly with a series of half-hitches. True, it saves a little trouble, which, to the professional, may be of some importance, but I venture to suggest that it is worth a trifling expenditure of time to make the work really secure, a result which can by no possibility be attained by the use of half-hitches.

The "*Whip Finish*" shown in the magnified sketches of the eye end of the hook is the most secure and reliable knot for fastening off. It is made thus :—

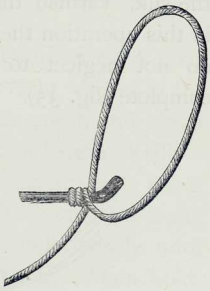

FIG. 32.

Lay the end of the tying silk back towards the tail to form an open loop, and work one turn of the loop round the neck of the eye (fig. 32).

Similarly work three more turns of the loop,

passing it at each turn over the eye (fig. 33).

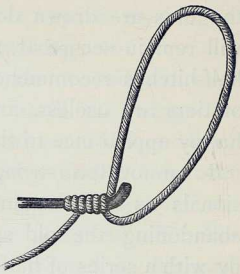

FIG. 33.

Holding the hook and turns of silk firmly between the left thumb and forefinger, draw the end of the tying-silk down with the right hand until the knot is quite tight (fig. 34). It is essential in this operation to proceed slowly, so as to allow the warmth of the finger and thumb to soften the wax, and allow the silk to draw freely. Cut off the remnant of the silk, varnish the knot thoroughly, and if in this operation the eye is filled with varnish, do not neglect to clear it. The fly is now complete (fig. 35).

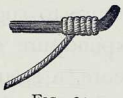

FIG. 34.

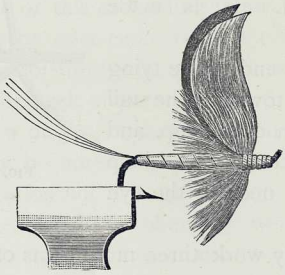

FIG. 35.

The use of the fine end of a porcupine quill is recommended both for varnishing and clearing the eye.

Mr. Skues' Method of Dressing an Upright Winged Quill-Bodied Dun.

Mr. Skues' vice.

Mr. Skues writes: "My table vice is a small one, with no great width across the jaws. The shaft is not set up perpendicularly, but slopes to the right, to enable the hand and silk to pass freely round the hook without striking the shaft. The vice is fixed at the corner of a table so as to project over the edge. The fly nut of the vice is on the far side, where it serves as a rest for the little finger of the left hand in the process of tying down the wings.

"Fixing the hook—an upturned eyed hook—with the eye towards the right, firmly in the vice, so that the jaws grip the point, and about half-way up to the bend, take a length of silk—about 18 inches—by one end in each hand, pass it under the hook and round the bend, double it and twist the two ends loosely until the twist nearly reaches the hook. Then, holding the two ends together firmly by the left hand, so as to stretch the silk between the hand and the hook, well wax the silk.

"With a pair of sharp-pointed pliers, separate the twisted silk at the eye of the twist, and,

bringing the pliers down sharply, rip out the twisting in one motion, and take the silk off the hook.

"In dressing double-winged floaters I use a finer and tougher silk than in dressing single-winged flies, for I find that the single wings are much more readily cut by the fine silk. Pearsall's gossamer silk is quite fine enough for single wings.

Forming bed for the wings.

"The next step is to form a bed for the wings. Taking the silk by one end between the left finger and thumb and by the middle in the right hand, pass it over the shank of the hook at about two inches from the left hand, and make the first lap away from you and over the end held by the left hand, beginning at such a distance from the eye of the hook as will leave room for the wings to be tied down and for the head to be finished. The wings should not be tied down *on* waxed silk, but on the hook shank quite close to, and so as to jam against, the next turn of silk.

"Wind five or six laps towards the tail of the fly, still holding the short end firmly in the left hand. This ensures even lapping, for each lap slides down the short end on to the last. Then whip back to the point where you began, break off the short end with a smart jerk, and the hook is ready to receive the wings.

Preparing wings.

"Taking a corresponding feather from each

wing of the same bird, strip off the flue at the base of the quill. In most birds the only suitable feathers for winging are primaries, but in land-rails and water-rails the secondaries are equally good. If the yellow part of the wing of a thrush be used the secondary is essential.

"If the wings are to be made of one thickness of feather each, tear off a suitable width from each feather with the right forefinger and thumb. If the wings are to be of two thicknesses, cut off the plume close to the quill, beginning near the tip of the feather and cutting down to the root of the quill, and then break off with the pliers sections of feather of appropriate size. The reason for this difference of method is that the roots of the fibres, when torn off, are left ragged, and thus make it difficult to lay one width of wing evenly upon another.

"In the case of double-winged flies, divide off with the pliers enough from each feather to wing one fly—that is, two equal strips from each. I tie them as broad as I can without getting the wing too long or breaking it. Then with the pliers lay the two strips from the right wing of the bird one upon the other, with the glossy or under side upwards, and see that they fit evenly. Repeat the process with two strips from the left wing.

"Place the first two strips, or the first single

strip, as the case may be, on the tip of the left forefinger with the glossy side upwards and the stumps towards you, and the second pair of strips or the second single strip upon top of the other with the glossy side downwards, so that the points of the upper and lower wing lie evenly together. The wings now lie with the slope of the fibre from left to right, and the curve of the lower wing fits naturally on the edge of the left forefinger.

"Taking the two wings together in the pliers, hold them up to the light to see that they fit evenly and have parallel edges with no overlapping strands. If there are too many fibres in any section remove them with a needle, which you may pass through the two or four sections, so as to detach any fibres that project beyond the main body. One thus gets all the sections of feather of precisely the same width.

Applying and tying on the wings.

"Then, taking the now fully prepared pair of wings between the left forefinger and thumb in such a way that when the wings are laid on the hook that part of each feather which has grown nearest the root of the quill lies uppermost, and that the fibres cross the centre line of the forefinger as nearly as possible at right angles, rest your left little finger on the wing nut of the vice, and bring down the prepared wings from above, so that the lower

edge rests as nearly as possible on top of the hook along its length. The difficulty here is to avoid leaving too much wing without leaving too little. Nothing but experience can teach the eye to measure correctly. The wing should not exceed in length that of the shank of the hook from the bend to the point where the wing is tied on.

"Bringing up the waxed silk between the thumb and the hook, take it down again over the wing on the other side between the left forefinger and the hook, making way for it to pass, and again tightening the grip firmly on the feather and pressing it firmly down on the hook. At this stage it is judicious to give the feather a slight twist, so that the stumps project over the eye with an inclination to the near side of the hook. Still holding the feathers firmly, but easing them down, pull the silk perpendicularly and draw the end slightly towards you. You can then let go the feathers, and if the operation has been properly performed the wings will set rightly and evenly on the hook, separating so as to form a V-shaped parachute. Still keeping the silk quite taut, pass it behind the wings, as close up to them as possible, so as to jam the fibres tighter than ever, lifting the wings, with the fingers or pliers for the purpose if necessary. The end of the silk may now be released, for the wings should be quite firm.

Separating the wing stumps.

"The next move is to separate with the pliers the stumps of the right wing from those of the left. It is convenient, when each batch has been secured, to screw it slightly with the fingers to make its fibres adhere. Then, bringing the silk from the far side up between the eye and the stump nearest you, turn it over that stump and under the hook, and bring it up between the far side of the eye and the other stump, over that and under the hook again, up between the wings from the near side and down between the stump and the eye on the far side, round the neck of the eye and back between the wings to the far side, behind the wings.

"At this point, if a fine body be required for the fly, the stumps can be cut off quite close with a sharp knife, in which case a couple of turns of the silk over the roots make all fast. If a stout, tapering body be the aim, the stumps can be drawn back behind the wings and firmly laid down with two or three laps of silk, and the ends taken off by slanting cuts of the scissors, so as to get an even taper of the body from shoulder to tail.

Fastening in the hackles.

"Here the time comes for tying in the hackle or hackles, and in the few instances in which I use 000 hooks, I make a difference in method between them and larger sizes. It is difficult to get hackles long enough in themselves and

short enough in the fibres for 000 hooks, and I therefore dress them with the hackle in front of the wings. By this method a longer and longer-fibred hackle can be used than if the hackle is wound behind the wings.

"To wind the hackle behind the wings it should be tied in on the near side with the glossy side horizontally upwards, and the root towards the tail. To wind it in front of the wings it should be tied in on edge with the glossy side facing you.

"Three or four turns of silk over the root will secure the hackle. If there are two, as is commonly the case, it is advisable to tie in each with a separate turn of the silk, so as to get them to lie right.

"The root ends are then cut off, and the whipping carried down to within two turns of the beginning of the bend.

Forming the tail.

"Here the whisks, fibres of cock's hackle, or Gallina, are tied in. The three or four fibres are laid slantingly across and somewhat under the hook on the near side with the roots downward. One turn of the silk over them and one close behind suffice to lay them properly projecting straight over the tail.

Forming and securing the body.

"Then lay the strand of quill for the body on the hook, projecting over the tail, with the fine or weak end towards the wings, and whip evenly over it to close up behind the wings,

cutting off the waste ends of whisk and quill and hanging a heavy pair of pliers to the silk to keep it fixed. This serves the double purpose of preventing the silk from unwinding (which indeed it shows little disposition to do), and of keeping it out of the way while the body is being wound. It should be borne in mind that the upper side of the quill, when it is laid on the hook, becomes the under side when it is turned round the hook. Seizing the end of the quill in the hackle pliers, you should wind it evenly up the body to the shoulder, where two laps of the silk secure it. Now cut off the refuse end close with a sharp knife. This is safer than breaking off the end, as the break is apt to release the whole quill.

Turning the hackles.

"Then, taking the point of the hackle if only one, or of the hinder hackle if there be two, in the hackle pliers, turn the hackle behind or in front of the wing, as the case may be, in close laps, pressing nearer with each turn to the wings when turning the hackle behind them and forcing them into an upright position. Then bring the silk through in a couple of turns so as to secure the hackle, and cut off the end with a knife. Then turn the second hackle, if there be one, in front of the first and still closer up behind the wings.

"Next coax the silk two or three times through the second hackle, and take one turn

round the neck of the hook in front of wings and hackle, and finish with the whip finish, cutting off the waste end of the silk with a knife. The varnishing may be most efficiently yet lightly done by putting a drop of very thin varnish on the loop of the silk before it is pulled through in the whip finish. It thus soaks the silk at the head, dries quickly, and makes no mess.

"During the whole process there is no need to be greatly concerned about the wings, so long as you do not break them, *i.e.*, split the fibres so that the split extends into the base. In other respects a little knocking about seems to do them no harm.

"At this stage the wing is finished by being coaxed into neatness with the aid of pliers, and the points, if too long, are nipped off with teeth or finger nails or the back of a pair of scissors against the forefinger (the last is Mr. Halford's plan). If the hackle is wound in front of the wings, press it firmly backwards so as to make it slope towards the point of the hook. The fly is now complete.

"I think it only fair to the reader to say that I have had next to no practical experience but my own. I never took lessons from a professional dresser. I began to teach myself when 'Floating Flies and How to Dress Them' came out, and took that book for my

guide. Apart from books, I have had little but my own experiments and failures to guide me. I can therefore venture to speak for no one but myself, and it is probable that in some respects my methods are hardly up to date. I think, moreover, that it is quite possible that a method that suits one dresser may be objectionable or difficult for another."

Mr. W. F. Brougham's Method of Dressing an Upright winged Quill-bodied Dun.

Mr. Brougham writes:—"I know little, if any, of the theory of the art of fly-dressing. My knowledge is entirely self-acquired, and possibly at variance with the principles followed by well-known professional and amateur fly-dressers. I fear that as a rule I attempt to sacrifice neatness and perfection of finish to utility. I have been very fond of fly-fishing since childhood, and like a great many other anglers, have always had my own ideas as to what flies are mostly to the liking of certain fish. It is possible that some of these ideas might shock the orthodox views of some friends. Nor can I pretend to have ever been able to prove to my own satisfaction the superiority of my own manufactures; at the same time (though perhaps saying so may be thought egotistical), I confess to having a sneaking distrust of any fly not tied by my

own hands. It is the old proverb of the crow and his egg, and the only extenuating circumstances in this case are, that many amateur anglers who dress their own flies hold the same views.

"Being a more or less busy man, the only times that I can devote to fly-dressing are Sundays, during long railway journeys, and on fine days in the boat when loch fishing, hence the use of a vice would be generally out of the question.

"The only instruments used by me are:—(1) a finely-pointed pair of scissors, with points ground down almost as fine as a needle (this operation I do myself), and (2) a small pair of tweezers.

Mr. Broughram's method of tying

"First of all I would state that I generally tie a dozen or so of flies of the same kind at one time. I have a small round tin box with trays in it, in which I put the materials, as it must be remembered that, as a rule, the tying table consists of the bottom of a boat or the rug for my knees in the railway train.

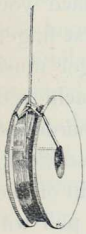

FIG. 36.

"I wind about 16 inches of tying silk from the bobbin, passing the end through the hole of the bobbin and bringing it out on the other side and underneath one turn of the silk, which passes round the bobbin (fig. 36).

On each side of the bobbin I cut two small nicks, in which the silk catches. The bobbin is thus held rigid and forms a constant weight upon the silk. When more is required, the silk is simply lifted out of the little nicks and unwound a little, drawing the end tight through the hole of the bobbin. This is an excellent method, and one for which I am indebted to a young lady in Ireland. Placing the bobbin between the knees, taking the end of the silk between the thumb and first finger of the left hand, wax the silk well. Pick out three strands of hackle for the whisk, which place roots upwards between the second and third knuckle (it must be remembered that winds blow and trains rock, so at no time should feathers be left unsecure when tying).

Holding the hook.

"The hook is taken by the bend firmly between the thumb and first finger of the left hand. This sounds very simple, but anyone trying it will find that it is exceedingly difficult to do properly. In the first place you must cultivate a strong thumb and first finger nail; secondly the top of the first finger must become quite hardened. This is only achieved by constant practice, but when once hardened it will remain so permanently, thus sacrificing the picturesque to the useful. The grip of the hook should be so firm that a sharp pull will not move it.

Fastening in the whisk and body.

"Gripping the end of the silk between the third and fourth finger of the left hand, catch up the silk with the thumb and first finger of the right hand, and make three turns round the hook. Then, letting the silk hang from the hook, take out whisk with the right hand and whip it in with two turns of the silk. Fasten in the body, allowing it to stand out over the whisk, and wind the silk up the body so as to make it even to within three-quarters of the length of the shank. Lay the hook and silk down, just catching the barb of the hook in the trousers in order to keep it from being blown away.

Preparing the wings.

"Take the two starling pinion feathers off the right wing, using only the lower half of the wing, the fibres of the upper half being too coarse. Strip off and throw away about half an inch from the bottom and divide off with the point of the scissors a portion suitable for the wing, holding the portion firmly between the thumb and finger of the left hand and pulling it away sharply. Take a similar portion off the other feather and squeeze the two pieces together. This done, place the wing so made between the joints of the second and third fingers, then take the two feathers from the left wing and make a wing in the same manner as heretofore described.

Applying and tying on the wings.

"Place the two sets of wings together, holding them between the thumb and first finger of the left hand; take up the hook in the right hand and place it just underneath the wings between the thumb and first finger of the left hand, so that the wing rests exactly on that part of the shank of the hook where it is to be tied on. Nip the two nails of the thumb and first finger tightly together, taking care that the bottoms of the wings are pressed against the shank of the hook. Taking a turn of silk over the left hand quite loosely, and placing the bobbin between the knees, hold the butts of the wings between the thumb and first finger nails of the right hand; then raise the hands so that the loose coil of silk gradually works itself over the wings and until it is as tight as can be strained without breaking. Still keeping the same tension on the silk, give the silk two more turns with the right hand and a fourth turn over the shank behind the wings, which now ought to be firmly fixed.

"It takes a considerable amount of practice to do this properly. The butts of the wings should stand up over the top of the head. Fine these down with the scissors, snipping off fibres which do not stand right, and bending them down tie them in underneath the shank of the hook very firmly, as described in 'Floating Flies and How to Dress Them.'

"Lay the hook down and take out the two hackles, one a hen hackle and the other a cock hackle, which place between the knuckles. Taking up the hook again, tie in first the hen hackle and then over it the cock hackle, by laying the hackle on its back on the side nearest to you and close up to the roots of the wings. Fastening in the hackles.

"Make the body quite symmetrical by carrying down the silk a little way and back again. Take the tweezers and wind round the quill for the body, tying it off so that the last turn of quill lies underneath where the wings stand up. Forming and securing the body.

"Then fix the tweezers on to the point of the cock hackle and twist it round underneath the wings, so as to make them stand well upright. Tie in this hackle by working in two turns of the silk between the fibres. Twist round the hen hackle over the head on the opposite side of the wings to that of the cock hackle. Three turns of the hen hackle are generally sufficient. Tie it off in a similar manner to the cock hackle. Turning the hackles.

"Take hold of the head of the fly between the nails of the right thumb and first finger, press down all the fibres of the hackle against the body of the fly, so as to make room for one or two turns of silk for the head; at the same time let go the grip of the silk with the left hand, and catch up the fly with the left Mr. Brougham's finish.

thumb and first finger where the right thumb and first finger has been. This is rather a difficult operation, and only to be acquired by practice.

"Then give three turns round the head of the fly, and let the left hand little finger fall right down; then taking a turn over the head of the fly and bringing the silk round the little finger so as to form a loop, through this loop pass the silk bobbin. This operation repeat three times. Then drawing out the little finger and putting in the first finger of the right hand, turn this loop round the head of the fly three times. Draw the silk tight. This knot was shown to me by a practical fly-tyer, who, I believe, tied for Mr. Cummings of Bishop Auckland. I have never seen anyone else use the same knot, and I think on the whole, without being prejudiced, it is the best and simplest tying-off knot known.

"Place the barb of the hook between the tweezers, divide the wings, and with the points of the scissors work in the fibre of the hackle between. If the wings seem at all too long squeeze them tightly together with the right thumb and forefinger, and with the left thumb and forefinger nails nip off the points. Apply with a needle a small touch of varnish to the head.

"I have tried tying a fly with a vice, but

cannot manage it at all, and now that I can dispense with this article I have no desire to learn the use of it, besides which it would be useless under the circumstances I have alluded to, *i.e.*, in the train or on the river bank. There is nothing more delightful on a hot summer day, when the fish are not rising, than to dress a fly on the river bank. Then when the evening rise begins, you can comfort yourself with the thought that had you not dressed that particular fly you might have caught no fish."

It will be noted that the methods of winging adopted by Mr. Skues, Mr. Brougham, and myself, although varying in matters of detail, are in fact almost identical variations of the improved method given in "Floating Flies and How to Dress Them." The plan of tying on the wings in the middle of the shank, cutting off the stumps, and then forcing them bodily with their foundation of tying silk up to the shoulder behind the eye has been abandoned. It has been found in practice that wings so tied did not set as well, and were not so secure as those worked by the more modern method.

TO DRESS UPRIGHT REVERSE-WINGED DUNS.

Work four or five turns of well-waxed silk close to the eye of the hook.

Preparing the wings.

Take two feathers from a right, and two from a left wing of a starling, or other bird; cut out the entire plume from each, excepting the extreme points and downy part of the roots of the feathers; lay these as cut on the table, taking care not to disarrange the fibres. Place the two pieces from the right feathers one on the other, with the points quite even along their entire length, and similarly those from the left feathers, in each case pressing the plumes together, so that they will adhere to one another. Lay the two lengths now adhering together from the one wing on the two lengths from the other, with their points quite even along the entire plumes, with the natural inclination of their fibres sloping towards the tail end of the fly, and with the darker sides outwards.

Take a pair of long bull-dog pliers of the form shown in sketch[1] (fig. 37), and, pressing them open by means of the thumb and forefinger of the right hand applied on the portion

[1] This form of pliers is the invention of the late Mr. Marryat, and can be procured from Messrs. Holtzapffel & Co., 13 & 14, New Bond Street, London, W.

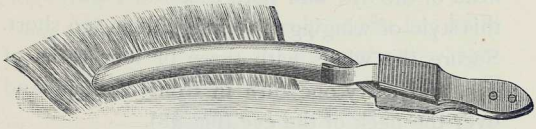

FIG. 37.

roughed for this purpose, place the four plumes together between the jaws of these pliers with sufficient width projecting beyond the points to form, when detached, a set of wings. Remove the pressure of the right thumb and forefinger, and the feathers are securely fixed in the position shown on the diagram. The projecting pieces, being four wings accurately in position, can now be detached, and when a set of wings is required for the next fly, it is only necessary to press the pliers open and draw the whole of the feathers out sufficiently for the next set of wings. Releasing the pliers, the remainder of the four feathers is kept firmly in place. In this way sufficient feathers can be arranged at one time to make six or eight sets of wings.

For single wings it is, of course, only necessary to use the plumes of one right and one left feather.

Applying and tying on the wings.

Having detached the set of wings, place them with the left thumb and forefinger with their points projecting to the right or over the

head of the fly; and note that the tendency in this style of winging is to judge them too short. Secure the wings with three or four turns of silk, and carry one turn in front of them and over the neck of the eye (fig. 38).

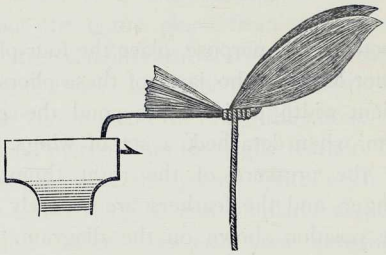

FIG. 38.

If the wings have been properly put on without disarranging the fibres, they will set outwards at the points with two thicknesses of feather in each wing; if, however, a few fibres are out of place, divide the wings carefully with the dubbing-needle.

Take the tying silk in the right hand, and pass it in front of the double wing on the further side from you, then carry it back between the wings, once round the wire of the hook behind the wings, then forwards between the wings, then round the neck of the eye in front of the wings, and then once more behind the wings, thus forming with

the tying silk the figure 8 with a wing in either loop. Hold the wings firmly in the left hand, and, with the right, pull the tying silk down quite tight, and take one more turn behind the wings, which should then be quite upright, and, looking at them "end on," set apart at the points in the shape of the letter V (fig. 39).

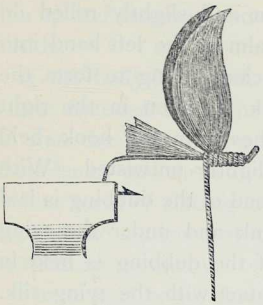

FIG. 39.

Cut away the stumps of the wings diagonally to taper the body, fasten in the hackles by the root-end, and continue the dressing of the fly precisely as given on pages 251 to 256.

This process is still used by some amateurs and professionals who have not yet mastered the improved method. Some twist the fibres of each wing together and work them as above described; they are then styled rolled wings, and it is the fashion to dress the rolled wings sloping forwards over the eye, adjusting them in this position with the figure of eight whipping.

Dubbing bodies

If the pattern to be dressed has the body of dubbing—*i.e.*, fur or crewel, mohair or other yarn, torn into shreds—the manipulation is as before described until the tying silk has been carried under the fibres forming the whisk and

over the hook shank to set the tail up. The tying silk is then waxed. The dubbing to be used is pulled out and slightly rolled on the table or on the palm of the left hand into a tapered length sufficiently long to form the body. The tying silk is taken in the right hand about three inches from the hook, held out at length, and slightly untwisted. With the left hand the fine end of the dubbing is laid against the hook shank and under the tying silk; the stout end of the dubbing is held in the right hand in contact with the tying silk. The hold of the right hand is then relaxed sufficiently to allow the tying silk to twist up into its original state, thus *spinning* the dubbing on to it. It is often necessary to continue the twisting, so as to spin the dubbing tightly on the silk for the body.

The body is then laid on in regular close laps to the shoulder, any superfluous dubbing removed, the silk waxed again, and two turns taken at the shoulder to make all secure. Any ragged fibres can be cut off with the scissors, or, if the body is too smooth, a little coaxing with the dubbing needle will pull out a few fibres and make it rougher. If the legs of the fly are of the same dubbing, a little extra quantity can be spun on at the shoulder, and the fibres picked out for the legs. It is, however, a better plan to lay some of the fibres trans-

versely across a well-waxed double length of the tying silk, as described on page 208; twist this up and fasten in and turn like an ordinary hackle.

Ribbed herl, silk, or tinsel bodies.

If the body is ribbed, the ribbing tinsel or silk is fastened in at the tail, the ribbing laid on after the body is formed, and secured at the shoulder by two turns of the tying silk. Three or four turns of ribbing are ample for a small fly, and the tendency of amateurs is invariably to work on too many.

For a herl body, three or four strands are fastened in by the root-ends and twisted together before being lapped on to form the body. With a herl body, an occasional twist is required to counteract the untwisting when lapping. It is always well to strengthen herl bodies by ribbing with gold or silver wire, or with silk if it is desirable that the ribbing should not be prominent.

Silk bodies of floss or sewing silk are worked like quill, excepting that care should be taken not to twist it or soil it by passing the fingers along it unnecessarily. Silk, however, is, as a material for bodies, rapidly becoming obsolete, the colours being so much changed by the water. A gold or silver body is worked exactly like the quill.

Horsehair or gut bodies.

Many of the new patterns are dressed with bodies of horsehair or gut laid on the bare

hook. To carry this out, after winging and fastening in the root ends of the hackles, the end of the horsehair or gut (this latter being first thoroughly soaked) is fastened in at the shoulder. The hair or gut is then lapped on in close folds down to the tail, the whisk, if any, being whipped on by the hair or gut. The body material is then lapped back from the tail to the shoulder, and there secured by the tying silk. To get these hair or gut bodies quite smooth and regular, a little care is requisite when lapping. As they have the appearance of being transparent, they are certainly attractive both to the fish and the fisherman.

Tags.

For a fly with flat gold or silver tag, one end of the tinsel is fastened in when carrying the tying silk down to the tail end of the fly after fastening in the root ends of the hackles. The tag is then worked on the bare hook, secured by the tying silk, and the refuse ends of the tinsel broken off; the whisk, if any, is then set on. The tag of a fly like the red tag, which is a small ibis breast feather, or of the orange tag, which is a feather from the ruff of the Indian crow, is put on like a whisk.

Dressing upright-winged fly hackled down body.

When dressing an upright winged fly with hackle carried down the body, such as the Wickham, the following is the procedure: Having winged as usual, three hackles are

selected, two of the ordinary type for the shoulder hackles, and the third rather a long one with comparatively short fibres for the ribbing hackle. The two shoulder hackles are fastened in by three or four turns of tying silk over the root ends, and the points projecting over the head of the fly. The ribbing hackle is then fastened in by the root end, the point projecting over the head of the fly, the refuse ends of all three hackles cut off, and the tying silk carried down to the bend of the hook, working in tag and whisk, if any. The body material and a short length of gold or silver wire for ribbing are then fastened in, the refuse ends cut off, and the tying silk carried up to the shoulder. The body is then formed and secured as usual, the tying silk being left at the shoulder, and the ribbing wire left projecting from the tail end of the fly (fig. 40).

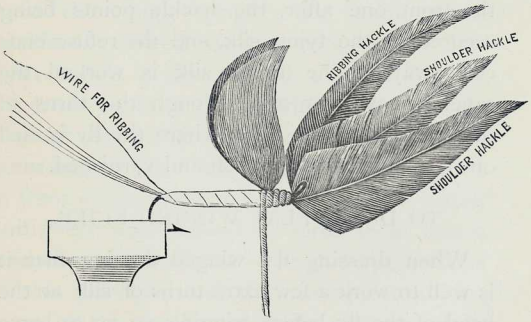

FIG. 40.

Turning and securing the ribbing hackle.

The ribbing hackle is then turned, the first turn not too close behind the wings, and the succeeding ones in open, evenly spaced laps to the bend of the hook. The hackle point is secured by two turns of the wire, which is then carried up the reverse way between the turns of the hackle to the shoulder, where the wire is secured by the tying silk and the refuse end broken off. In respect to this, it must be remembered that if a hackle is worked from the shoulder towards the bend of the hook and the wire is brought up from the tail towards the head, and both wire and hackle are wound in the same direction, the wire ribbing is carried up the reverse way to the turning of the hackle itself. The refuse end of the hackle point is cut off.

The shoulder hackles are then turned and secured successively, the hinder one first and the front one after, the hackle points being secured by the tying silk, and the refuse ends cut away. The tying silk is worked the reverse way over and through the turns of the hackles to the head, where the fly is tied off by the usual whip finish and varnished.

TO DRESS FLAT WINGED FLIES.

When dressing flat winged floating flies it is well to work a few extra turns of silk at the head of the fly before winging, so as to leave

a somewhat longer neck; the object of this will be shown in the subsequent manipulation. The wings are set on as described on page 248, the stumps, however, are not set out horizontally and forced back, as this operation tends to make them upright. The stumps are cut off close to the head of the fly, and a couple of turns of the tying silk worked over them.

If the fly is hackled at the shoulder only, the fastening in of the hackles, the lapping of the silk down to the bend of the hook, the working in of tag or whisk, the fastening in of body material and ribbing, if any, carrying tying silk to shoulder, forming and securing it at shoulder, are worked precisely as before described.

The hinder hackle is turned, but the turns are not jammed in in front of one another to force the wings upright; the point of the hackle is secured by the tying silk. The front hackle is then turned, the first turn on the neck in front of the wings, and the subsequent ones either there or behind the wings, according to their set. Every turn of hackle in front of the wings tends to set them flatter, and every turn behind to force them into a more upright position. The due appreciation of this principle, and the consequent adjustment of the number of turns in front of or

behind the wings, will enable the operator to correct any fault in the original set of the wings.

For a flat winged floating fly most fishermen like the wings to be set at an angle of about 30° to the horizontal or hook shank. The extra space in front of the wings is necessary to allow of the turns of hackle being worked there without running the risk of clogging the eye with the tying silk when making the whip finish. If too little space has been left, this fault can be in a measure corrected by pressing the fibres of the hackle well back with the right thumb and forefinger after the tying silk has been worked through and over the turns of the hackle, and taking three or four laps over the hackle at the neck before making the whip finish.

Flies with very flat wings.

Some dry-fly fishermen like the wings of a flat-winged pattern even flatter than the angle of 30°, and when dressing for them, a modification of the procedure is necessary. The silk is worked on at the head, the hackle, or hackles, fastened in by their root ends, one hackle being preferable to two for this kind of fly. The tying silk is carried to tail end, whisk or tag, if any, set on, body formed and secured, hackle or hackles turned and fastened in, and the fibres pressed well down toward the tail of the fly. The wings are then laid

on as flat as possible, the stumps cut off, and the whip finish worked at the head and varnished. This manipulation will be found useful for most of the wet-fly patterns; but, of course, the hackle should be spare, two or three turns at most, and the slips of feather for the wings much narrower than those of the floating patterns. The wings must, of course, be single.

Flat-winged flies hackled down the body.

With a flat-winged floating fly hackled down the body, such as the various patterns of Sedge, Hammond's Adopted, Artful Dodger, &c., the method of dressing is as previously described for an upright winged fly with hackle carried down the body, with the modifications described above for the flat winged floating flies hackled at shoulder only. These are the working of extra turns of silk at the neck and the turning of the front hackle in front of the wings. As before, if by this procedure the wings are not flat enough, the plan of winging last can be adopted.

DRESSING HACKLE FLIES.

Flies hackled at shoulder only.

In the case of a pattern hackled at the shoulder only, the tying-silk is worked at the head of the hook, the two hackles fastened in, the tying silk carried to bend of hook, whisk, &c., worked in, body formed, hackles turned,

points secured, and tying silk carried through to head. The hackles are pressed well back with the right thumb and forefinger, two or three turns taken over them at the neck, and the whip finish made as usual.

Hackle flies are recommended for beginners, as they are much more easily tied, owing to the absence of the wings. A little more care, however, is required when turning the hackles if it is desired that the fly should have an artistic appearance. With a winged pattern the fibres of the hackles above the hook are kept in place and partially concealed by the wings; while with the hackle pattern every strand is visible.

Bumbles

For a bumble or other hackle pattern in which the hackle is carried down the body, the two shoulder hackles are fastened by the root ends, and then the ribbing hackle. If the fly is to be ribbed with gold or silver wire, proceed as described for flat-winged flies hackled down the body. If, however, the ribbing wire is objectionable, the fly should be tied with silk, which, when waxed, is the same colour as the body.

After the ribbing hackle has been fastened in, the body materials should also be fastened in at the shoulder with the portion to form the body projecting over the eye. The refuse ends are cut diagonally to taper the body, and

the tying silk lapped down to the bend of the hook; the body should then be laid on and secured at the tail end by two turns of the tying silk.

The ribbing hackle is then turned, secured at the tail end by two turns of the waxed silk; the tying silk is then carried through the turns of the hackle to the shoulder, the point of the ribbing hackle at the tail end cut off, the shoulder hackles turned and secured as usual, the fibres pressed back, two or three turns of tying silk lapped over the hackles at the eye, and the fly finished in the usual way.

DRESSING MAYFLIES.

A pair of feathers from the back or breast of a Canadian summer duck, Egyptian goose, Rouen drake, or other suitable bird, are selected for the wings. Holding each feather between the left thumb and forefinger, and judging of the length required for the wings, the remainder of the plume on both sides of the central quill is stroked down towards the butt. This is preferable to stripping off the superfluous fibres, as tending to make the work of winging more secure.

Winging.

The waxed silk having been lapped on to the neck of the hook, the pair of wings are laid in position, with the stumps one on each side of the hook, and then secured by three or

four turns of silk, and one turn behind the wings and over the hook shank. The quill ends are pressed back against the hook shank, whipped securely in this position, and the stump ends cut off diagonally to taper the body. The tying silk is passed between the wings in a figure of eight, and one or two turns taken horizontally round the quills close to and above the hook shank. Mayfly wings in use often split at the base, owing to the inherent weakness of the central quill of these feathers, and whipping round with the waxed silk has been found efficacious in counteracting this tendency.

Fastening in the hackles.

The shoulder hackles, of which one is usually a close-plumed feather, are then fastened in by the root ends. To prepare a close-plumed feather for use as a hackle, hold it by the point between the left thumb and forefinger, and with the right thumb and forefinger, slightly moistened, stroke the rest of the plume down towards the butt end of the feather. If the feather is too harsh it is also well to press the right and left plume together before turning the hackle. If the pattern is hackled down the body, fasten in the root end of the ribbing hackle, and carry the tying silk in close, even laps down to the bend of the hook, where the whisk is fastened on and set up.

Forming body and turning the hackles

The body materials—consisting of a narrow strip of white quill, split from a peacock tail feather, which must be thoroughly soaked before use, and a narrow strip of Rofia grass —are fastened in, as also a length of silk or gold wire for ribbing. Work the tying silk to the shoulder, carry the quill, laid quite flat in regular laps, up to the shoulder, where secure by two turns of the tying silk, and cut away refuse end; work the Rofia grass also quite smoothly to the shoulder, secure, and cut away refuse end.

Turn the ribbing hackle, as usual, down to the bend of the hook, secure it there by the ribbing wire or silk, which carry up between the turns of hackle to the shoulder. Secure the ribbing wire or silk by the tying silk, and break or cut off refuse end. Turn the shoulder hackles as usual, the hinder one first, carrying the tying silk through to head, where tie off with the ordinary whip finish. Omit the bronze herl head, which is absolutely useless, as it not only prevents the possibility of varnishing the whip finish, but almost invariably gives way itself when the fly is in use.

Mayfly hackled at shoulder only.

If the pattern is hackled only at the shoulder, omit the ribbing hackle; instead of gold wire for ribbing the body, use narrow flat gold; with some patterns a ribbing of coloured sewing silk, besides the flat gold, is used.

With respect to the shoulder hackles, where one is a close-plumed feather and the other an ordinary cock hackle, the close-plumed feather is invariably used as the front one nearest to the head of the fly, and the cock hackle for the hinder.

Straw bodies.

Rofia grass is undoubtedly the best material for a Mayfly body, but if it is desired to dress a pattern with straw body take a strip of thin maize or wheaten straw, and having first soaked it in warm water until quite soft, cut out of it a slip of the form shown in the sketch (fig. 41). With the left thumb and forefinger apply it under the hook, immediately after the ribbing wire has been fastened in, and the tying silk is at the tail end of the fly, so that the join will run up the back of the fly, and, pressing it tightly so as to make it lie round the wire of the hook, fasten it securely at the tail end with three very tight turns of the tying silk ; rib the body up evenly with the tying silk, and take two secure turns at the shoulder, just behind the wings.

FIG. 41.

Turn the ribbing hackle, secure it at the tail end with the wire, which is then carried through the turns of the ribbing hackle, and there secured by the tying silk. The shoulder hackles are then turned and secured, and the fly finished as usual.

DRESSING SPENT GNATS.

When dressing the Marryat pattern of Spent Gnat, take four Andalusian cock hackles for the wings, selecting the best and most glossy with warm or ginger coloured points, and strip away from the butt ends all the fibres, leaving only sufficient at the points to form the wings.

Arranging the wings.

Arrange the two hackles for the left wing or that on the farther side of the vice, one on the other evenly at the points, and with the glossy sides upwards. Then the two hackles for the right wing are also arranged one on the other evenly at the points, and with the glossy sides upwards. The left wing is laid on the table with the root ends towards the operator and the glossy sides of the hackles upwards, and the right wing with its root ends away from the operator is laid on the left, so that the last fibres left on the hackles come together at the central stems midway between the wing points.

Winging.

Five or six turns of tying silk are worked on the neck of the hook, and the set of wings as arranged are placed horizontally at right angles to the hook shank, and with the hackle points projecting equally from the hook shank, those forming the left wing on the farther side of the vice, and those forming the right wing on the side of the vice next to the operator. They are placed on the hook shank immediately

behind the last lap of the tying silk, and secured by two or three turns over the stumps, and hackle points worked diagonally in both directions so as to secure them in position. The four stumps are then pressed forwards towards the head of the fly, and there secured by two turns of the tying silk. The four stumps are then pressed backwards towards the tail end of the fly, the hackle-point wings stroked forwards, and the stumps whipped to the hook shank.

Fastening in the hackles.

A grey partridge hackle is fastened in by the root end, and then a cock badger for a second shoulder hackle in the same way. A long cock badger ribbing hackle is also fastened in by the root end, and all refuse ends of wing stumps and hackles cut away diagonally to taper the foundation of the body. The tying silk is worked down to the bend of the hook, and the whisk fastened in and set up.

Forming and working the body.

A strand of condor is selected for the body with dark point and pure white root, the longer flue is stripped off at the root end only and fastened in by the fine end with a length of silver wire, and the tying silk carried up to the shoulder. The condor body is worked on so as to show three or four turns of the dark colour at the tail end, secured at the shoulder by two turns of the tying silk, and the refuse end broken or cut off.

Turning the hackles.

The ribbing hackle is turned, secured by two turns of the silver wire at the bend of the hook, the wire is carried up through the turns of hackle to the shoulder where it is secured by the tying silk, and refuse end broken off. The badger shoulder hackle is turned and secured, and then the grey partridge hackle similarly treated, the points of both hackles being cut off and the tying silk worked over the turn of the hackle to the head.

Finishing the fly.

The wings are pressed back and two or three turns of tying silk taken close in front of them, so as to set them at right angles to the hook shank, and so that they lie quite flat and horizontal. The fly is tied off by the usual whip finish and varnished. If the wings are a trifle too long the points can be cut away with the scissors in a curve sloping inwards and towards the tail end of the fly. Any of the patterns dressed with hackle point wings set horizontally are dressed in the same way, except that one hackle point on each side only is used in some cases for the wings.

It may be noticed that no description of the manipulation for dressing flies with wings of any material except feathers has been given Excepting the whalebone shavings used for the spent olives, dressed according to Mr. Power's pattern, and pike scales, there are, according to the experience of most chalk

stream fishermen, no successful substitutes for feathers. All the loudly-puffed and patented wings have proved, on trial, to be no better killers and far less durable than the old-fashioned feather wings; and it may safely be predicted that the inventors themselves will cease to dress them.

TO MAKE DETACHED BODIES.

Many modern anglers complain that when fishing with detached-bodied flies, they miss a large proportion of the rises. Some of them have, from this, formulated the theory that fish come short at this type of fly, and argue that the use of detached patterns is therefore to be deprecated. Such a theory is not in accord with the experience of many dry-fly fishermen in the first rank. For very shy fish no flies have been so successful as the transparent detached-bodied patterns. All such monstrosities as quill-bodied or cork-bodied detached flies, or, worse still, the patterns in which the bodies are made partly on the hook shank and partly detached on a bristle, are worse than useless. They fail in the one essential feature of detached bodies —viz., that they should be as transparent as possible.

The reason why so large a proportion of rising fish are missed with detached flies as

usually dressed is obvious. The body is, as a rule, made far too long, often projecting as much as one half its length beyond the bend of the hook. When a shy trout or grayling rises at such a fly its lips come in contact with the stiff projecting detached body before the barb of the hook is in its mouth, and the fish, detecting the fraud, ejects the fly before there is any possibility of its being hooked. The remedy is equally obvious: do not tie or buy any detached-bodied fly in which the body projects beyond the outside of the bend of the hook.

Preparing the bristle.

Take an ordinary bristle such as is used by bootmakers, either natural or dyed, according to the colour of the body of the fly to be imitated. If too thick, split in two from the point. Double it tightly in form shown (fig. 42).

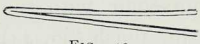

FIG. 42.

Holding the bristle firmly between the nails of the thumb and forefinger of the left hand, take two tight turns of waxed silk close down to the double end of the bristle. Lay in position, the fibres to form the tail.

Procedure with horse-hair covering

If the covering of the detached body be of *horsehair*, affix to the bristle well-waxed tying silk as near the colour of the horsehair as possible. Place the whisk and horsehair in position, and fasten them in with the tying silk.

Commencing close to the doubled end of the bristle, lay on four or five turns of horsehair, and, holding it securely in the left hand so that the folds shall not open, take a single turn of the tying silk round horsehair and bristle (fig. 43).

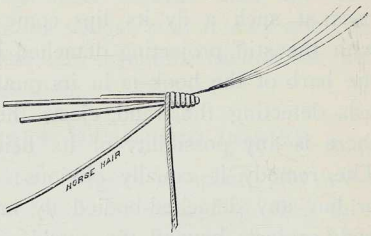

FIG. 43.

Take four or five more turns of horsehair, and then one of the silk, and so on, in succession, until sufficient length of bristle is covered to form the body, when secure the horsehair with the tying silk, and finish with whip finish (fig. 44). Cut away any projecting

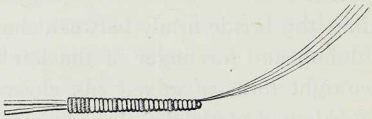

FIG. 44.

ends of horsehair or whisk, roll body on table to make it round, and bend body to set the tail up. The single turns of tying silk give the appearance of the joints of the body, which are prominent features in all the natural flies.

For the *Jenny Spinner* body, select the most transparent bristle and the finest and clearest white horsehair. Use red-brown silk, which secure as before at the doubled end. Lay a cream-coloured whisk along the top of the body with points projecting to the right, and the horsehair projecting towards the left. Secure both with the silk, and make a whip finish. Cut away the tying silk (fig. 45). Jenny Spinner body.

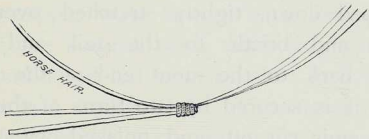

FIG. 45.

Roll the horsehair on, taking care not to cover the silk at the tail end; fasten it off with two or three turns of silk, and conclude with the whip finish (fig. 46).

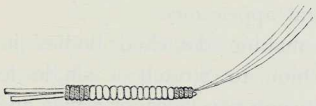

FIG. 46.

If it is to be covered with india-rubber—which can be cut from the ordinary bottle rubber with a sharp knife previously wetted, or drawn from elastic webbing—two or three turns of waxed India-rubber covering to body.

silk are taken round the doubled bristle at the point where the stout end of the body should terminate, and one end of a thin narrow strip of rubber is fastened in. This length must be judged with great care to avoid making the body too long.

Taking the strip of rubber between the right thumb and forefinger, and with the left hand laying the gallina for whisk in position on the doubled bristle, the india-rubber is lapped down, tightly stretched over the gallina and bristle to the tail, and then lapped back to the stout end of the body, where it is secured by two turns of the silk, refuse ends cut off, and finished with whip finish.

Roll the detached body backwards and forwards on the table with the flat handle of the dubbing needle to make it perfectly round. By this method there is no waxed silk under the india-rubber, and the body has a transparent and natural appearance.

Making detached bodies in vice.

When making detached bodies it is the latest fashion to stretch a single length of bristle between two vices, or a vice and a stout hook. Five or six bodies are dressed in this bristle and are cut off when finished. After the fly is winged and hackle fastened in, one of these detached bodies is whipped on, the hackles turned, and the fly finished. This

plan certainly saves time, but the bodies so made are neither as sightly nor as secure as those built according to the old method on the split doubled bristle.

The manipulation has, however, been improved in one respect. When the split bristle has been doubled, a short length of fine copper wire is inserted through the loop at the fine end of the doubled bristle. The stout end of the bristle is fixed in a vice, and the two ends of the copper wire, having been brought together, are secured, with the bristle and wire stretched out at full length, either in a second vice or in a strong hook. This simplifies the procedure, as the bristle foundation is securely held and both hands are free.

In all cases note that the whip finish at the end of detached bodies should not be varnished; otherwise it is almost impossible to attach them securely to the hook, as the tying silk does not *bite* on the hard varnished surface.

Finishing detached bodied winged duns.

To complete the flies with detached bodies *for a winged dun*, set on the wings in either of the methods previously indicated; fasten in the root-ends of two hackles. Apply the body with the two projecting ends of bristle *à cheval* on the hook, and close up behind the wings (fig. 47).

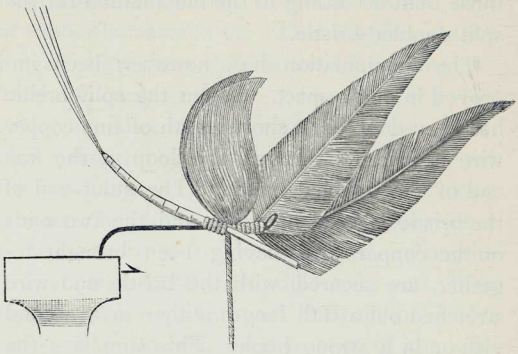

FIG. 47.

It is a good plan to flatten the ends of the bristle slightly between the teeth before applying.

Fastening on the body.

Holding the body securely in position with the left hand, bind down over the ends of the bristle and round the wire of the hook five or six tight turns of the tying silk, then make one turn of silk under and behind the body and round the wire of hook, so as to set the tail-end of the detached body well up. Cut away the refuse ends of the bristle not too closely (fig. 48).

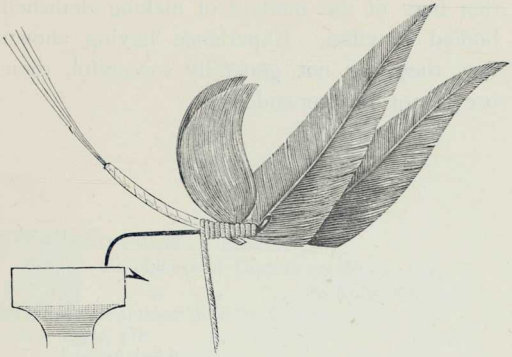

FIG. 48.

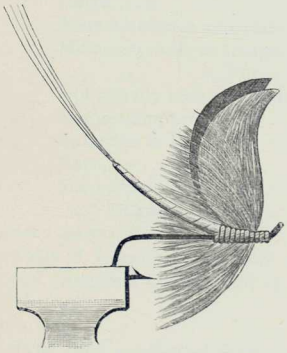

FIG. 49.

Take three or four turns of the silk round the body and hook, carrying it towards the shoulder; turn the hackles, fasten in their points, bring silk between the fibres of the hackles to head, where finish with whip finish, and varnish (fig. 49).

For a detached bodied hackle pattern the procedure is identical excepting, of course, for the omission of the wings.

It may be noticed that there is no descrip-

tion here of the method of making detached bodied Mayflies. Experience having shown that they are not generally successful, their use is not recommended.

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