ENTOMOLOGY

Nature's Poison Factory

A tiny wasp's poison causes "living death" to prey. Diluted 200,000,000 times, it gives instant paralysis. Venom in one wasp could kill 50 pounds of insects.

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➤ LONG AGO INDIANS of the Orinoco and Amazon River Valley learned to brew a poison so potent that, when an arrow-tip dipped into the gummy mass drove into an enemy, he keeled over—paralyzed.

The Bushmen of the Kalahari Desert also made themselves feared by using darts saturated in poison brewed from the larva of an innocent-looking beetle.

These death weapons were but crude copies from nature, however. Many insects are experts in the use of poison weapons, and the poison manufactured by one tiny wasp is probably the most powerful paralyzing agent yet discovered. Only one part of its venom in 200,000,000 parts of its victim's blood is required to cause permanent paralysis.

This wasp, *Habrobracon juglandis,* is one of the best examples of an insect with a built-in poison plant. His poison apparatus is used more as a hypodermic needle than a poison shaft from a bow or a blow-gun, but the end results are identical. Each produces a paralysis from which there is no recovery.

Fresh Food Source

The female *Habrobracon* wasp uses her poison to put the larvae, or caterpillars, of certain insects into a state of "living death." Then she deposits her eggs on the helpless prey as a source of fresh food for the young when they hatch.

Dr. Raimon L. Beard, entomologist at the Connecticut Agricultural Experiment Station in New Haven, has found that the *Habrobracon* wasp discharges about 0.000000065 milliliters of venom at one time. (A milliliter is slightly more than 1/1,000 of a liquid quart.) Yet this infinitesimally small amount of poison is more than enough to do its deadly job.

By weighing an experimental caterpillar, *Galleria,* stung by a *Habrobracon* wasp and calculating its blood volume, Dr. Beard estimated that the presence of one part of venom in 200,000,000 parts of the caterpillar's blood is plenty to cause permanent paralysis.

The blood from a wasp-paralyzed larva will produce paralysis when injected in a second larva. Blood from the second larva can be transfused to a third and it, too, will succumb. If all of the larvae thus injected are small, the blood transfer may be carried to a fourth and paralysis will still result.

Using a bit of arithmetic, if all the blood of one *Galleria* caterpillar stung by a *Habrobracon* is used to poison other *Gallerias,* and then all their blood injected into still others, an estimated 1,641 caterpillars could be paralyzed from the poison of a single stinging. Of course, mass slaughter of such proportions would have to be accomplished with the aid of humans to make the subsequent injections.

Small Dose Potent

Actual observations have disclosed that one of these wasps has stung as many as 175 host larvae. Turning back to arithmetic, if each of those larvae were treated in the manner just described, that single female appears to have produced enough poison to kill 227,175 caterpillars, or approximately 50 pounds of insects.

Habrobracon's stinging apparatus is an amazing mechanism. The poison glands, usually consisting of eight elongated lobes made up of single-layer cells surrounding a central passage, communicate with the base of a central reservoir. This poison reservoir is surrounded by a heavy muscular coat. A poison duct leads from the reservoir to the poison canal, which is formed by an oblong space between two sharp appendages, the "stingers."

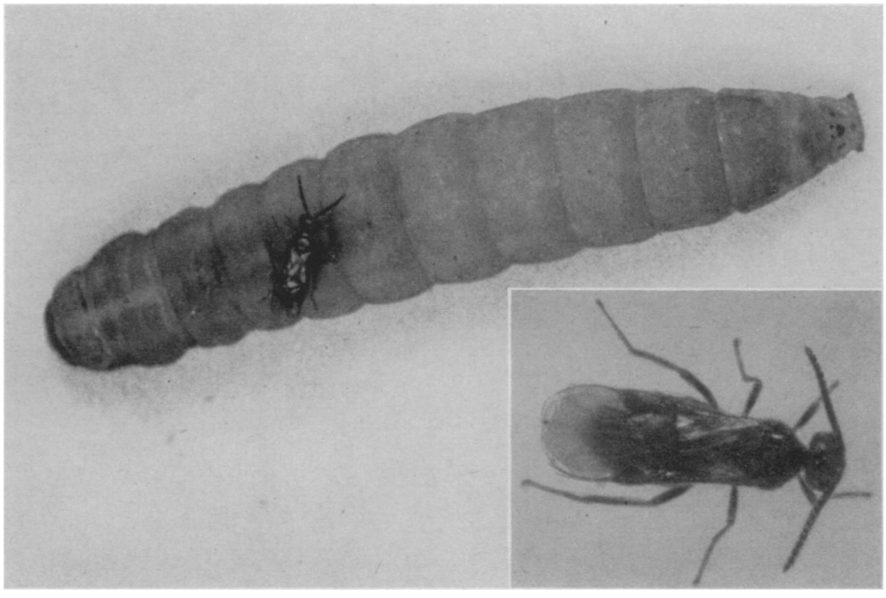
The paralysis which follows *Habrobracon"s* sting is striking. Poisoning symptoms are perceptible immediately. At the time of stinging, the victim shows marked irritation.

It bites at its tormentor or at the point where the stinger entered. If the victim tries to crawl away, its progress is short-lived. Feeble attempts to move may continue for a few seconds, but it just "walks" in one spot, as a man "walks" on a conveyor belt without going anywhere.

All regular external body movements, except the mouth parts, halt suddenly. There are no apparent signs of life. At this point even electrical stimulation is without effect. Uncoordinated muscular tremors sometimes continue for a short period, but when the victim's mouth parts cease to quiver, the stupor of paralysis is complete.

Functions Survive Paralysis

Heart action of a paralyzed larva seems quite normal and does not slow appreciably until several days later—unless death occurs in the early days of paralysis. The insect's alimentary tract continues to function, too. This activity cannot be consid-



GIANT-KILLER WASP—This tiny Habrobracon *wasp is injecting one of the most potent poisons known into a comparatively gigantic caterpillar. She will lay her eggs on the caterpillar, to provide her young with living food when they hatch. The inset shows a close-up view of the* Habrobracon *wasp, bringer of death to its prey.*

ered normal though, since feeding has ceased. It is apparently caused by material already accumulated in the body.

Habrobracon's venom is believed to be composed of protein-like material. The venom may be dried, dissolved in water, and the solution will still paralyze other larvae.

The wasp's poison seems to work by breaking down the connections between muscles and nerves in its prey. *Galleria* caterpillars undergoing violent tremors after exposure to DDT are readily quieted by *Habrobracon* venom, Dr. Beard has found.

The larvae of several species of insects are acceptable to female *Habrobracons* as living nurseries and food supplies for their young, but they prefer those of the small moths of *Galleria, Ephestia* and *Plodia.* These include the almond, tobacco, raisin, Indian-meal and wax moths, all of which are especially susceptible to *Habrobracon* venom.

There are, however, several kinds of insects that seem immune to the wasp's poison, among them, unfortunately, some important insect pests to man.

Japanese beetle larvae, the European corn borer and adults of the large milkweed bug show no reaction to the venom even when the poison is injected artificially into them.

With such a bloodthirsty wife, the male *Habrobracon* remains an insect Caspar Milquetoast. Having a sweet tooth, he prefers to dine on meals of diluted honey robbed from flowers.

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HORTICULTURE

Electric Lights Fool Lawn Shrub

➤ ELECTRIC LIGHTS will fool the weigela plant into growing at night the same as it would during the day.

The popular landscaping shrub can now be grown in the greenhouse to a larger size and can be made to put out buds during the winter, the U. S. Department of Agriculture reported.

Experiments by R. J. Downs and H. A. Borthwick, plant physiologists at the Plant Industry Station, Beltsville, Md., showed that weigela shrubs getting 12 hours of light a day grew two and one-half inches during a 60-day period. Plants getting an extra four hours of light from electric bulbs grew nearly 19 inches in the same time.

The 12-hour-day plants stopped growing at the end of the 60-day interval. But the 16-hour-day shrubs kept right on growing. When the 12-hour weigelas were given a 16-hour day they began to put out buds within a week and new growth was noticeable within 12 days.

The experiments may lead to similar methods of controlling growth in other woody plants.

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MEDICINE

Operate for Hypertension

➤ YOUNG AND MIDDLE-AGED MEN with seriously high blood pressure, especially those with heart involvement, do better when they have an operation than when they are treated by drugs and diet, Dr. Paul D. White of Boston reports in the *Journal of the American Medical Association* (March 24).

Of 50 of his patients first seen between 1941 and 1946 and treated medically, only two are still alive. One of these had a stroke and is partially paralyzed although otherwise in good health.

Of 50 patients similar as to age and sex who were operated on, 25 are still alive, 20 of them in good health with blood pressures in almost every case much lower than when first seen.

The operation, one in which nerves near the spinal cord were cut, was devised by Dr. Reginald H. Smithwick of Boston.

Certain patients, especially middle-aged men, should not be kept on medical treatment if it does not help them within eight to ten weeks, Dr. Smithwick states.

He and his associates report, in the same issue, their results in terms of five-year mortality rates for 1,118 male and 1,109 female patients.

They divided patients into four groups according to the severity of the disease when first seen.

For group one, the least severe, 24% of the men medically treated died within five years, compared to seven percent of those operated on. For group two, next in severity of illness, the mortality was 47% for the medically treated, 18% for those operated on.

The difference appeared even greater in the third and fourth groups, with 75% and 97% of the medically treated dead within five years, compared to 57% and 34.3% of those surgically treated.

Dr. White points out that the patients he reports on were treated before the development of the more active blood-pressure-lowering drugs and use of very low-salt diets. Further comparison will be needed, he says, between patients operated on and those treated by these newer drugs and diet.

However, he says the operation may be better than the "tedious and continuous" taking of drugs and dieting.

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PSYCHOLOGY

"Fence in" Baby For Half Playtime

➤ KEEPING THE TODDLER in his play pen or otherwise "fenced in" for half his playtime does more than spare mother's nerves and the household ornaments and gadgets.

It makes the child more adaptable and keeps him from developing the habit of resisting grown-ups.

Findings showing this are reported by Dr. E. Robbins Kimball, pediatrician of Evanston, Ill., in the *Journal of the American Medical Association* (March 24).

The reason "fencing in" is good for the small child, Dr. Kimball explains, is that until he is four the child does not really understand what is his and what belongs to his parents.

He needs to escape grown-ups' "no-no" for some of his time, and he needs the expansion of his world slowed to the point where he can handle it.

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