14.5; of pronotum, ♂ and ♀, 4—5.7; of fore femora, ♂, 5—6, ♀, 4.5—7; of hind femora, ♂, 12.5—17.5, ♀, 11.3—14.8; of hind tibiæ, ♂, 13.5—18, ♀, 11.7—15; of ovipositor, 4.5—6 mm.

A careful study of the type of *C. sallei* Scudder (1894 63) at Cambridge and direct comparison with that of *C. cæcus* from Lexington, Ky., shows no material difference except in size. The form of the subgenital and supra-anal plate in each is the same and the very distinctive teeth of the ovipositor exactly similar. I have, therefore, combined the two. Scudder separated them in his key only by the size, slightly different color and the relatively longer hind tibiæ of the smaller northern form *cæcus* which has page priority of name. The *C. cæcus* as such is definitely known only from the one male and two females taken by Garman at Lexington, Ky., June 28, and which served as Scudder's types and a second male in the Lexington collection taken by Garman at Hickman, Ky. *C. sallei* was described from New Orleans and recorded by R. & H. (1916, 274) from De Funiak Springs, Fla. The type of *C. occultus* Scudder (1894, 77), a female from Georgia in the Cambridge collection, is a nymph of his *C. sallei*. The two other specimens by its side and probably considered *occultus* by Scudder, are a pair of immature *C. tenebrarum*.

306. CEUTHOPHILUS PENINSULARIS R. & H., 1914c, 408.

This is based upon a male nymph so immature that its proper relationship cannot be fixed. It is colored much like *latens* with the median pale stripe of dorsum more narrow. The subgenital plate of male is deeply cleft, the lobes incurved at tip; supra-anal tongue-shaped and with a deep median lengthwise groove; infracercal plates present and black in hue.

The unique type was taken near Homestead, Fla., from beneath a coquina boulder near the edge of pine woods. Two still smaller nymphs, named *C. peninsularis* for me by Hebard, are in my collection from Dunedin, Fla.

Family VIII. GRYLLIDÆ.

THE CRICKETS.

"And crickets sing at the oven's mouth,
As the blither for the drouth."—*Shakespeare.*

"The crickets are heard in the grass, chirping from everlasting to everlasting."—*Thoreau.*

The fourth family of Orthoptera belonging to the suborder Saltatoria comprises the Gryllidæ or crickets. From the other leaping Orthoptera they are distinguished mainly by the characters given in the key, page 149. They have the form usually subcylindrical, robust; head broad, usually perpendicular or nearly

so, the vertex closely merged with front of face; eyes rather small, usually oval or elliptical, widely separated; ocelli variable in size, form and position, sometimes wanting; antennæ usually long and filiform; pronotum short, broad, usually depressed above; tegmina flat above, bent abruptly downward at sides, usually fully developed, though (Gryllotalpinæ, Myrmecophilinæ and *Nemobius*) often abbreviated or even wanting; wings folded like a fan, usually shorter than tegmina, often very rudimentary or wholly absent; fore tibiæ variable in structure and usually with a hearing organ on both sides; hind femora usually much enlarged, though in the tree crickets (Oecanthinæ) very slender; hind tibiæ armed above either with numerous spines or fine teeth or both on each margin, except in the Gryllotalpinæ and Tridactylinæ, where only the inner margin is so armed; also armed near apex with two or more pairs of subapical spurs; tarsi usually three-jointed (in Tridactylinæ one- or two-jointed or wanting) the first joint often very long; pulvilli wanting; cerci very long, hairy, tapering; ovipositor as described below.

The name Gryllidæ is derived from that of the principal genus *Gryllus,* a Latin name for cricket. By Kirby and some of the European authors the family name Achetidæ is used for these insects. The family is widely distributed over the earth, but in this country the species are less numerous than those of either the Acrididæ or Tettigoniidæ.

The tympanum or calling organ of the males of Gryllidæ, when present, is, as in the Tettigoniidæ, located near the base of the dorsal surface of the tegmina, but is wider and broader, extending across both anal and median areas of the tegmina. In the males of *Gryllus,* as Lutz (1906) has shown, the right tegmen almost always overlaps the left and the "file" or stridulating ridge on the under side of the left is therefore rarely used, yet it appears as fully developed as the other. Lutz changed the position of the tegmina in a freshly moulted male, placing the left one above, and after they had hardened the cricket "could chirp just as well as one whose tegmina had not been tampered with, although he was using the sound-producing organ which would naturally not have been used at all." More than one-third of the 742 females of *Gryllus* examined by Lutz carried the left tegmen uppermost, and in that sex the position of the tegmina were during life frequently changed by the insects themselves, but were never so changed in the males.

The chirps or love calls of the different species of crickets make

up the greater part of that ceaseless thrill which, in the northern states, fills the air, usually at night, from mid-July until after frost. These sounds are made only by the males, and are not vocal, as most persons suppose; but are produced by the tympanum, the insect rubbing the veins in the middle of one wing cover over those of the other. It is often difficult to locate one of these chirpers by its song. The distance and even the direction are usually most deceiving; the crickets being exceedingly shy, much more so than katydids and grasshoppers. Those which live in the ground generally chirp near the entrance to their burrows, and retreat thereto at every approaching footstep. Those which live upon trees or shrubs resemble closely the hues of bark or foliage, and are therefore difficult to find even when close at hand; while the majority, dwelling as they do, among grasses and beneath logs and chips, find also a safe protection in their color, which is usually closely like that of the objects beneath which they rest while sounding their cymbals.

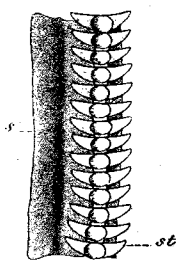

Fig. 211. Stridulating ridges in a house-cricket; *s*, stridulating ridge; *st*, stridulating teeth. (After Landois.)

The inner wings of the crickets are, for the most part, short, weak, and comparatively useless as flying organs, though sometimes they are nearly twice as long as the outer pair. Like their nearest relatives, the grasshoppers and katydids, these insects, therefore, travel mostly by leaps and, in the course of time, their hind femora have thus become greatly enlarged.

The ovipositor of the females of most Gryllidæ, when exposed, is usually a long, cylindrical spear-shaped organ, consisting apparently of two pieces. Each of these halves, however, when closely examined, is seen to be made up of two pieces so united as to form a groove on the inner side, so that when the two halves are fitted together, a tube is produced, down which the eggs pass to the repository in the earth or twig, fitted to receive them.

The eggs of most crickets are laid singly in the ground. A few of the burrowing species deposit them in irregular masses in underground cavities. Some tree crickets place them uniformly in a single row in the pith of twigs. In Indiana and other northern states most species are represented in winter by the eggs alone. A few, however, pass the cold season as nymphs, or as adults. The mole crickets are said to live for several years.

Among the families of Orthoptera the Gryllidæ and Tettigoniidæ take a rank superior to all others. As Scudder (1869b, 233) has pointed out, the high specialization of the ovipositor of the female and the perfection of structure of the stridulating organ of the male place these two families above all others in the scale of Orthopteron life. That the two are very closely related can be readily seen by any one who will carefully compare them, organ with organ. The Gryllidæ are placed first, however, by most entomologists, as the great variety of form of almost any given organ among them, when compared with its relative uniformity of structure among the Tettigoniidæ, seems to indicate the higher rank of the former. Scudder adds: "I do not think it is without meaning that the crickets often live in company, that they sing both in concert and during day and night and are the closer attendants upon man. Their stridulating organ too is more complicated and more extensive and the pitch of their song is higher."

The North American species of Gryllidæ are herein divided among eight subfamilies, all of which are represented in the territory covered by this work. The following key is largely based upon that of Saussure (1877, 185) which was used by Scudder (1897c, 62). The Tridactylii have been separated from the Gryllotalpinæ, of which they heretofore formed a group or tribe, and made a separate subfamily. The form of the antennæ and the one- or two-jointed tarsi are sufficient of themselves to justify this proceeding, without taking into account the other important differences. The Mogoplistii have also been raised to subfamily rank as they are very different both in structure and habits from the Myrmecophilinæ with which they have previously been placed as a tribe.

KEY TO SUBFAMILIES OF NORTH AMERICAN GRYLLIDÆ.

a. Tarsi compressed, the second joint minute, compressed.

b. Fore tibiæ enlarged, fitted for digging; tympanum of male, when present, without a speculum; female without an exposed ovipositor. (Burrowing crickets.)

c. Antennæ setaceous, their joints very numerous; two large ocelli present; size large, 18 or more mm.; body thickly clothed with short hairs; all the tarsi three-jointed. (Mole crickets.)
I. GRYLLOTALPINÆ, p. 642.

cc. Antennæ filiform, 11-jointed; three small ocelli present; size small, less than 10 mm.; body smooth, shining; fore and middle tarsi two-jointed, hind tarsi one-jointed or wanting. (Sand crickets.)
II. TRIDACTYLINÆ, p. 654.

bb. Fore tibiæ not enlarged; tympanum of male, when present, furnished with a speculum; female with well developed external ovipositor.

d. Body subspherical, wingless; pronotum covering the occiput and eyes, the latter very small; hind femora ovate, very strongly swollen; hind tibiæ armed above with only a few movable spines. (Ant-loving crickets).
III. MYRMECOPHILINÆ, p. 659.

dd. Body more elongate, usually winged; occiput and eyes not covered by pronotum, the eyes well developed; hind femora more elongate, not exceptionally swollen.

e. Hind tibiæ armed above on both margins with minute teeth, but no spines; body covered with translucent scales; pronotum of males usually prolonged backward; species wingless or males usually wih very short membranous tegmina. (Wingless bush crickets.) IV. MOGOPLISTINÆ, p. 662.

ee. Hind tibiæ armed above with two rows of spines; body not covered with scales; pronotum not prolonged backward in either sex; tegmina always present, sometimes much abbreviated.

f. Head short, vertical or nearly so; hind tibiæ rather stout, armed with stout spines without teeth between them; ocelli present; color black or brown. (Ground and field crickets.) V. GRYLLINÆ, p. 670.

ff. Head elongate, horizontal; hind tibiæ slender, armed with delicate spines (except in the genus *Neoxabea*) with minute teeth between them; ocelli absent; color white or pale green. (White tree crickets.) V1. OECANTHINÆ, p. 709.

aa. Second tarsal joint distinct, depressed, heart-shaped.

g. Hind tibiæ armed above with two rows of spines without teeth between them and with only two apical spurs on inner side; ovipositor in our species compressed and distinctly upcurved. (Small brown or black bush crickets.) V11. TRIGONIDIINÆ, p. 728.

gg. Hind tibiæ armed above with two rows of spines with small teeth between them, the apical spurs three on both outer and inner sides; ovipositor in our species subcylindrical, but little upcurved. (Larger brown bush crickets.)
VIII. ENEOPTERINÆ, p. 737.

Subfamily I. GRYLLOTALPINÆ.

THE MOLE CRICKETS.

Crickets of large size, having, in addition to characters given in key, the antennæ much shorter than body; eyes very small; pronotum subcylindrical, arched, prolonged more or less backward, its hind margin rounded; lateral lobes with lower margin straight or concave, oblique; tegmina somewhat triangular, usually abbreviated; wings often fully developed; fore femora dilated and compressed; fore tibiæ with a tympanum on outer face, strongly dilated, coarsely toothed; middle and hind legs slender, compressed; hind femora slender, scarcely saltatorial, divergent from the body; abdomen cylindrical, its apex obtuse, 9-jointed,