

sensible, obliging, anxious to do their duty well towards their landlord and his tenants alike. One notable instance I may mention from my own experience. Being obliged, in my absence from Paris during the sieges, to leave all my goods and chattels to the sole care of a *concierge* whose conduct had not always been above suspicion, I naturally felt a good deal of anxiety about them. But my fears proved groundless, for I found everything intact. The worthy fellow, to whom I had committed the key of the outer door, having patiently endured the privations and perils of those terrible months, had at the risk of his life baffled the attempts of the Communists to pillage the rooms. Had I kept the key, and not relied upon his honour, the result might have been very different.

A word on another practical matter of no slight importance may fitly close this brief sketch. I refer to the question of *economy*. There is a mistaken notion still common on this side of the Channel that one may live in Paris less expensively than at home. In some cases it may be so. Those whose position in their own country obliges them to keep up large establishments, and whose claims for hospitality are in proportion, may considerably reduce their expenditure by living where they are comparatively unknown. *Noblesse oblige* in such cases. But persons of small or even moderate means will be grievously disappointed if they think to make both ends meet any

better there than at home. Their difficulties will be rather increased. Provisions of all kinds, and especially fuel, are much dearer in Paris than even in London, partly in consequence of the heavy *octroi*, or duties, levied on their admission within the city gates. Rents of *appartements*, even on the upper storeys, are higher than those of houses of corresponding size in our metropolis. Taxes, in the absence of income-tax, being chiefly indirect, except that levied on the value of the *appartement* and its furniture, are certainly lower. The scale of servants' wages, on the other hand, has risen there even more than with us. On the whole the cost of living is undoubtedly heavier. The idea that a franc is equal to a shilling is a myth long since out of date. Its value is more nearly represented by a sixpence. And, whatever other motives may induce our countrymen to emigrate to Paris, a desire to economise ought assuredly in most cases to have no weight. Higher considerations, such as the lower moral tone and the loss of many religious privileges, may well be added to the adverse side of the balance. The superiority of the climate, the peculiarly pure and bracing air, the freedom for the most part from the dismal fogs and mists for which our islands are so notorious, as well as the peculiar charms and convenience of this beautiful city, are indeed most attractive features; but they must be enjoyed by a resident at the sacrifice of many substantial advantages.

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COLLECTING BUTTERFLIES AND MOTHS.



HERE is, perhaps, no more beautiful or more interesting science than entomology, and particularly that branch of it which is devoted to the Lepidoptera or scale-winged insects, commonly called butterflies and moths. Like the botanist, the entomologist enjoys the benefit of pleasant country rambles in search of his specimens; but besides the pleasure of collecting them, he also feels the excitement of the chase.

Many people urge cruelty as an objection to the study of entomology, but the accusation is erroneous. The slightest cruelty need never be practised. Even supposing insects to possess a nervous system equal to that of the higher animals—which they do not—the death by the cyanide or chloroform bottle would be nearly painless. As a further argument against the charge of cruelty, it may be stated that many insects appear to be incapable of feeling pain. The dragon-fly for instance, if deprived of its tail, will eat flies with as great a relish as though it had a stomach to digest them;

and the butterfly, though impaled on a pin, will calmly sip the honey from a flower, evidently unconscious of anything wrong.

Strange as it may seem, although in many cases apparently oblivious to pain, insects appear to possess the sense of smell in a wonderful degree of perfection. If the females of several kinds of moths are placed in the open air, they will soon be surrounded by a large number of males of the same species, these having been most probably attracted by means of a very acute sense of smell.

As our space does not permit even the briefest description of the various kinds of Lepidoptera, we must therefore proceed at once with our principal object, viz., collecting and preserving them. The necessary apparatus for this purpose is simple and inexpensive, and such as can be easily made in a few hours. All that one requires at first are some setting-boards, a net, killing-bottle, store-box, collecting-box, and some pins.

First as to the net. There are several kinds, all more or less possessed of some peculiar advantage of their own. The strongest and most simple is undoubtedly the plain ring-net. This is simply a ring of cane or stout iron wire lashed firmly to the end of a stick. A great drawback to this net, however, is the impos-

sibility of folding it up when not in use. On this account it is seldom used by those persons who have a considerable distance to carry it before reaching their hunting-grounds.

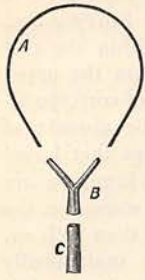


FIG. 1.

A more portable net is one made as in Fig. 1. B is a Y-shaped tube of tin or brass, which fits into the end of the stick, C. The net is put on to the cane, A, the ends of which are then bent round and stuck into B.

This net is strong and light, and has a great advantage over the ring-net, as it can be taken to pieces when not in use. Another good net is the umbrella-net (Fig. 2). This consists

of a stick, W, on which slides a short tube, X. Two strips of steel or stout whalebone, K K, are fastened to the stick and tube by means of the hinges, B B, B B. To open the net, the tube, X, is pushed up the stick until the steel rods form a circle; it is then fixed firmly by means of the screw, R.

This is about the most convenient form of net, as it can be opened or closed in a few seconds, and when not in use can be carried in an ordinary umbrella-case. The amateur, however, will perhaps be unable to make it himself.

For our own part we always use a folding net made as in Fig. 3, and find it strong, portable, and capable of being fixed to the stick or taken off in a very short space of time. It is made as follows:—

At opposite sides of a stick, J, drill two holes, L M, one about an inch and the other about two inches from the end. Two pieces of wire, A B—about three-sixteenths of an inch in thickness—are bent so as to form two half-circles, joined together by means of the loops which form the hinge, C. The ends, D F, are bent at right-angles at X K; D being about two inches long; F, one inch; and X and K, half an inch.

To fix the net on to the stick, open it as in the illustration, and place X in the hole, L, and K in M. A short tube, H, is then slid over D and F, thus keeping the frame of the net perfectly rigid.

Fig. 4 is a net which will be found very useful in taking insects off walls and the trunks of trees. H and K are pieces of stout wire lashed firmly to the stick, G, and M is a strong piece of string. The great advantage of this net is that it will adapt itself to any curved or flat surface.

The net itself should be made of leno—green is the best colour to use—and a convenient size is about a foot or eighteen inches in diameter, and a yard in length. In places where brambles abound, however, a short net is far better than a long one. As the wire frames soon wear the leno, it is a good plan to have the top of the net made of green holland.

Before leaving the subject of nets, it will be as well to describe the forceps net (Fig. 5), these being very useful instruments. They can be made as follows:—

A B are two strips of wood about half an inch wide, a quarter of an inch thick, and eight or ten inches long. These are fastened together by a peg at M, so as to move like a pair of scissors. The wire circles, D C, are lashed firmly to B A, at E F, and are then covered loosely with leno.

To make a killing-bottle, procure a wide-mouthed bottle, and place at the bottom of it about an ounce of cyanide of potassium. Mix some plaster of Paris to the consistency of cream, and pour into the bottle a sufficient quantity to cover the cyanide. In a few hours it will be dry and ready for use. A properly made killing-bottle will last two or three years.

Setting-boards should be made several sizes, ranging from half an inch to five or six inches or more in width, the most convenient length being twelve or fourteen inches. They can be

made either flat or rounded according to taste; but for our own use we prefer the flat ones. Fig. 6 shows sections of both kinds. Setting-boards are made by gluing a smooth sheet of cork, half an inch thick, to a strip of wood a quarter of an inch thick, and cutting along the middle of the cork a groove rather larger than the body of the insect which it is to contain.

A store-box is simply a plain wooden box about four inches deep, lined with cork top and bottom, and is used for keeping the insects in after they have been set out.

A collecting-box is made in the same way, but is sufficiently small, however, to be carried in the collector's pocket.

The collector had better not attempt to make an entomological cabinet, as, unless he is a good hand at cabinet-making, it will prove a failure. The best plan is to buy one ready-made from a respectable naturalist—their cost commences at about 14s. each. Entomological pins can be obtained at from 6d. per ounce.

Having obtained the requisite apparatus, the next step is collecting the insects.

The best time for butterflies is between eleven in the morning and three in the afternoon. The best time, however, for the high-flyers, such as the Purple Emperor, is after three o'clock in the afternoon, as they then fly lower than in the middle of the day. It is perhaps needless to say that hot sunny days bring out the butterflies in the greatest profusion. This is not always the case with moths. In fact we have frequently caught large numbers of the latter when sugaring on a bleak, dreary, autumn night; while on fine evenings we have often returned almost empty-

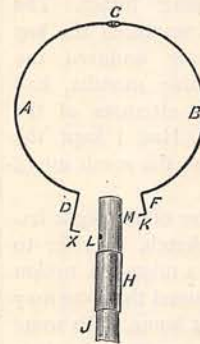


FIG. 3.

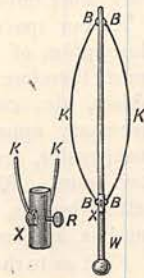


FIG. 2.

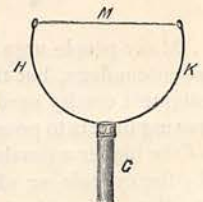


FIG. 4.

handed. But a bright warm day, with a shower of rain about five or six o'clock in the afternoon, is generally followed by a good evening for sugaring. A very good sugaring mixture is made as follows:—

Take half a pint of beer, a quarter of a pound of sugar, and a quarter of a pound of treacle; boil together until the sugar is dissolved, and when cool add half a gill of rum. This mixture is applied to the trunks of trees in streaks about two inches wide.

Having sugared a sufficient number of trees, the entomologist goes from one to another with a lantern and killing-bottle, and captures those insects which

he requires. The number of moths which can be caught in an evening by the process of sugaring is often enormous; we have frequently counted over fifty on a tree about ten minutes after it had been sugared.

By pupæ-digging many rare kinds of Lepidoptera can sometimes be obtained. The best places to dig are at the roots of trees—oaks and poplars being very good. The pupæ are found a few inches under ground and close to the trees. October is the best month for pupæ-digging, but operations may be carried on throughout the winter.

Having caught a butterfly or moth and killed it, fasten it into the collecting-box by sticking a pin through its side. By adopting this plan the insect's back is uninjured, as the hole at the side is not seen when the insect is set out. Besides, by pinning them through the side several insects can be placed on one pin, thus enabling the collecting-box to hold more than if each insect was pinned out separately.

The style of setting out insects varies greatly with different collectors; but the method remains the same in all cases. Some entomologists place the upper wings of their Lepidoptera at an angle of about 60 degrees, others set them level with the head, whilst a few prefer to see them lower still.

For our own part, however, we adopt a style midway between the first and second. The distance up the pin at which an insect is to be is also a matter of contention, Continental collectors placing them nearly up to the pin's head, and those of

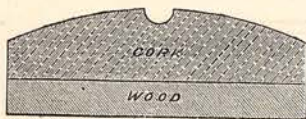


FIG. 6.

the British school almost down to its point. Again we adopt the "happy medium," and place our own specimens half an inch up the pin.

To set out an insect, stick an entomological pin carefully through the thorax at right angles to the body, and place it in the groove of a setting-board, as in Fig. 7. Having placed the wings in the required posi-

tion with a fine-pointed needle, keep them in their places by means of the triangular slips of thin card, A B C D. The length of time for which they must be kept thus set out varies according to the size of the insect, a few hours sufficing for a small one, while several days are required by the larger kinds.

Should the wings of a butterfly or moth get stiff before it can be set out, the insect must be placed in a relaxing-box until it is sufficiently limp. A relaxing-box is a plain zinc or tin box containing some damp cotton wool—which must not be too wet however.

Great care must be taken to keep cases of Lepidoptera free from dust and mites. A composition for destroying the latter is sold by most naturalists, but camphor will be found a good, though not a thorough, protection against the pests. Should an insect be attacked, however, a few drops of spirits of camphor applied to its body will destroy the mites.

Before concluding this paper it may not be inappropriate to say a few words on breeding insects, for by

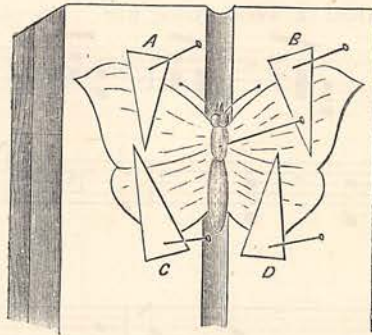


FIG. 7.

this means undoubtedly the finest specimens can be obtained. For successful breeding, however, plenty of fresh air and food and careful attention are necessary.

There are several kinds of breeding-cages, but perhaps the most convenient is made from a large box—say three feet by two, and eighteen inches deep—having at each side several apertures covered with muslin, the lid consisting of a frame covered with the same material. The bottom of the box should be covered to the depth of several inches with a layer of soft mould, in which are placed several bottles of water containing the necessary food-plants. Both plants and water should be changed at least once a day.

Many of the caterpillars bury themselves in the ground when their metamorphosis is about to take place. These should not be disturbed, but allowed to remain in their subterranean situation until they emerge in the perfect state.

Pupæ may be hatched, so to speak, long before the natural time by means of artificial heat; but we fail to see that any advantage is to be gained by this procedure,