The Canadian Entomologist.

Vol. XXXI.

LONDON, APRIL, 1899.

No. 4.

A SERVICEABLE INSECTARY

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With the constantly increasing activity in applied entomology in America, the necessity for rooms or apartments especially adapted for the study of the development of insects is becoming each year more imperative. The insectary has, in fact, become almost as necessary to the working entomologist as has the laboratory to the chemist. While it is especially true in entomological investigations that one must "study nature where nature is," it is equally true that one cannot, in all cases, watch with the necessary care and constant application in the fields that he will be able to do in a fairly well equipped insectary. Not only can forms be transported thousands of miles while in an inactive state and their development watched at close range, as it were, but eggs and larvae may be brought in during late autumn or winter and studied through their various stages, frequently long before they have appeared outside; and in cases of uncommon or unfamiliar forms this will give the investigator a vast amount of information that he can use to great advantage when the species appears in the fields under a natural condition, perhaps months later.

In the following it is not the intent of the writer to present an illustrated article on a "model" insectary, but to describe one that is in actual use, and the evolution of which has been the direct result of that mother of all invention — necessity. When any demand for certain facilities in order to study any particular species of insect has arisen, and this has constantly been the case, the ingenuity of myself and my assistant has been drawn upon to devise the best methods of accomplishing this end, and thus our insectary at the Ohio Agricultural Experiment Station has come into existence. The only object in presenting this paper is to place in the hands of working entomologists some ideas in regard to an insectary and its equipment, from which they can deviate as their position and requirements may demand. In other words, it may be used as something to work from in their efforts to get that which will best suit their requirements.

The insectary proper is constructed much after the plan of an ordinary greenhouse, the walls being made of hollow tile, and the movable sashes in the roof, for ventilating purposes, are enclosed in dormer-like, wooden frames, covered with swiss or a very thin cotton sheeting in order to prevent the introduction or escape of the most minute insect. A door at one end opens into a workroom, while a window in the roof at the other end is provided with a protected, movable sash like those previously mentioned.

Along three sides extends a bench, such as are in use among florists, except that, in this case, it is only about 30 inches in width, to facilitate the close examination of objects at the far side. A portion of the central space is occupied by a reservoir, and originally we had here also a wider bench.

Wooden benches were tried at first, but these soon decayed, while, as is well known, the larvae of many species remain long in the earth and to disturb them is fatal, so we were obliged to cast about for something more stable to meet these requirements. We are now using, with apparently perfect success, a bench the construction of which is shown in Plate 3. The bottom is of ordinary stone flagging, two inches in thickness, and supported on a framework made of ordinary gas pipe. The upper side of this flagging is deeply grooved, about an inch from the edge, along each side. For the back of the bench ordinary roofing slate is used, the lower edges being fitted into the groove in the stone and embedded in cement, while the upper edges are held in place by a cap of galvanized iron running along the entire length. For the front a heavy galvanized sheet iron is used, the lower edge, as with the slate, fitting into the front groove in the flagging, while the upper is drawn over and turned under the smaller, horizontal gas pipe, the latter being held in place by a T joint, all of which is shown in the background of Plate 3. Before filling the benches, the inside of this galvanized iron front is coated with asphalt.

The wider, central bench was discarded altogether and the space enclosed by a low brick wall plastered with cement. This enclosed space is filled with earth and will accommodate shrubs and even small trees.

The finished benches, with the whole apartment in actual service, are shown in Plate 4. Formerly we placed soil in the breeding cages, and grew, or tried to grow, the food plants of whatever insects we

happened to be studying therein, but the plants seldom thrive well under such conditions, and the effect on the insects feeding thereon is unsatisfactory and in many cases fatal. Especially is this true where it becomes necessary to transplant from out of doors, as it frequently occurs that we wish to transfer a plant with the larvae feeding upon it to a position that will enable the movements of the latter to be carefully studied. Under the new arrangement we can either grow the food plant in the benches or transplant it from the garden or field, place our insect upon it, and cover it with a breeding cage, thus eliminating to a considerable extent the objectional features of the old method. Or if we find an insect attacking a plant out of doors we can place one of the cages of the pattern that we are now using over the plant, and pushing the metal base into the soil deftly inclose the whole within our cage without in the least disturbing the insects that we wish to study under the most natural conditions possible.

The breeding cage now in use is shown in Figure 25 and also in Plate 4. It consists of a wooden frame of four upright pieces supporting a wooden top and with an upper base also of wood. Three sides are

FIG. 25.

covered with swiss drawn tightly and fastened along the edges by means of galvanized iron strips about one-fourth of an inch in width, and these are in turn fastened to the wood by tinned staples, such as are used in laying carpets and matting. The remaining side is of glass, which is raised and lowered as required, and works in vertical grooves. By using galvanized iron strips and tinned staples the rusting out of the swiss or other cloth covering is avoided. The lower base is also of galvanized iron, and is shown in Figure 26, as is also the wooden bottom which fits inside of this, and can be used when needed, and when not may be readily removed and laid aside, as it is fastened in place by screws.

When used without the bottom it is only necessary to place the cage over the plant or plants and press it down until the metal portion is sunk

into the soil. The cage can be used out of doors as well as in the insectary, and without materially affecting the plant or disturbing the insects feeding upon it. When used with the wooden bottom the metallic base raises this above the damp soil, thus preventing the decay of the lower portion of the cage.

But "one supply reveals another want," and we soon found that there was a need of some method of keeping our notes and records conveniently attached to the proper cage to which they belonged, as well as

FIG. 26.

to protect them from being wetted whenever the benches were wet down with the hose. This led to the use of a holder of galvanized iron with a sliding glass front, fastened to the cages as shown at the left

in Figure 25, and also in actual use on the cages in Plate 4. The holder is two by three inches, the sides turned over, and one end over these, while the other end is left a little longer and rounded, with a small hole to pass over a small nail or brad, while the other end is held by a small screw-eye, such as are used on picture frames to which to attach the ends of the cord or wire. The note sheet is folded the proper size and placed in the holder, and the rather close-fitting glass slide pushed in over it. The sheet is so folded that all of the notes will come on the same side, and each space or page is consecutively numbered, and, being all of a uniform size, these sheets when filled or the record finished, can be filed away for permanent preservation. This holder cannot easily become detached from the cage to which it is fastened, the notes are preserved from being injured by wet, the galvanized iron does not rust them, and the last record can always be seen through the glass cover without removing it from the cage. With slight modifications, this holder can also be used out of doors on shrubs and trees. For this purpose, what shows as the lower end in Fig. 25 is cut square off and a similar triangular piece is soldered to the back of the upper end to accommodate a fine wire which is used not only to attach the holder to the object, but the end running downward along the back is hooked over the lower end of the holder, thus effectually preventing the glass slide from being shaken out by the action of the wind. On cages outside, it is of course used in the same way as in the insectary.