Work of Striped Tree Cricket on Raspberry Leaf.

Tree Crickets of Garden and Orchard.

Summarized by F. H. Hall


Published by the Department of Agriculture.
Undoubtedly many country folk have heard, during the sultry nights of late summer, the shrill, musical trills, or "songs," of tree crickets; but probably only a limited number of nature students have more than wondered who the singers might be. Few persons, indeed, have seen many tree crickets and fewer still realize that there are several species of these interesting little songsters of the night, that they may be both helpful and harmful to fruit-growers, and that they have some most interesting structural peculiarities and habits, unlike those of any other group of insects.

Of these crickets there are three species worthy of some attention from orchardists and gardeners in New York State; but only one that causes serious harm directly by its own work. The other two may even be quite useful at times, and have usually been placed in the category of beneficial insects, as they often feed upon San José scale and other small insects that are distinct menaces to fruit interests. But it is now known that all these species may transport the spores of the fungi that cause certain plant diseases, and that they sometimes deposit these spores where the resultant fungus growth produces cankers and dead areas in bark and wood.

Tree crickets belong to the group of straight-winged insects, which includes our common grasshoppers, locusts, katydids and black crickets; but they are smaller, slenderer insects than any of these, and are of a delicate, light yellowish-green color which makes them quite inconspicuous among the foliage of the plants on which they live. Indeed, during the daytime in bright weather, to see them at all, in their five immature stages, it is usually necessary to search very carefully for the very long, slender, forward-stretched antennae, which the insect extends from within or below some curled leaf or

*This is a brief review of Bulletin No. 388 of this Station, by P. J. Parrott and B. B. Fulton, entitled Tree Crickets Injurious to Orchard and Garden Fruits. Those specially interested in the detailed account of the investigations will be furnished, on request, with a copy of the above-mentioned bulletin. The names of those who so request will be placed on the Station mailing list to receive future bulletins as issued, either Popular or Complete edition as desired.
similar shelter, seemingly to secure warning of the approach of any intruder. Only as evening approaches, or on cloudy days, do the tree crickets become active; for they are essentially nocturnal insects, and feed, sing, mate and lay their eggs mainly in the dusk of evening or at night.

The five immature stages and the adult of one of the tree crickets are shown on Plate I, and the pictures convey better than can words the general appearance of all the species. There has been considerable confusion as regards both the systematic classification of these tree crickets and the economic importance of the different forms. The studies made at this Station should aid in fixing permanently the distinctions between the three species of economic importance in this State. These species differ mainly in small markings on the antennae and in the slight variations in size and in the relative length and width of the wings. Imagine the entire insect tinted a light, yellowish-green, more soft and delicate than that of the luna moth, with the abdomen somewhat darker, and the figures on the plate will give a good picture of the tree crickets.

The eggs of tree crickets are laid in late summer or early fall in or partly beneath the bark of woody tree crickets. stems, or in the softer pith at the center of the stem of plants like raspberry, elderberry or grape. The female cricket is provided with a delicate but strong ovipositor, a most ingenious boring implement which the insect forces to a considerable depth through bark and soft wood, afterward reaming out the hole until the egg can be passed through the channel to its protected winter home. Not satisfied with depth alone, the mother cricket seals each orifice, either with a pellet of her own excrement deposited for that purpose, or with bark chips which she dislodges, chews up and makes into a ball. The method of sealing with excrement seems to be a peculiarity of one species, the snowy tree cricket, and makes this species doubly liable to be a transmitter of plant diseases; since the spores of fungi have been cultivated in the laboratory from such excrement caps. This species deposits only one egg in a place, on apple frequently selecting a lenticel to lessen the labor of boring out the egg chamber. On trees and bushes with tougher bark the eggs are frequently placed where the bark is thicker and softer, as at the side of buds or small twigs. In raspberry canes the most common place of oviposition is in the fleshy area at the side of the bud in the axil of a leaf, and sometimes an egg may be laid at each side of the bud; but more have never been found in the Station studies.

A closely allied species, the narrow-winged tree cricket, very similar in structure as well as habits, sometimes places two eggs through one opening, but drills two chambers at a slight angle with each other, places an egg in each and then seals the single opening with a bark pellet.
The third species of economic importance, the striped tree cricket, prefers for egg deposition plants with a central pith, like raspberry, blackberry, and certain weeds, while their punctures are common locally in elder, grape, sumac and willow. This species, unlike the others, places its eggs in long rows, one above the other, and the punctures are so numerous that the stems frequently break at the points punctured. This is particularly true of the raspberry, and makes the cricket a pest of serious economic importance under some conditions.

The female cricket may lay from one to a dozen or more eggs in a night and continue the process every night or with occasional intermissions until from twenty-five to seventy-five eggs are laid.

Fig. 1.—Snowy Tree Cricket.

a, Egg punctures and cankers in apple wood, (× 1 1/2); b, egg in raspberry (× 2 1/2); c, egg in apple bark (× 15); d, egg cap (× 50); e, spicule of egg cap (× 500).

The eggs are much longer than wide, are etched over most of the surface with cross-hatched scratches, and each has a cap covered with minute mound-like or teat-like projections. The size and shape of the cap differs with the different species and serves as a means of identification.

The nymphs of the tree crickets begin to emerge from the eggs during early June, and the hatching process is a most interesting one. When the egg hatches, the cap at the outer end breaks off, leaving its trace on the head of the emerging nymph in the shape of
Plate I.—Life stages of the Snowy Tree Cricket: Nymphal Instars and Adult.
PLATE II.—SNOWY TREE CRICKET
1, Female feeding on thoracic gland of male; 2, Characteristic posture of female in act of ovipositing.
PLATE III.—SNOWY TREE CRICKET.
1, Young canker showing exudation; 2, more advanced stage; 3, separation of bark about diseased area; 4 and 5, partially and normally healed cankers; 6, woolly aphid in cankers.
a projecting watery lump which may remain for twenty minutes after the insect has fully emerged.

The young larva assists its own emergence by movements of fore legs and twistings of the body, and when about half out of the orifice pulls its long antennae out by grasping them with its mouth parts at different points along their length and pulling gently.

Each of the five nympha1 stages, or instars, lasts about a week or ten days, with much overlapping of the stages. The change from each stage to the next means a molting of the old skin, and emergence clothed in a new and larger suit. With each change the wing pads become more prominent, but the other variations are inconsiderable, so that the nymphs look very much alike at all stages; but the adults are notably changed by the long, gauzy wings.

The mature forms begin to appear about the first of August and from that time until late in October, their songs may be heard every favorable night.

The cricket songs. The "song" of the tree cricket is not, of course, a true song, but a more or less musical sound made by the rasping of one wing over the other, the volume being increased by a resonator-like expansion of a portion of the fore wing near the base. In trilling, the wings are raised vertically and vibrated rapidly from side to side, the rasp of the right wing lapping over the scraper-like edge of the left. With the snowy cricket the song is one of the most conspicuous and musical of the common insect sounds of late summer and autumn; a clear, mellow whistle resembling the words treat, treat, treat, pitched about in C, two octaves above middle C, on a warm evening rising to D. These clear, high-pitched trills are repeated rhythmically for an indefinite length of time, with considerable variation between individuals in quality, intensity, pitch and rapidity of notes and with a tendency of the insects in a restricted site—a raspberry plantation, clump of bushes or trees or a single tree—to sing in unison.

The song of the narrow-winged tree cricket is about a half tone higher than that of the snowy cricket, about C♯ to D♯ instead of C to D, is not so loud, is longer both in notes and in rests and is not rhythmical in character. Each trill lasts from one to five seconds, but most commonly about two seconds, and the rests vary from one to eight seconds or longer. The song is more mournful in quality than that of its snowy relative, and so much feebleer that it is not noticeable without special attention where the two species are in equal numbers.

The striped tree cricket makes a shrill, continuous, whir-r-r-r-r-r-ring trill, like the sound of a small tin whistle, continuing sometimes for several minutes. It is much higher in pitch than that either of the other two species—about F♯ on an average summer evening. Unlike the other species it sings in the daytime as well as at night, though the full chorus does not join in until toward evening.
Most remarkable of the peculiarities of tree crickets is the fact that the male attracts the female not only by music, but by a feast, both furnished by his own body. When singing, which is evidently to attract the female, the upraised wings disclose upon the body of the male a peculiar rounded depression with elevated margin, which contains numerous hollow glandular hairs, and two paired openings from much branched glands within the fore-body of the insect. The secretion of these glands is eagerly consumed by the female cricket which mounts upon the back of the male and feeds in the depression for several minutes previous to the actual mating, while the crossed antennae of the pair are touched and rubbed one upon the other in what appear to be mutual caresses.

Two of the three forms mentioned, the snowy tree cricket and the narrow-winged tree cricket, live quite largely in apple, plum and cherry orchards but are also somewhat common on the raspberries and on walnut. During their early life they are probably beneficial, at least not injurious, as they live to quite an extent on other insects—including even their own weak or disabled relatives. On dissecting several snowy crickets (nymphs of the fourth and fifth instars), the crops of about half of them were found to contain a large proportion of materials of insect origin, while in the others vegetable matter predominated, including leaf tissue and fungous threads and spores.

The insect remains that could be identified were those of their own or their mates’ cast-off skins, broken pieces of insects’ eyes, probably those of plant lice, and, in practically all cases, portions of the protective coverings and of the bodies of San José scales. In one cricket’s crop remains of twenty-four scales were found, with others probably present but not identifiable. This discovery led to an experiment to test the destruction of scales by crickets, and in laboratory tests a single cricket ate from 300 to 900 scales nightly, both covering and insect below. This would indicate that where crickets occur on scale-infested trees they make this pest a considerable part of their diet; yet the scale is constantly spreading in orchards that are well stocked with crickets. They can never be depended upon to control the scale, and if injurious in other ways, as they seem to be, the destruction of the scales should not be allowed to count heavily in their favor.

During the later stages of their lives tree crickets live largely on vegetable tissue; and may do some slight harm by eating holes in leaves. They are also said, in some places, to cause considerable damage by eating holes in fruit, in which they produce a very characteristic injury. The opening through the skin of the peach or plum will be small, just large enough to allow the head and thin
neck to enter, while a considerable cavity may be excavated in the fleshy part of the fruit. These cavities, protected from rapid drying by the small size of the opening, make excellent starting points for fruit rot; so that the initial injury by the cricket is but a small part of the final harm to the fruit. It should be said, however, that such injury to fruits has not been found in New York State, but it is reported to be quite common in Kentucky.

The same small initial injury and considerable attendant damage later result from the oviposition punctures; for these are sometimes followed by slight exudation of sap, with formation of a gummy substance and, particularly on apple trees, open the way for canker-producing fungi. The cankers formed about these punctures are usually small, but they may later be extended by the entrance of other fungi and do much harm to the trees. They also serve as excellent harboring places of the woolly aphid.

The possibility of injury from the orchard crickets in these indirect ways probably more than counterbalances the good they may do by destroying scale insects and plant lice. They should not be allowed to increase; but are usually kept well restricted in well-cared for orchards. The freedom of such orchards from some of the favorite weed-hosts of crickets, the pruning and the spraying seem to make conditions unfavorable to their increase; but the exact manner in which these conditions and operations affect the crickets has not been determined.

It is evidently inadvisable to set young apple orchards adjacent to large plantations of raspberries without some precautions against tree crickets; as these insects are usually found most numerous in such localities, both the orchard species and the one which affects the raspberry particularly.
This species, the striped tree cricket, must be classed definitely as an injurious species, as it apparently feeds to a much smaller extent on other insects than the other two species, sometimes becomes numerous enough to do quite a little harm to raspberry foliage, and by its punctures so weakens the canes that they break from any unusual strain. In most cases only occasional canes suffer, but in some raspberry plantations, as much as three-fourths of the bearing wood has been found broken from the effect of the punctures or by the development of the raspberry cane blight fungus at these points. Even where the canes do not break, the ready entrance which the punctures offer to this fungus leads to death of the canes, for this disease is one of the most destructive and difficult to control of those affecting the raspberry.

This makes it necessary to restrict the numbers of the striped tree cricket as much as possible; for which the best measures are clean culture, the destruction of weeds in and about raspberry or blackberry plantations, and the removal and burning, during winter and spring pruning, of canes that show tree cricket punctures. Should these measures prove ineffective, it is probable that the crickets can be completely controlled by systematic spraying during July and August with arsenate of lead, three pounds to fifty gallons of water.