Details about some flytraps and their application to biological research

by

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When studying the life history of a Dipterous insect it is of importance to know the exact dates of appearance of the adults as well as the duration of the flight period. For this purpose flytraps of different constructions with or without attractants were used during investigations in 1951 of the biology of the noxious bean seed fly *Hylemyia cana* Macquart (=*Chortophila cilicrura* Rond.) Three traps with partially new constructive modifications were used with good results.

I. The all metal conical trap. — Fig. 1.

The flies in the field are attracted into a screen cone. By going through the cone the entrance of which is large and the exit small, the chance of the flies, finding their way out, is practically nil.

The frame of the trap A, made of zinc, consists of 2 hoops (a and a', 1⅜ inch wide) with diameters 12 and 2¾ inches, 4 strips (¾ inch wide) connecting the two hoops, and 2 round zinc wire rings (b and b', ⅛ inch in diameter). The height of the frame is 16 inches. All connections are soldered together. The frame is covered by a zinc screen (16 mesh to the inch) which is soldered completely around to the outside of the lower edge of hoop a' and to the upper edge of hoop a. At the lowest hoop (a) 3 zinc strips — "legs" — (¾ inch wide, 6 inches long) are vertically attached, and in each of the legs 3 small holes are drilled at distances of ⅜, ¾ and 1¼ inches from the lower edge of the hoop. The neck of a jam pot B fits well in the upper hoop (a). A small zinc hoop to which a small zinc screen cone (16 mesh) has been soldered completely around the periphery, fits into the neck of the jam pot. The cone (C) is 3 inches in height and has an opening at the apex, ⅜ of an inch in diameter.

A thin square wooden plate (D) is also used with the conical trap. There are 3 slit-like openings (1 inch wide) in the plate and the distances between these openings are exactly the same as those between the 3 legs attached at the lowest hoop.

Plate D is horizontally placed on the ground and the 3 legs are pressed into the soil through the 3 corresponding openings in D. With the aid of a nail put into one of the 3 holes in each leg, the space between the lower side of the hoop (a) and plate D can be arranged at ⅜, ¾ or 1¼ inch. A petri dish containing the attractant is placed in the centre of D. After entering through the space between the hoop and plate D, the flies by walking and flying movements make their way up the large screen cone and arrive via the aperture in the small screen cone into the jam pot. The flies are killed in the jam pot and they are collected by removing cone C.

The all metal conical trap, without the application of an attractant, can also be used in another way. One often collects puparia of a certain generation to determine the duration of this pupal stage and the emergence of the flies. To find dates that may be compared with normal field observations it is very important to store these puparia in such a way, that

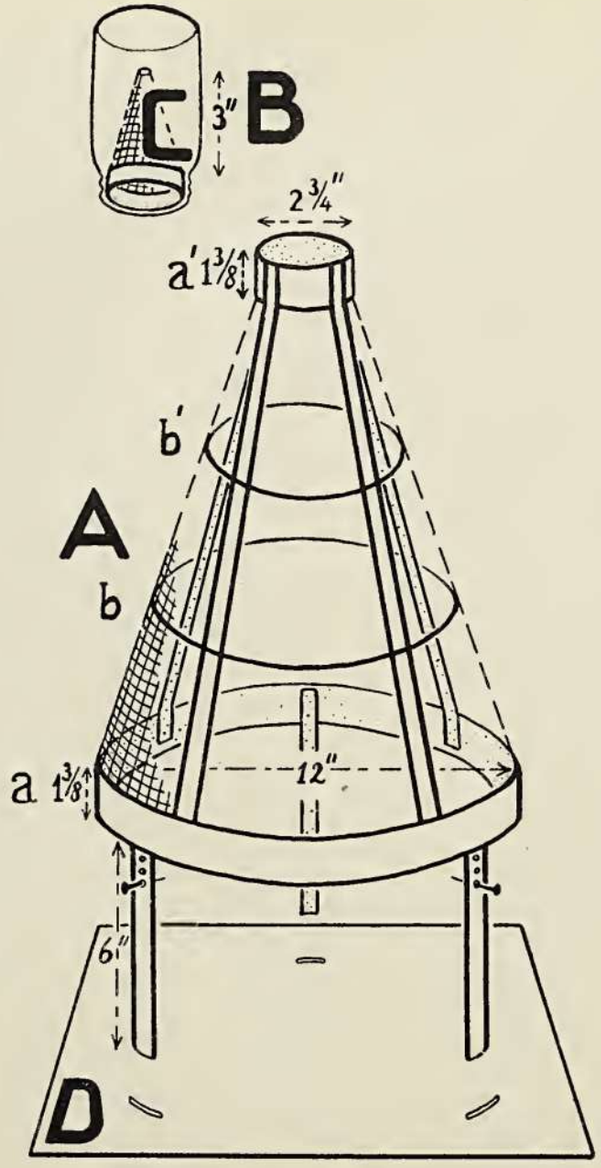

Fig 1

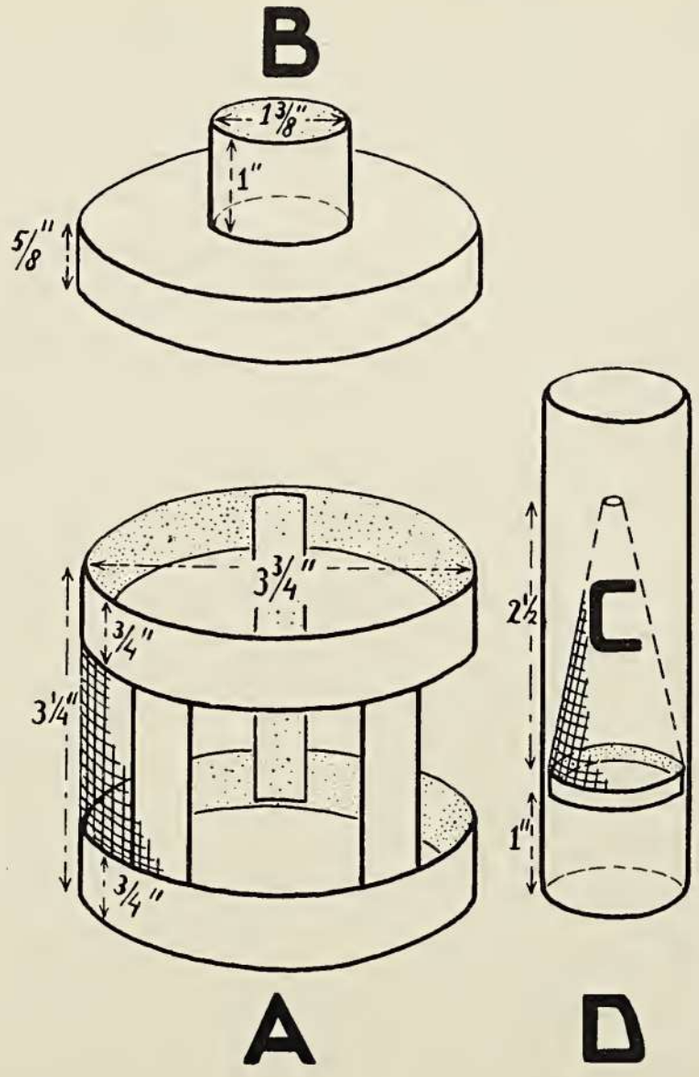

Fig 2

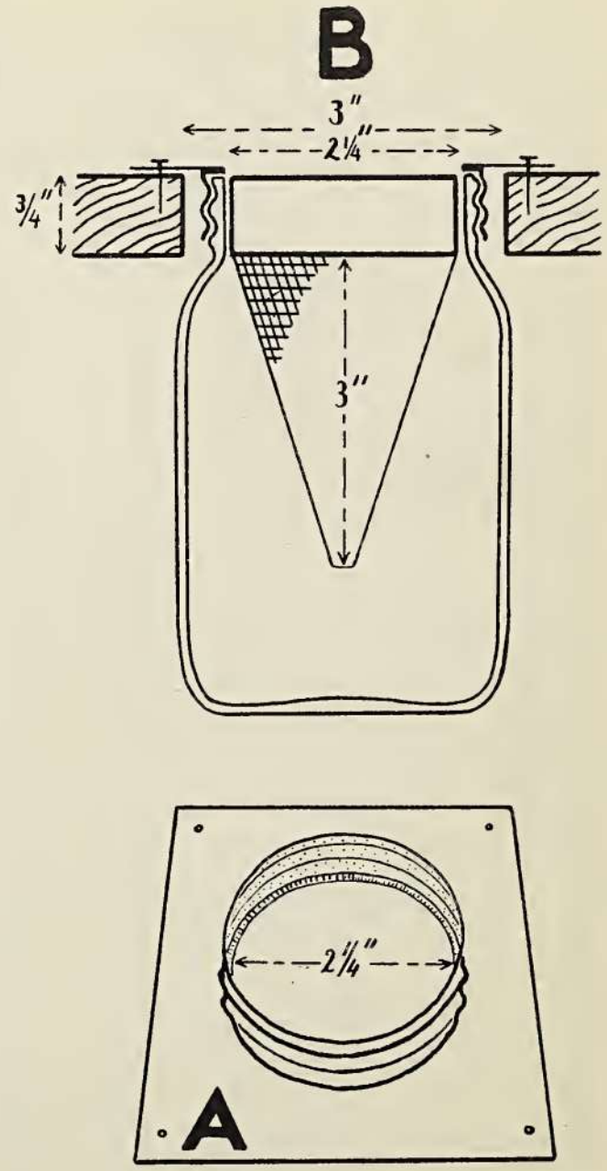

Fig 3

the storage is similar as much as posible to the manner in which the pupal stage of the fly is passed under natural conditions in the field. A number of puparia (100—300) are put into the soil at the necessary depth, this corresponding to the depth at which the larvae pupate normally. The conical trap is placed over the soil, and the legs are pressed firmly into the ground until the lower edge of hoop (a) enters the soil. To prevent possible destruction of puparia by a mole or mouse it is recommended to store the puparia beforehand in an open screen basket (diameter 8 inches, height 2½ inches; 10—16 mesh gauze). The square wooden plate (D) is not used. The "open" construction of the conical trap does not change in a noticeable way the natural climatological influences on the pupae and the trap may be given preference to the usual wooden storage boxes.

II. The small all metal storage cylinder. — Fig 2.

This trap is used to breed flies from a small number of puparia (10—100), collected as much as possible under circumstances equal to natural conditions. The puparia are placed into the cylinder in which a layer of soil is already present and then the cylinder is filled up with more soil to a depth of ¾ of an inch from the upper margin. The cylinder is closed by a cover and afterwards placed into the soil in such a manner that the cover is found just beneath the soil surface. The puparia are placed into the soil in the cylinder at a depth equal to that at which the larvae pupate in the field.

The cylinder consists of a zinc frame work (A); two hoops (¾ of an inch wide) are connected by soldering to 3 vertical strips, ⅝ of an inch wide. The height and diameter of the cylinder are 3¼ and 3¾ inches respectively. The bottom and wall are formed by a zinc screen (16 mesh to the inch) soldered to the frame work. A zinc plate with a flanged edge which is cover B, has a hole 1⅜ of an inch drilled in the centre. An open cylinder (1 inch high)is soldered to the cover above the hole.

After putting the puparia in the cylinder and placing it in the ground, according to the above mentioned method, a glass tube D containing a creen cone C (16 mesh to the inch) soldered to a zinc hoop, is fitted over the open cylinder on the cover B. The cone is easily removed. On emergence the flies move up the cone and through the small aperture into the top portion of the tube, where they can easily be collected. The flies are positively phototrophic.

III. The box trap. — Fig. 3.

In studying the biology of Anthomyiidae such as *Hylemyia antiqua* Meigen and *Hylemyia* (= *Chortophila*) *brassicae* Bché. a box trap has already been used for years in Holland (see: MAAN, DE WILDE). This box is placed over a number of plants infested by the larvae of the Anthomyiid in question. The upper side of the box formed by a screen is covered every day for an hour by a canvas or a wooden plate to darken the interior of the trap. The flies which have emerged during the previous hours now arrive, by phototactic stimuli, in a glass tube that fits in a small hole in one of the walls and are soon collected. The writer has replaced the glass tube by a jam pot containing a fitted but movable small gauze cone. The advantages are: a stronger construction — the danger

of breakage of the jam jar is not so acute — and the flies, once in the pot, never find their way out.

The box trap consists of a wooden rectangular frame 40 inches long, 20 inches wide and 8 inches deep (wood ¾ inch thick). The roof is formed by gauze (16 mesh), nailed completely around the upper periphery of the frame. In the middle of one of the walls 20 inches wide there is a hole 3 inches in diameter. A screw thread, into which is screwed a jam pot with a gauze cone of the same type as used in the all metal cone trap (Fig. 1, B—C), is fitted into the 3 inch hole in the following manner. The centre portion of a screw type jam pot cover is removed leaving a ⅛ of an inch rim and the screw thread. This is soldered around a hole 2¾ inches in diameter which is in the middle of a zinc plate 4 inches square. The zinc plate is nailed on the innermost side of the wall so that the screw thread fits into the 3 inch hole of the wal. Fig. 3 B shows a cross section of the construction.

Although these three described traps have been specially used in studying the biology of the Anthomyiid fly *H. cana,* it is obvious that they can be employed for observations on many other flies belonging to various families. Collected puparia for breeding experiments kept in the all metal conical trap (used as a depot) or in the storage cylinder must always be stored in such a way that the natural field conditions are imitated. A more universal application of the conical trap in combination with an attractant is also possible as a great number of fly species have been trapped other than *H. cana.*

However the success in trapping enough flies to plot a graph of the flight of any generation depends on the species. The problem of selecting the best trap model and a good attractant deserves important consideration as it depends upon the biological characteristics of the fly as e.g. the height of flight and the responses to geotactic and olfactory stimuli. There is an extensive literature in regard to the attractants and baits for several flies (HOWARD, MARSHALL, MELLOR & WOODMAN, REID a.o.)

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Ruil. M. R. VIEUJANT, 44 Avenue Georges Pêtre, Brussel, wil Hymenoptera, Coleoptera en Lepidoptera ruilen of kopen, voor zover ze in Nederland of België voorkomen. Corr. Frans of Engels.

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