HOW COLLECTORS OBTAIN SMALLEST INSECTS

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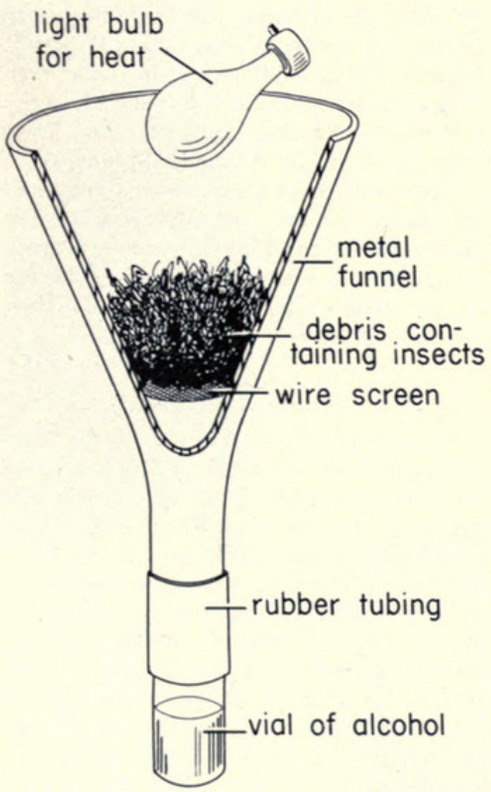
COLLECTING specimens for the research and reference collections is one of the more important as well as colorful activities of the Museum staff. The museum entomologist has an especially big collecting job, as our planet seems to be more richly endowed with insects than with any other kind of life. One type of insect collecting—the stalk and wild gallop with a butterfly net—is familiar enough to most of us. It is a perfectly legitimate way of collecting the larger and more conspicuous and active insects, as well as being good clean fun. But most in-



AN INSECT FUNNEL

Diagram of a simple apparatus used for collecting microscopic insects, as described in accompanying article by Associate Curator Henry S. Dybas.

sects, either because of their cryptic habits or their small size, cannot be collected in this way. The smallest of insects are about one-hundredth of an inch long and are scarcely visible under the most favorable light and against a white background. In comparison with insects of such size, the mosquito and housefly are giants.

Minute insects are no less interesting scientifically or important economically than are large insects. We need to know about these small things, and our collections should contain them for study and comparison. But these small forms remain relatively much less known than the large species. It is one thing to discover a bird or a butterfly in a tropical forest, but it is a very different matter to detect a speck of an insect, one-fiftieth of an inch long, that is hiding in the leaves and twigs on the forest floor.

ENTOMOLOGIST'S TRADE SECRETS

Visitors, who see some of these small kinds of insects in our collection, commonly ask, "Just how does one see and collect anything that small?" The answer is partly in knowing where to look and what to look for and partly in the use of special equipment. The most generally useful piece of special equipment for collecting tiny hidden insects is the insect funnel.

With an insect funnel, an entomologist can extract an astonishing variety and number of insects out of such situations as decayed logs, compost heaps, manures, straw, debris from hollow trees, fungi, soil, and, indeed, almost any conceivable organic material. Unusual situations, such as pocket-gopher burrows and chambers, subterranean fungus gardens of tropical leaf-cutting ants, and the large twiggy nests of pack rats, often produce very unusual kinds of minute insects that are restricted to these special habitats.

The total number of individual insects in some of these situations is almost incredible. Ivar Trägårdh, of Sweden, recorded an average of 120,000, and a maximum of 282,500 Collembola, or springtails, per square meter in the 2–5-inch layer of dead leaves and twigs on the floor of a spruce forest in southern Sweden.

HOW INSECT FUNNEL WORKS

The piece of equipment that Trägårdh used in making his collection of minute animals from the forest floor was the insect funnel, first developed by the great Italian entomologist Berlese in 1905 and now usually named for him. Berlese, in a simple but ingenious way, made use of a common reaction that insects, living in such situations as soil and leaf-litter, make to conditions of heat and dryness. Under such conditions, the insects tend to burrow downward where it is normally cooler and more moist. Berlese brought samples of leaf-litter and other materials containing tiny insects to the laboratory, placed these on a wire screen in a large funnel, and applied moderate heat to the funnel. As the sample of debris became warm and began to dry at the surface, the insects gradually moved downward through the debris until they passed through the screen and fell into a vial of alcohol placed under the narrow spout of the funnel. The contents of the vial could then be sorted under a microscope and even the most minute of insects could be easily detected. When this method of collecting was first introduced, some very remarkable new types of insects and other invertebrates were discovered.

It is difficult to overestimate the usefulness and importance of this simple device. Not only does it offer us a tool for sampling various niches in nature for the kinds of minute insects and other animals that they support, but it permits us to obtain information on the numbers of each kind of animal in these situations. This last information is especially important for understanding the complex food-webs by which animals are bound together in an interdependent system in nature.

One limitation of the Berlese funnel in the past was the dependence on a heat source (hot water or electricity) and the length of time, sometimes a week, that was required to drive the insects into the vial of alcohol under the funnel. This, in general, limited the use of the funnels to a more or less permanent laboratory setup. Resident entomologists could bring samples of material from the immediate area to the laboratory for analysis, but traveling entomologists, on field trips and expeditions, were hampered in their search for minute insects.

PROBLEM SOLVED

Recently it has been found that naphthalene flakes (the substance in moth balls) can be substituted for the heating and slow-drying method. The flakes are sprinkled on top of the debris sample in the funnel and the irritating fumes gradually work down through the debris and drive the insects down just as effectively as does the heat and a good deal more rapidly. This development makes the funnel much more portable and much more practical for use on expeditions and field trips away from laboratories and bases.

In much of the world, there are no resident entomologists. A knowledge of the insects of these parts depends on collections made by entomologists traveling under museum, university, and other auspices. The development of a portable Berlese funnel will enable these entomologists to learn much more about the lower part of the size-spectrum of the insect world than has been possible before.

A GEOGRAPHICAL MYTH ABOUT MEXICO

For more than a hundred years the public was kept in a state of suspense over the alleged Chinese discovery of Mexico in the fifth century. The idea is pure fiction but was given credence through the deductions of De Guignes in the 18th century from the Chinese account of a marvelous island called Fu-sang. Fu-sang is not a real country but a product of the imagination, a geographical myth pieced together by Buddhist monks from many different sources. Whatever Chinese influences may be found in the indigenous cultures of America are not the result of a migration of individuals or a direct transmission of cultural ideas from China or Japan across the Pacific but have gradually filtered in over the land route through intertribal communication from northeastern Asia down our Northwest Coast.

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