Life History of the Thrips Parasite *Dasyscapus parvipennis* Gahan

And the Technic for Breeding It

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While the writer, as a representative of the U. S. Department of Agriculture, was searching for the natural enemies of the sugarcane moth borer, *Diatraea saccharalis* F., and other pests in Trinidad, British West Indies, during the winter of 1935–36, for introduction into Puerto Rico and the United States, the government of Trinidad was undertaking the introduction of the thrips parasite *Dasyscapus parvipennis* Gahan from the Gold Coast, Africa. There it was reported by Cotterell (1927, 1928) to be effectively controlling *Heliothrips rubrocinctus* Giard, the red-banded thrips. The object of this attempted introduction was the control of the same pest on cacao in Trinidad, where it has been a serious pest for many years.

Following establishment of the parasite in its new home, the request of the U. S. Department of Agriculture for specimens to introduce into Puerto Rico was generously granted by E. J. Wortley, Director, Department of Agriculture of Trinidad and Tobago, and Sir Geoffrey Evans, Principal of the Imperial College of Tropical Agriculture. Dr. A. M. Adamson, professor of entomology of the Imperial College, rendered valuable aid in facilitating the breeding of the parasite.

History.—*Dasyscapus parvipennis* Gahan was first reported from Java by van Heurn (1923), who several years later sent specimens to Washington for identification by the taxonomists of the Bureau of Entomology. Gahan (1927) described it as a new genus and species in the family Eulophidae. That same year and also in 1928 Cotterell reared it in the Gold Coast without knowing its identity. Ferrière (1931) was the first to record it by name from Africa. It was successfully introduced into Trinidad in 1935 and into Puerto Rico in 1936.

Hosts and distribution.—As *Dasyscapus parvipennis* has been discovered and described comparatively recently, not much is known concerning its hosts or distribution. The species was originally described from adults "reared from *Thrips tabaci* Lind., along with *Thripoctenus brui* Vuillet" from Java. In the Gold Coast and in Trinidad its principal host is the red-banded (cacao) thrips, *Heliothrips rubrocinctus* Giard. Adamson (1936) has bred it in Trinidad also from two undetermined species of thrips. Evidently it is not fastidious as regards hosts. Its introduction into the United States would seem to be highly desirable in view of the presence here of both *Thrips tabaci* and *Heliothrips rubrocinctus*. The former occurs throughout the country on more than two score plants, while *H. rubrocinctus* has been recorded thus far only from Florida attacking mango, jobo and *Acalypha wilkesiana*.

Life history.—The following life-history notes were taken in the course

of the rearing work in Trinidad.[1] The adult of *Dasyscapus parvipennis* lives less than a week under laboratory conditions, usually only four or five days. Although the female will attack the nearly mature host larvae, reproduction is obtained only in the younger stages. In the body of its host the female lays a single egg, which hatches in about 24 hours. The development of the parasite larva is at first very slow, allowing the host also to develop nearly to the prepupal stage. Six days after hatching the parasite larva completes devouring the body contents of the host, leaving only the empty outer skin, through which the fully developed maggot is now easily discernible. The prepupal stage of *D. parvipennis* lasts approximately 48 hours. When the parasite pupates it adheres to the skin of the thrips, which is still attached to the object on which the larva was resting at the time of its death, usually the leaf on which it last fed. There the pupa remains for 10 or 11 days, a jet black and shining object, until the emergence of the adult. The entire lifecycle covers 17 to 21 days. Parthenogenetically the species is arrhenotokous.

Breeding.—The breeding technic developed by Professor F. W. Urich and Dr. A. M. Adamson was used in the work in Trinidad. On February 15, 1936, 38 male and 61 newly emerged female adults of the species were divided into four lots of about equal numbers, and each lot was placed in a glass cylinder 5 inches in diameter and 10 inches deep, closed at the top and bottom by fine muslin held in place by rubber bands. Food was provided in two forms, a 10 per cent sugar solution on white blotting paper and cut raisins, and was renewed daily. Water was provided almost continuously throughout the day by keeping the muslin at both ends of the cylinders moist. On the first day approximately 300 young thrips were exposed to parasitization by each group of *Dasyscapus parvipennis* adults through introduction into the glass cylinders of infested cashew leaves. After 24 hours exposure to the parasites these leaves were removed, and a fresh lot of hosts was made available for attack. On the second day the thrips exposed numbered about 250, on the third day about 200, and on the fourth and fifth days only about 150. Each day the infested leaves that were removed from the glass cylinders were placed in separate battery jars 12 by 7 by 9 inches. These jars had glass tops, but pieces of white blotting paper were placed under the lids and pieces were also placed on the bottom, and the atmosphere was kept humid by moistening the blotting paper at the bottom and top as often as was necessary. Fresh thrips-free cashew leaves were added daily to each battery jar to provide food for the parasitized thrips. During the transfer of the exposed thrips from the cylinders care was taken to prevent the escape of the adult parasites or their removal with the foliage.

Shipment.—From the approximately 4000 immature thrips exposed to the 61 females, 1556 pupae of *Dasyscapus parvipennis* were obtained, all of which were shipped by air express to Puerto Rico on March 2. The safest method of introducing beneficial insects into a new country

[1] Previous investigations by entomologists of Trinidad had determined the host relationships of the species, and consequently no studies were made along this line. All efforts were concentrated upon rearing an adequate supply for shipment. Because of this the life-history notes are fragmentary.

is without doubt sending them in the adult state. In this particular instance, however, an exception was deemed necessary for several reasons, and the parasites were sent to Puerto Rico in the pupal stage. In the first place, the adult *Dasyscapus* is very short-lived, surviving only four or five days; and, since the airplane schedule provided only weekly service between Trinidad and Puerto Rico, it was impossible to synchronize the emergence of adults with the date of departure of the airplane from Trinidad. In the second place, the material shipped was free of hyperparasites, since it was all laboratory bred. Lastly, the long pupal period of the parasite made possible the accumulation of maximum numbers for introduction.

To determine the best method for shipping the pupae of this microscopic insect, a test was made by preparing the material in several ways. Some were allowed to remain adhering to the original leaf on which they pupated; some were attached to heavy cardboard by means of plain water; another lot was affixed by the use of gum arabic; while a fourth lot was placed on the moistened glue on the back of postage stamps. Results indicated that there was only an insignificant difference in the percentage of adults emerging from the pupae prepared for shipment by the first three methods. The first two methods produced an emergence of approximately 75 per cent, the use of gum arabic reduced emergence to 67 per cent, whereas the glue on the back of postage stamps seems to have been responsible for a further reduction in emergence to about 55 per cent.

Recovery.—Dr. K. A. Bartlett, who received the shipment from Trinidad, cared for the emerging adults and made the field liberations, informed us upon our return to Puerto Rico late in May 1936 that he had very recently made the initial recoveries at the site of the original liberation on the western end of the island. Thus the desire and fond hope of every entomological explorer, the definite establishment in their new home of the beneficial insects he sends, were realized, and in this case within the short period of three months.—12-18-36.

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English ivy as a host of the citrus white flies was eliminated from California Quarantine Proclamation No. 10, while *Ixora* as a preferred host, and *Viburnum* as a casual host, were added, in a revision of the quarantine which became effective November 10, 1936.