

life-history of this beetle, we imagine that it hibernates in the adult stage, since the beetles are seen running about the fields actively searching for prey soon after the frost is out of the ground.

We obtained several eggs from this species during May, but all of them failed to hatch. The larvæ are found in largest numbers towards the end of June, by which time their natural cutworm food is so scarce that they feed freely on each other and thus reduce their numbers considerably.

Calosoma zimmermanni is less abundant than the preceding species, but has been taken feeding on army cutworms.



Fig. 8.—*Calosoma tepidum*. a larva (cutworm lion), b adult. Natural size. (Original.)

Small *carabidæ*. Several of the small Harpaline species have been found feeding upon small cutworms, but they will not attack the large specimens. They are probably of little value in helping to keep cutworms under control.

Ammophila luctuosa. This black "digger" wasp is attracted to infested fields in large numbers, and we have seen them capture and paralyze full grown larvæ, which they then drag to their nests.

Of lesser importance may be mentioned *Cicindellid* adults (Tiger beetles), which are evidently attracted in numbers to infested fields, though we have not seen them feeding on healthy cutworms; and the ant, *Formica sanguinea*, the workers of which were observed dragging larvæ towards their nests.

Cannibalism. When food is scarce, the larvæ feed extensively on each other. Dead specimens are eaten most readily, but many healthy larvæ are killed as a direct effect of the attacks made upon them by others.

Birds and mammals. Wild birds, among which may be mentioned especially meadow larks and sparrows, feed extensively on the larvæ, while poultry range far out into infested fields in search of them. These birds destroy, also, many adults. Hogs turned out into an infested alfalfa field destroy large numbers of larvæ, and the common gopher feeds readily upon these and other cutworms.

PARASITES.

About 28 per cent of the larvæ collected around Lethbridge in 1915 were parasitized. This is rather a low percentage, but it is due probably to the abnormal abundance of the host.

The hymenopterous parasites were determined by Messrs. Girault and Gahan through the courtesy of Dr. L. O. Howard, of the U. S. Bureau of Entomology.

Apanteles laeviceps Ashm. (fig. 9). Masses of the cocoons of this species were obtained from 10.5 per cent to 11 per cent of larvæ which were collected at Lethbridge within about a week of maturation.

The parasites mature at about the same time as the host does, but the latter, instead of burrowing in the ground, crawls up some convenient object,