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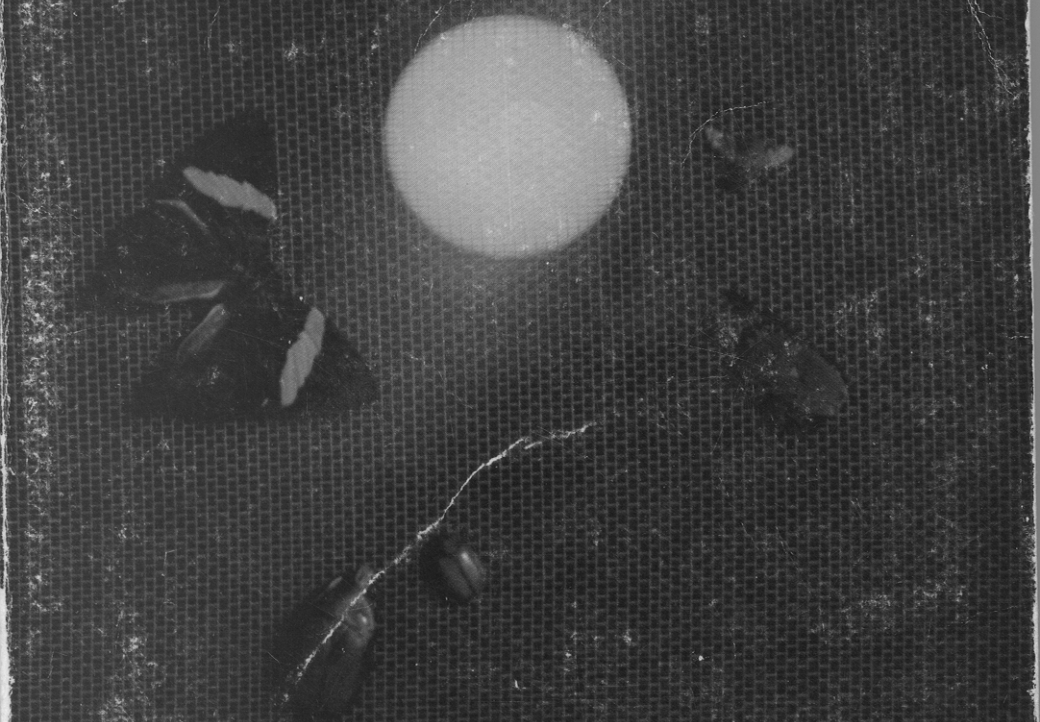
LIFE ON A LITTLE-KNOWN PLANET

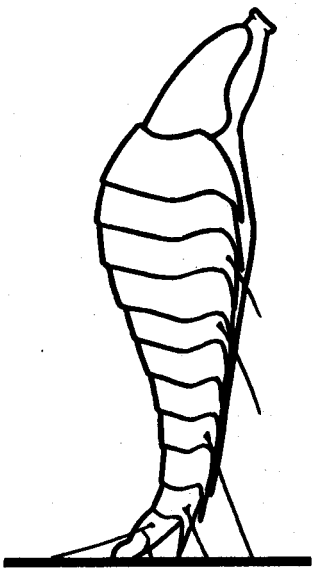


HOWARD ENSIGN EVANS

"Fascinating . . . an absorbing study of the insect world in all its infinite variety."
—John Barkham, *Saturday Review Syndicate*

The females of one peculiar group of rather rare parasitic wasps, the Trigonalidae, lay their eggs not on the host at all, but on leaves. Here the eggs remain alive, sometimes for months, but do not hatch unless the leaf is eaten by a caterpillar. Once inside the caterpillar, the abrasion and the digestive juices cause the egg to hatch. Experimentally, the eggs of the parasite can be made to hatch by piercing them gently and then covering them with weak caustic potash. Curiously, the parasite does not attack the caterpillar, but one of its ichneumon wasp parasites (that is, it is a hyperparasite). Needless to say, a great many of the eggs are never eaten by a caterpillar, and many of those that are end up in an unparasitized caterpillar, so they fail to develop. The female wasp compensates for this by laying a prodigious number of eggs. One of them is recorded as laying 4,376 eggs in one day.

An even more devious method of reaching the host, coupled with a high egg-laying capacity, is shown by quite a different group of wasps, the family Eucharitidae. These wasps attack the larvae of ants, but the females lay their eggs in situations remote from ant colonies, chiefly on leaves or in buds or seed pods. Here the eggs hatch into small larvae that are more or less "clothed in armor," that is, covered with hard, spiny plates that enable them to withstand drying and to crawl about to some extent. In some cases the larvae assume a "waiting posture" on the



A newly hatched larva of a eucharitid wasp in waiting posture. If an ant comes in contact with the larva, the latter will attach itself and be carried to the nest, where it will fasten itself to an ant larva, wait until the latter transforms to a pupa, then molt to a more grublike body form and consume the ant pupa.

plant until a worker ant comes along, whereupon they grab hold of it and are carried to the nest. Others attack ants that do not forage on plants, and in this case they propel themselves into space, to fall to the ground and assume a waiting posture there. Once in the ant nest, the parasite larva transfers to an ant larva, waits until the latter transforms to a pupa, and then proceeds to devour it. The parasites emerge as adults inside the ant nest, and it is said that in some cases the ants carry them around and even feed them, though eventually they leave the nest. Mating may occur outside the nest entrance or sometimes inside. The late Dr. William Mann, for many years director of the National Zoo in Washington, once observed males mating with female pupae in the nest—before they had even transformed into adults.

All this surely comes under the heading of "useless information": these are tiny, odd-looking wasps, never noticed by the average citizen; they are only sporadically common, and all attack ants, most of which themselves live relatively obscure lives. Surely the lives of these insects are of interest only to a few professors, who are or ought to be teaching courses in insect control to justify their salaries. These are the days of cost-benefit analysis; the days when we are being urged to channel our efforts into the fields most likely to produce results to fill immediate human requirements. In President Johnson's words, the "time has now come to zero in on the targets." He was speaking of medical research, but the philosophy is now pervasive. "Urgent support of a field," said the director of the Oak Ridge National Laboratory recently, "is justified only if that field is likely in some way to solve a pressing human need."

Unfortunately, this distinguished gentleman failed to spell out his formula for deciding what "is likely to solve a pressing human need." The lowly Eucharitidae, the most insignificant of the insignificant, in fact created a bit of a stir a few years ago. Modern man has been conditioned to expect his fruit to be perfect in every detail: large, immaculate, delectable; and the fruit industries are geared to the production of such fruit. The modern banana is a jewel in the crown of agricultural technology. But a few years ago the United Fruit Company found some peculiar spotting on the skin of its bananas. The spotted bananas were not wormy, but they could not be sold for a good price. Observation revealed that the spots were caused by a strange-looking little insect having no known connection with bananas—a eucharitid wasp. No one knew much about them, but by digging up the researches of a few starry-eyed naturalists it was concluded that this must be an ant parasite that was merely using the bananas as a place to deposit its eggs, such that the larvae would have a good "jumping-off" place prior to attaching themselves to an ant on the ground. Suddenly these poorly known insects were found to be affecting the Gross National Product! This

more than a million or a million and a half species of insects on earth. That, of course, is enough—far too many, from a human point of view. Is there any point in trying to acquaint ourselves with all of them? There are biologists who claim that total knowledge of life on earth is impossible and unnecessary, that study in depth of certain representative species is enough to teach us all we need to know about the principles of life. These men are right that we should study representative animals in depth: think, for example, of all we have learned from Drosophila, from Rhodnius, from the guinea pig and the rat. Does it matter that there is a midge dancing over a patch of moss on Baffin Island, a springtail gluing its stalked semen droplets to a moldering leaf in New Guinea, a wasp living as a tertiary parasite of a miner in pandanus leaves? I would be hard pressed to prove that any of these illustrate some new biological principle or are going to impinge, at some remote date, on man's culture. Is there a need to catalogue every obscure creature on earth and to try to decipher its contract with nature? As a curator in a natural history museum, one whose job it is to preserve representatives of all forms of life, I should like to think that there is. But the view from my ivory tower is a limited one: it does not include, for example, a vista of unbroken wheat fields, the New York Stock Exchange, or the slums of Lima, Peru.

Of course, no one in his right mind would suggest dumping entomology *in toto* into the wastebasket. No one wishes to go back to 1793, when yellow fever decimated the population of Philadelphia; or to 1870, when the Colorado potato beetle seemed ready to eliminate the potato from the American diet; or even to 1940, when gardens in the northeastern United States seemed able to produce nothing but Japanese beetles. We cannot let our guard down, particularly when aircraft are capable of carrying people, produce, and pests all over the world in a few hours. Who could have supposed that the Japanese beetle, a relatively obscure insect in its native home, would suddenly emerge as a major pest on a new continent? Who would have supposed that the eucharitid wasp mentioned in Chapter 11, living as a poorly known ant parasite in Central American forests, would suddenly become a cause for concern? Who can foresee when some new insect will arrive on our shores and explode into a major dilemma—as the notorious face fly recently has? Who, incidentally, was responsible for identifying each of these new pests, thus permitting us to look it up and find out where it came from and what was known about it? In each case, it was a taxonomist, one concerned with the little-appreciated art of classifying and preserving specimens, one moved primarily by curiosity about the earth's inhabitants and little concerned with what may or may not be a "pest."

For Further Reading

Chapter 1 **The Universe as Seen from a Suburban Porch**

Here are a few good, recent books on insects that present much general information. All are well illustrated, and the first two and fourth have many excellent photographs in color.

Farb, Peter, and the editors of *Life*. 1962. *The Insects*. Life Nature Library; Time, Inc., New York. 192 pp.

Klots, A. B., and E. B. Klots. 1959. *Living Insects of the World*. Doubleday & Company, New York. 304 pp.

Lanham, Url. 1964. *The Insects*. Columbia University Press, New York. 292 pp.

Newman, L. H. 1966. *Man and Insects: Insect Allies and Enemies*. Nature and Science Library; Natural History Press, New York. 252 pp.

Oldroyd, Harold. 1962. *Insects and Their World*. Phoenix Books, University of Chicago Press (paperback). 139 pp.

Chapter 2 **Cities in the Soil: The World of Springtails**

Christiansen, K. D. 1964. *The Bionomics of Collembola*. Annual Review of Entomology, Vol. 9, pp. 147–148.

Farb, Peter. 1962. *Living Earth*. Pyramid Publications, New York. 160 pp.

Kevan, D. K. McE. 1962. *Soil Animals*. Philosophical Library, New York. 237 pp.

Mills, H. B. 1934. *A Monograph of the Collembola of Iowa*. Collegiate Press, Ames, Iowa.

Chapter 3 **The Intellectual and Emotional World of the Cockroach**

McKittrick, F. A. 1964. *Evolutionary Studies of Cockroaches*. Memoir, Cornell University Agricultural Experiment Station, No. 389. 197 pp.