RELATIVE ABUNDANCE OF *CYCLOCEPHALA IMMACULATA* AND *C. BOREALIS* AT URBANA

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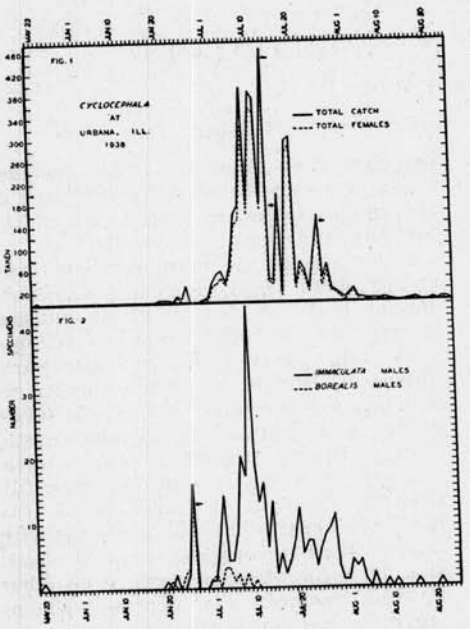
Damage to crops and lawns by "annual white grubs" or "false June beetles" of the genus *Cyclocephala* has been reported at various times from North and South America and the West Indies. Injury is similar to that of ordinary June beetles of the genus *Phyllophaga* and other related Scarabaeids. Valuable plants attacked by the grubs are corn, wheat, oats, barley, sugar cane, sunflowers, strawberries, and the grasses of pastures, lawns and golf courses. As early as 1887 these beetles had been studied under Illinois conditions by Dr. S. A. Forbes.

At Urbana during the summers of 1937 and 1938, while engaged on a light trap project under the direction of Mr. W. P. Flint of the Natural History Survey, I became interested in the genus *Cyclocephala* and saved some of the specimens obtained the first year for a morphological study. It soon became apparent that two species were involved. Consequently in 1938 all specimens taken in the traps were preserved in order that something might be learned of the relative abundance of the two species. This information is desirable since there has been some confusion of the species in the economic literature.



Saylor (1937) in California and Sanderson (1940) in Arkansas have recently published on the taxonomy of the group, with notes on distribution and abundance. The paper by the latter author is of especial interest to us in Illinois because of the species discussed. Hayes (1918), in Kansas, reporting on the life history of *Cyclocephala immaculata* (Oliv.) (misidentified as *C. villosa* Burm.), reviewed the economic literature up to that time. More recently Neiswander (1938) has discussed *villosa* (now called *borealis* Arrow) as it occurs in Ohio. Between 1918 and 1938 scattered notices have appeared on the economic status of the grubs in various regions.

Forbes (1891) stated that our only species of *Cyclocephala* in Illinois is *immaculata*, and this idea seems to have persisted until quite recently. It is true that *immaculata* is the more abundant species in the region of Urbana, but *borealis* is also present in considerable numbers.

During the season of 1938, 4,124 adult *Cyclocephala* were taken in 10 light traps located in the University of Illinois orchards not far from blue grass areas. Since the traps were of the electrocuting type, a few specimens were burned so that they could not be determined even as to sex, but they were counted in the daily totals, fig. 1. Neiswander in his Ohio light trap studies in 1937 found that these insects were attracted to the traps in the ratio of 7 males to 1 female. Yet at Urbana in 1938 the ratio was 10.3 females to 1 male. This difference has no apparent explanation. The curve of seasonal abundance for both species of female *Cyclocephala* is shown in fig. 1.

The two species, *immaculata* and *borealis*, are evidently very closely related and the females, especially specimens from electrocuting light traps, are often difficult to tell apart. So, for the sake of accuracy, our figures on relative abundance are based entirely on the males, fig. 2.

Errors involved in light trap work have been competently discussed by Williams (1939, 1940) and others. While these are freely admitted, I do not believe they seriously affect a study of this type, because these two species are so closely related and each has a one year life cycle. The same factors would apparently affect equally the light trap catch of both. Although a comparison based upon the catch of several years would undoubtedly be better, some idea of the relative abundance of the two species can be obtained from one year's catch. However, it should be pointed out that these beetles have cycles of extreme abundance alternating with years when the population is relatively low as in 1938, and the ratio between *immaculata* and *borealis* probably varies slightly from year to year.

Of the male *Cyclocephala* taken in 10 light traps at Urbana in 1938 *immaculata* outnumbered *borealis* in the ratio of 9.3 to 1. It is interesting to note that the first male *immaculata* was taken on May 23, and the last on August 21, while all the *borealis* appeared between June 21 and July 10.

LITERATURE CITED

Forbes, S. A. 1891. Rept. Ill. Sta. Ent. 17:30-53.
Hayes, W. P. 1918. Jour. Econ. Ent. 11(1):136-44.
Neiswander, C. R. 1938. Jour. Econ. Ent. 31 (3): 340-44.
Sanderson, M. W. 1940. Ann. Ent. Soc. Am. 33 (2):377-84.
Saylor, L. W. 1937. Jour. Ent. Zool. 29 (3): 67-70.
Williams, C. B. 1939. Trans. R. Ent. Soc. Lond. 89 (6):79-131.
. . . . . 1940. Trans. R. Ent. Soc. Lond. 90 (8):227-306.