# NOTES ON THE HABITS OF RHINONCUS PYRRHOPUS BOH

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By sweeping patches of smartweed between July and October, one is almost sure to get a small snout-beetle about 2.3 mm or .09 inch long. Its body is robust and clothed above with rather coarse brown pubescence, and beneath with white scales. On each side of the prothorax there is born an acute tubercle, and the wing covers are marked at the base on the median line with an elongate white or yellowish spot. This beetle is *Rhinoncus pyrrhopus* Boh. Two other species of *Rhinoncus* occur in America, which may be distinguished from *pyrrhopus* by the much larger size of *pericarpius* Gyll., and the absence of the lateral thoracic tubercles in *longulus* LeC. *R. pyrrhopus* is known to occur from New England and Ottawa, Canada, west to Colorado, and southward to Texas. Careful studies of the American species of *Rhinoncus* do not seem to have been made.

This snout beetle was found common on smartweed (*Polygonum*) at Urbana, Illinois, on July 18, 1924. Seven pairs were isolated in small vials and provided with fresh smartweed leaves for the sake of making observations on their seasonal development. These studies were supplemented with occasional field trips.

Mating usually begins about the first of July and was delayed last summer by the prolonged cool weather. These beetles were most energetic in copulation in mid-July, but continued with noticeable abatement at least until August 8, or for three weeks. However, as late as September 2 one male exhibited a notable tendency to mate. The males of this species spend considerable time perched upon the backs of the females, even when not in copulation.

The first eggs were found in the cages on July 20. They are at first lemon-yellow, but as the date of hatching approaches the color changes to a dirty orange. In shape they are oval, broadly and equally rounded at each end, and ½ mm long by 1/3 mm in largest diameter. The surface is finely roughened and light colored, sug-

gesting the exterior finish of a frosted light-globe, and sculptured with superficial hexagonal depressions which are limited by slightly elevated boundaries rounded above. The yolk showing through this covering is the source of the yellow color of the egg.

In the cages where only parts of smartweed leaves were available the eggs were sometimes dropped singly over the leaf surface, and at times in masses of two to four. A singular and rather habitual oviposition act is the deposition of one or more eggs with a mass of excreta. Whether the eggs are laid first, then covered with excreta, or both are deposited together is not known. The eggs thus covered entirely or in part were noticed to hatch in greater number than those completely exposed to the air. Not only does this device prevent too rapid evaporation of moisture from the eggs on hot dry days, but it seems to make relatively secure the position of the eggs near the larval food on a plant whose surface is glossy and bare. But even with the covering of excrement to hold them on, moderate jostling of the plant was seen to cause eggs to loosen and fall. Beetles exposed to a growing plant in a cage never oviposited on the leaves. The characteristic position of the eggs is between the leaf sheath and the main stem, the position under the sheath seeming to depend upon the distance the female can enter there. Therefore, if the eggs were loosened by contortion of the stem they probably most often lodge within the sheath. Some females caged with a bit of leaf and leaf petiole inserted their eggs under the end of the petiole where it rested on the bottom of the vial. This seems to suggest that the female backs up to a crevice as far as the opening permits and inserts her eggs. Such a process was observed to be rather prolonged in an instance in which the beetle maneuvered to aim her pygidium into a tight space between the cork stopper and the neck of the vial in which she was caged. No eggs were laid in this case.

Although two to four was the usual number of eggs observed to be laid daily, twelve were deposited in one instance. The last eggs were found on September twenty-third, making a known oviposition period of ap-

proximately eight weeks. Under indoor cage conditions the period of incubation was about eight days in midsummer.

The newly hatched larva is a fleshy grub, which when outstretched in crawling, is one mm. in length. It is light straw-colored to whitish, the head distinctly broader than the thorax, and each of the thirteen thoracic and abdominal segments has a lateral, broad, fleshy process on each side. Each process bears a flaxen colored hair. Similar hairs are scattered sparsely over the rest of the body. The larva in all stages lacks both the true thoracic and the false abdominal legs. The mature larva attains a length of about four mm. and in respects of shape, color and possession of hairs is similar to the newly hatched stage.

The first larvae were seen on July thirteenth. Hatching probably took place earlier in the field, for eggs were found in the cages soon after the beetles were caged. Upon hatching, the young larva crawls only a few centimeters or less to the node of the main stem just below the point where the eggs were usually deposited. A few tiny larvae in the cages were noted to contain green material in their alimentary tracts, indicating that leaf tissue is also taken as food when circumstances make this necessary. Larval development occurs for most part within the stem. The process of reaching the interior is a combination of negative reaction to light and positive response to gravity and pressure. The larvae kept under observation crawled downward to the point between the stem and the leaf sheath where the acute angle formed by these parts prohibited farther progress. At that spot the larva begins chewing its way into the stem, depending on the leverage it gains from bracing against the leaf sheath. Observations on a particular individual showed that by a continuous process of chewing for three hours and thirty-five minutes, this larva succeeded in boring its way just out of sight, leaving a ring of yellowish frass on the periphery of the hole.

Although legless, these tiny larvae are capable of locomotion on the smooth stem between the nodes. The above larva was placed on a leaf. It crawled downward,

successfully crossing the narrow leaf petiole, and moved down the main stem a distance of two inches. The two inch space was traversed in about nine minutes. This particular larva stayed on the shaded side of the stem, and crawled around to the other side when the stem was turned so the larva was exposed to direct light. When it had entered as far as possible into the shelter of the sheath it began penetrating the stem at once.

Studies on this specimen were continued on a growing smartweed plant in a cage. Fourteen days after entering the stem, it had grown to a length of three and a half mm. and had burrowed in the tissue of the stem to a point fifteen mm. above the place of entrance. Judging by the size of the tunnel the burrow was made when the larva was quite small. It stopped to eat out small reservoirs at two points along the way. A burrow was made downward also, but in no case were the burrows more than fifteen mm. from the entrance hole, and always entirely within the nodal area where the stem is fleshy and not so fibrous or tough as at the internodes. The cavity in which the larva was located after two weeks feeding was two mm. in diameter. Dissecting smartweed stems from the field showed that the usual abode of the larvae is in cavities made in the nodes. The size of these completed burrows is several times the volume of the larvae that made them. The larvae may also at times move from node to node by way of the natural central hollow of the stem. In one instance noted the body became necessarily much attenuated to make passage through this cavity.

Larvae were not reared to maturity, but one developed about three-fourths its full size in eighteen days, indicating that the larval stage lasts approximately three weeks in mid-summer. A very few larvae three to four mm. in length were found in outdoor plants as late as October eighth. Therefore, from the date of the first eggs on July twentieth, to the probable date of emergence of the adult in late August, may be a period of four or five weeks, allowing eight days for incubation, twenty-one for larval growth and the rest of the time for pupation.

Specimens of overwintered adults taken on July eighteenth were kept alive until October twelfth, when they were killed accidentally. During these twelve weeks they had subsisted entirely on a diet of smartweed leaves. In nautre the beetles are most commonly seen on the foliage of their food plants, where they probably usually feed. But in several instances subquadrate holes were seen gouged in the stem under the diverging leaf sheaths. In two such holes, which were almost the size of the adult beetle, several eggs were found. It does not seem probable that these holes are made for oviposition, as in the case of the plum curculio. Obviously they are made as a means of securing food and the eggs may have been dropped into the hole later accidentally.

The old beetles become somewhat rusty in appearance in late fall, and all are probably dead out of doors by early October. In contrast with the survivors of the old generation are the brighter colored adults of the new brood. The period of emergence of adults is from about the latter part of August to late fall, perhaps continuing near to November. Beetles were fairly common on October fourth at Urbana, on smartweed that was still green with succulent leaves, but were not available on plants bearing dry foliage and mature seeds. On October sixteenth and seventeenth the species was still abroad, but not plentiful, and difficult to detect because the smartweed seeds were swept up in the collecting net in quantities. Amid the seeds the snout beetle was well concealed, for the seeds and the beetles are about the same size and not well differentiated in color. They are discovered only by careful scrutiny of the seeds or by waiting patiently until they become active again after their death feint. The beetles collected on the above dates were kept alive until October twenty-ninth, when they died perhaps from the lack of proper hibernating conditions. Never was any tendency to mate observed among the new brood beetles; hence, there is without much doubt only one generation per year in this latitude. The winter is spent on the ground under the shelter of refuse near the plants on which the insect occurs when cold weather makes locomotion impossible. One beetle was found in

such a situation on April 13, 1925, when the smartweed was only two inches tall.

This beetle apparently does not use its wings for flight. Its distribution is dependent on its legs, which are used in two ways. First, it is capable of running rapidly over the leaf surfaces, and probably spreads by running from plant to plant. On the other hand, the beetle frequently makes its departure from the plant by a sudden jump. Jumping is effected by the enlarged hind femora. The employment of this means of locomotion seems not to serve for ordinary passage over the plant, but rather as a device for getting off the leaf. The distance traveled in this way is only a few inches, which is sufficient to clear the leaf, and gravity completes the act of escape. When the beetle strikes a resting place it "plays possum" for a short time. If left undisturbed momentarily, it nimbly scrambles to its feet and soon renews its activities on the food and host plant.