

## ON THE COLLECTION AND PRESERVATION OF INSECTS.

By F. M. HOWLETT, B.A., F.E.S.,

*Christ's College, Cambridge. Second Imperial Entomologist, India.*

(With 3 Text-Figures.)

THE collection and study of tropical insects now being undertaken in connection with medical and other researches has resulted in the publication of two or three very useful leaflets of instructions as to how to catch and send home specimens of blood-sucking and parasitic insects. These leaflets are intended for collectors who will send home their specimens soon after they have caught them: when this is impossible, when specimens have to be carted from place to place and housed, it may be, in very unsuitable quarters, it becomes important to use only the best methods for preserving them in good condition, and the best methods can be arrived at only by combining the experience of collectors in different countries.

One of the greatest wants at present unsupplied is of a store-box which shall be really reliable in any climate. No wooden box seems able to stand with any certainty against the great variations of humidity so frequently experienced. At Pusa (Bengal) well-seasoned teak boxes are found to be reliable only when the wood is so thick as to render them unpleasantly heavy and cumbersome, a great disadvantage in a tropical climate. A metal box gets too hot; it cannot be left in the sun even for a few minutes, and at any drop in temperature moisture tends to condense on the inside. Cardboard "carton" boxes sometimes keep their shape for a surprisingly long time, but have no pretensions to permanence. Boxes of three-ply wood appear to be heavy and expensive: I have had no personal experience of them.

The ideal box would be (1) light, strong, and easily handled, (2) made of impermeable non-conducting and non-hygroscopic material, (3) unaffected by any degree of moisture or drought in conjunction with any temperature between 30° and 120° F., (4) ant-proof and reasonably air-tight, (5) not expensive. It should not be difficult to make such a box, if not of wood or impregnated wood, then perhaps of metal covered with some non-conducting substance, or of one of the many patent materials and "substitutes" now available. Single boxes are preferable to double ones.

The lining of boxes is usually of cork, cork carpet, German peat, or pith. The three latter tend to attract moisture more than does cork, and in time corrode the pins, unless these are made of silver or nickel. The lining should be of a fair thickness; for sending specimens by post an inch thick layer of pith is excellent; if the pith is procured locally it should be very carefully dried. Carbolic acid cannot be used with cork carpet or German peat, as it causes them to swell up in billows and crush the specimens against the lid of the box. Dr Graham of West Africa recommends white beech creosote as a preventive against mould and insects: Lefroy finds that an improvement on this is effected by mixing the creosote with an equal quantity of a saturated solution of naphthalene in chloroform; a little of the mixture is poured over the bottom of the box from time to time: it is very effective, and can be used with any lining.

The necessity of poisoning boxes is to a great extent if not entirely obviated by the use of paraffin-wax, which has been tried at Pusa with very good results. A box is lined with cork carpet painted white, and over this is run about a quarter of an inch of wax with 5% of naphthalene melted in with it. The melting-point of the wax should be about 20° F. above the maximum shade-temperature. No "mites" seem able to live in these boxes. Both paraffin and the creosote mixture are superior to naphthalene alone, apart from the risk of damage to specimens occasioned by using lumps of the latter in the box.

It is possible to preserve diptera *very* carefully packed in layers of well-sifted sawdust, but this should never be done if it is possible to pin them. *Nothing but silver or nickel pins should ever be used*, and the insects should not be pinned directly in the box, but to a support which in turn is pinned firmly on to the lining of the box.

The round discs of paper so often used as supports for mosquitoes and other diptera have proved in our experience to be unsatisfactory, and

particularly so when used by people who have not had much practice in setting insects; their only advantage is that they are easily made. It is far preferable to use round or rectangular slabs of pith, papered or unpapered cork, or thin strips of polyporus: any of these gives a firm hold for both pins and will stand comparatively rough usage. It is difficult to get cork free from holes, and as an improvement on papered cork we have used cork carpet or "suberit" covered with an elastic quick-drying enamel called "Paripan" and cut to standard sizes. The supports should be pinned in the box with good stout pins, not thin elastic ones, and should not be put higher than about half-way up the pin; this gives protection to the specimen and makes it easier to handle. It is generally very much easier and quicker to pin specimens through the side than through the back, and great care should be taken that no part of the insect overlaps the support. If possible a small label bearing the date and locality should be gummed or pinned on the support, so that it can be seen at once: other labels at the bottom of the pin.

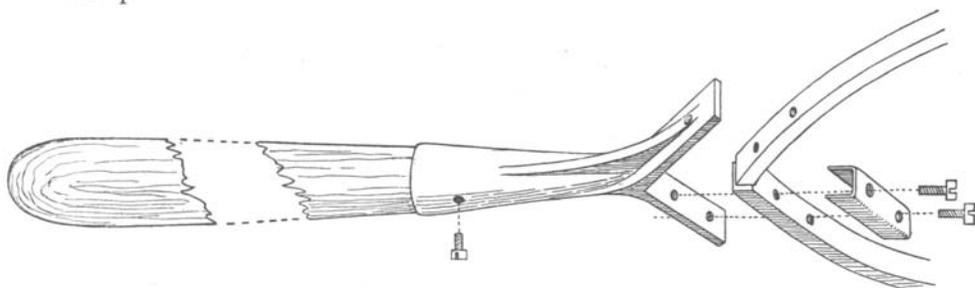


Fig. 1. The Y-piece is a solid aluminium casting, the hoop of wood, the screws of brass with deep and broad cuttings in the screw heads.

When pinned in the box the supports should be all at one uniform level.

The best pattern of net for hard work is that used at Cambridge (Fig. 1). The "Swiss bolting-silk" of which the bag is made is expensive, but quite worth its cost in the long run, as it is extremely durable and improves with wear: it should be well soaked and crumpled before use. Mosquito-netting and a wire ring does very well for mosquitos, but for *Simulium* and particularly for *Ceratopogon* a very small mesh is necessary. Messrs Winkler and Wagner sell a handy little pocket-net (kleines Fangnetz), but the bag is of such delicate material that it soon wears out. An old tennis-racket makes quite a good net-frame.

For killing, cyanide is perhaps most generally useful: benzene is apt to make the tubes sticky, and chloroform tends to stiffen insects killed with it, but either is useful in damp seasons when the deliquescence of cyanide may become a nuisance. It is much better to use several fairly small tubes than one large and heavy killing-bottle.

The diagram (Fig. 2) gives a suggestion for a tube which could be used with any killing-agent and be easily re-charged. If cyanide and



Fig. 2.

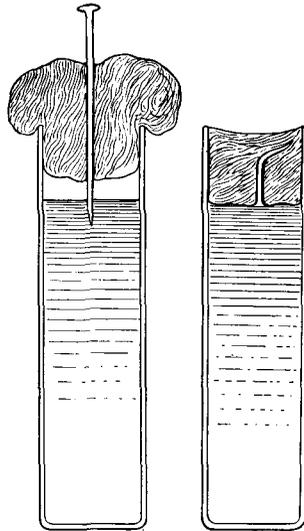


Fig. 3.

Fig. 2. The cartridge is seen below separated from the main tube by two layers of gauze secotined on to a ring of cork.

plaster of Paris is to be employed, a piece of tube of similar bore is used as a mould in which a cyanide "cartridge" can be cast, the tube being lined with paper, and the cartridge when set pushed out of the tube and inserted in the killing-tube. Small lumps of cyanide wrapped in soft paper may be used instead, or cotton-wool wetted with benzene or chloroform. Rubber corks are attacked by the two latter substances, but not by cyanide. When insects have been killed in rainy seasons it is better to put them with some pieces of soft paper into pill-boxes rather than into glass tubes, as they run less risk of getting wet and spoil. A number of living insects in a tube with paper will often keep

their condition (as regards moisture) better than the same number of dead ones, and if a certain degree of over-crowding is unavoidable, it is sometimes better merely to stupefy the insects and let them revive in a box or tube, and to kill at the journey's end. If of fair size, a little pad of soft paper above each (dead) insect is useful in absorbing moisture.

For closing tubes or bottles containing formalin-specimens, Mr Gordon Merriman has shown me a method which is both ingenious and efficient (Fig. 3). A plug of plasticine (cheap and easily obtained) is pushed right down on to the surface of the liquid, until the latter spurts up through a pin-hole made in the plug, all the air in the tube having previously escaped through the same hole. The hole is then sealed by a wipe of the thumb, and the liquid remains completely filling a permanently closed tube, preventing all damage from shaking. For closing bottles which contain specimens in any fluid preservative, and which will not require to be opened for a long time, "Viscose" bottle-caps (obtainable from chemists) seem admirably adapted, but they must be kept in a special fluid solution till used.