Journal of the Minnesota Academy of Science

Volume 19 | Number 1 Article 10

4-1951

The Biology of the Goldenrod Gall-Fly, Eurosta solidaginis (Fitch)

Blanchard O. Krogstad
University of Minnesota

THE BIOLOGY OF THE GOLDENROD GALL-FLY, EUROSTA SOLIDAGINIS (FITCH)

BLANCHARD O. KROGSTAD
University of Minnesota

Eurosta solidaginis is the most conspicuous member of an insect community which lives in the stem of the goldenrod, *Solidago* spp. This fly is most conspicuous because its larva produces a round gall which is readily seen along roadsides, especially during the fall and winter seasons.

It was found that the gall-fly is distributed throughout most of the United States and Canada, and that in Minnesota the galls occur on at least three species of goldenrods.

The adult fly emerges from its puparium during the latter half of May to the first part of June, depending on the locality and the season. It was found, contrary to previous beliefs, that the preoviposition period is very short (only two days) and that the peak of oviposition is reached on the fourth day. Previous workers have stated that eggs are deposited on the outside of the *Solidago* stem. In this study it was found that the female punctures the terminal shoot of the goldenrod plant and deposits eggs in the growing tip. Only one egg is deposited in each puncture. The period of adult existence is only 8 to 10 days. Their feeding habits throughout this short period is not known to date.

The eggs normally require from 9 to 11 days for incubation with the seasonal temperature variations undoubtedly affecting this period to some extent. After eclosion the larva bores into the center of the growing tip and begins to feed. It is the excrement or the salivary juices of the larva which are instrumental in causing gall growth. The gall grows rapidly so that it is full grown by the end of one month. The larva moults two times during its growth; once during the first part of July and the second time during the first part of August.

In the fall the larva bores a tunnel from its central cavity to the outer epidermis. The tunnel cannot be detected visually since the waxy epidermis covering the stem is not disturbed by the larva. This tunnelling occurs during the months of September and October, the exact time depending on the conditions of moisture present in the plant on which the gall is located. It seems that tunnelling by the larva is made in response to the relative humidity to which the larva is exposed and is affected only secondarily by a decrease in temperature.

After boring the tunnel the larva returns to the central cavity and remains over winter in that condition.

Pupation occurs during the month of April and generally the adults emerge about one month later.

Natural enemies such as insect parasites and birds take a heavy toll of larvae throughout the year. Drought was also found to be an important factor in limiting the population of the insect. These factors will not be discussed further in this paper.

This species can be of considerable value to a teacher, whether it be at the elementary, high school or college level. Its constant availability throughout the fall, winter and spring seasons in most parts of the United States, in addition to the fact that the larvae may be induced to pupate and the adults emerge at any desired time make it an especially convenient source of laboratory demonstration material. This species of insect can be used to demonstrate a number of biological principles: complete metamorphosis, gall formation, parasitism by other insects, commensalism, and superparasitism.

SOME CHARACTERISTICS OF A PROTEINASE ASSOCIATED WITH HONEYBEE LARVAE KILLED BY AMERICAN FOULBROOD DISEASE

T. A. GOCHNAUER

Research Associate, Division of Entomology and Economic Zoology
University of Minnesota

ABSTRACT

Preliminary studies were conducted on the activities of a proteolytic enzyme associated with the spores of the bacterial agent that causes American foulbrood diseases of honeybee larvae, namely, *Bacillus larvae*. The enzyme is found in the remains of the larvae infected by the micro-organism, and thus serves as a visible indicator of infection in field tests. These tests use the ability of the enzyme to curdle and peptonize milk suspensions as an end point. However, some workers had found the test difficult or impossible to use, and in some cases the results were contradicted by laboratory examination of the samples for viable spores. Therefore this work was started in order to find means of increasing the sensitivity of the test, to define some of the limits of the reaction conditions, and to test the effect of interfering substances.

The peptonizing activity was apparent over a range of pH 6.0-7.0 in M/10 phosphate buffer, with an optimum of 6.6. The curdling activity was similar to that of rennin, displaying increased activity in the acid range.

The peptonizing activity was increased by the addition of chlorides, up to 0.2 per cent added NaCl or KCl, and was proportional to the temperature up to 45 degrees Centigrade. Of these three factors, the chloride effect is most easily controlled by the field test