

## CHAPTER 24

### ***Eneopterinae:*** Bush Crickets

The more than 500 species of this subfamily are largely restricted to moist, tropical habitats. Only 2 of the 11 North American species occur inland from the southeastern coastal plain and 7 occur no farther north than peninsular Florida. There are no western species.

**Identification:** (Fig. 24-1,2,3) (9-35 mm) Medium to robust, brown or gray crickets. Each upper margin of hindtibia armed with row of spines with small teeth between (Fig. 21-4). Head roughly spherical; mouthparts directed down; three ocelli. Second segment of tarsi bilobed. First and second segments of fore and middle tarsi and second segment of hind tarsi with fleshy pad beneath.

**Remarks:** Crickets of this subfamily eat leaves, flowers, and fruits of living plants, occasionally damaging species of value to man. They deposit their eggs in pith, bark, or soft wood of plant stems.

Males have dorsal glands on the metathorax. In tree crickets (*Oecanthinae*) mating females feed at similar glands. No such feeding has been reported in bush crickets, but their mating behavior is poorly known. What is known might be described as quirky. For example, in the restless bush cricket the female sometimes eats the male's forewings during mating. In *Orocharis* the female immediately removes the first spermatophore and eats it as she receives the second, which she then removes and eats as she receives the third, etc. This may continue for more than three hours, with the female receiving up to 20 spermatophores.

Loss of calling is frequent in this subfamily. Thirteen of the 27 New World genera have no stridulatory apparatus. Two of three U.S. genera have the apparatus, but one of the two has noncalling populations in two species groups (i.e. in two independent evolutionary lines). Being large and exposed (on foliage) may increase the dangers of calling relative to its benefits.

Because their eggs are laid in the tissues of living plants, bush crickets from other countries may stow away (as eggs) on imported nursery plants where they are difficult to kill without damaging the plant. Two species that probably arrived in this way are *Hapithus vagus*, from Jamaica, which became temporarily established in greenhouses at Cambridge, Massachusetts, 1900-1905; and *Xenogryllus* sp. (from Taiwan?), well established in the grove area north of Homestead, Florida. A third species, *Chremon repitinus*, from Haiti, is known in North America from a single female collected, on citrus, 12 Sep 1946 at Glen St. Mary, Florida, and is unlikely to have become established.

Vertical lines are  
actual body lengths

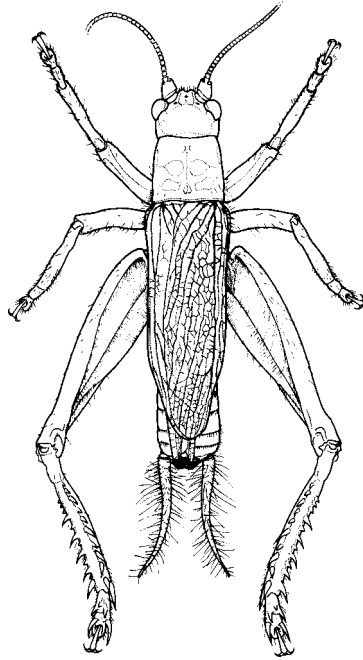


Fig. 24-1. **Robust** (male)  
*Tafalisca lurida*

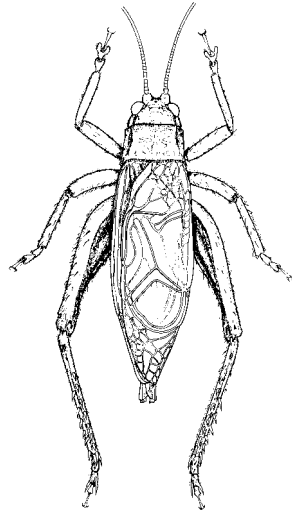


Fig. 24-2. **False Jumping** (male)  
*Orocharis luteolira*

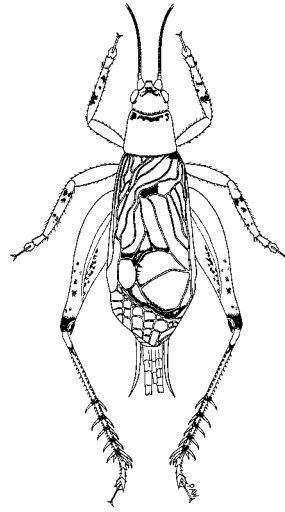


Fig. 24-3. **Lychee** (male)  
*Xenogryllus* sp.

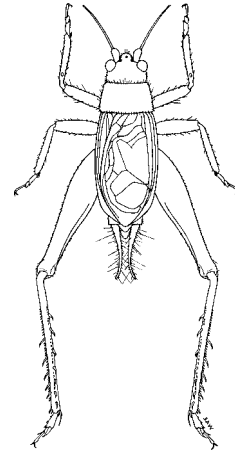


Fig. 24-4. **Restless** (male)  
*Hapithus agitator*

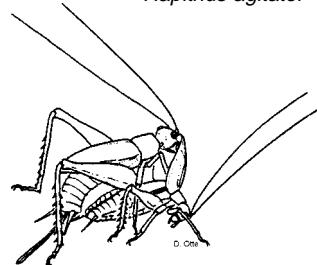


Fig. 24-5. Restless bush cricket female  
feeding on forewing of male

**References:** Alexander and Otte 1967a\* (mating), 1967b (mating); Arndt & Dozier 1931 (*Chremon*); Bullock 1973 (citrus damage); Funk 1989 (mating); Gurney 1953 (parasite); Walker 1969\* (*Orocharis*), 1977\* (*Hapithus*).

**Key to genera:**

- 1 Length less than 22 mm; foretibiae with tympana (Fig. 24-15,16); male forewing with stridulatory file.....2
- 1' Length more than 22 mm; foretibiae without tympana; male fore wing without stridulatory file..... Robust Bush Cricket, *Tafalisca lurida* (Fig. 24-1; p. )
- 2(1) Hindwings shorter than forewings; foretibia with anterior tympanum only .....Flightless Bush Crickets, *Hapithus* (Fig. 24-4; p. )
- 2' Hind wings longer than forewings; foretibia with anterior and posterior tympanum.....3
- 3(2") Anterior tympanum fully exposed (Fig. 24-15); posterior typanum sometimes poorly formed..... Loud-singing Bush Crickets, *Orocharis* (Fig. 24-2; p. )
- 3' Anterior tympanum behind slit-like opening (Fig. 24-16); posterior tympanum well developed..... Lychee Bush Cricket, *Xenogryllus sp.* (Fig. 24-3)

**Hapithus: Flightless Bush Crickets**

These are brown, sedentary crickets that occur only in the New World. Three of the 16 species are native to eastern United States.

**Identification:** (Fig. 24-4) (9-19 mm) Hindwings shorter than forewings; foretibia with anterior tympanum but without posterior one.

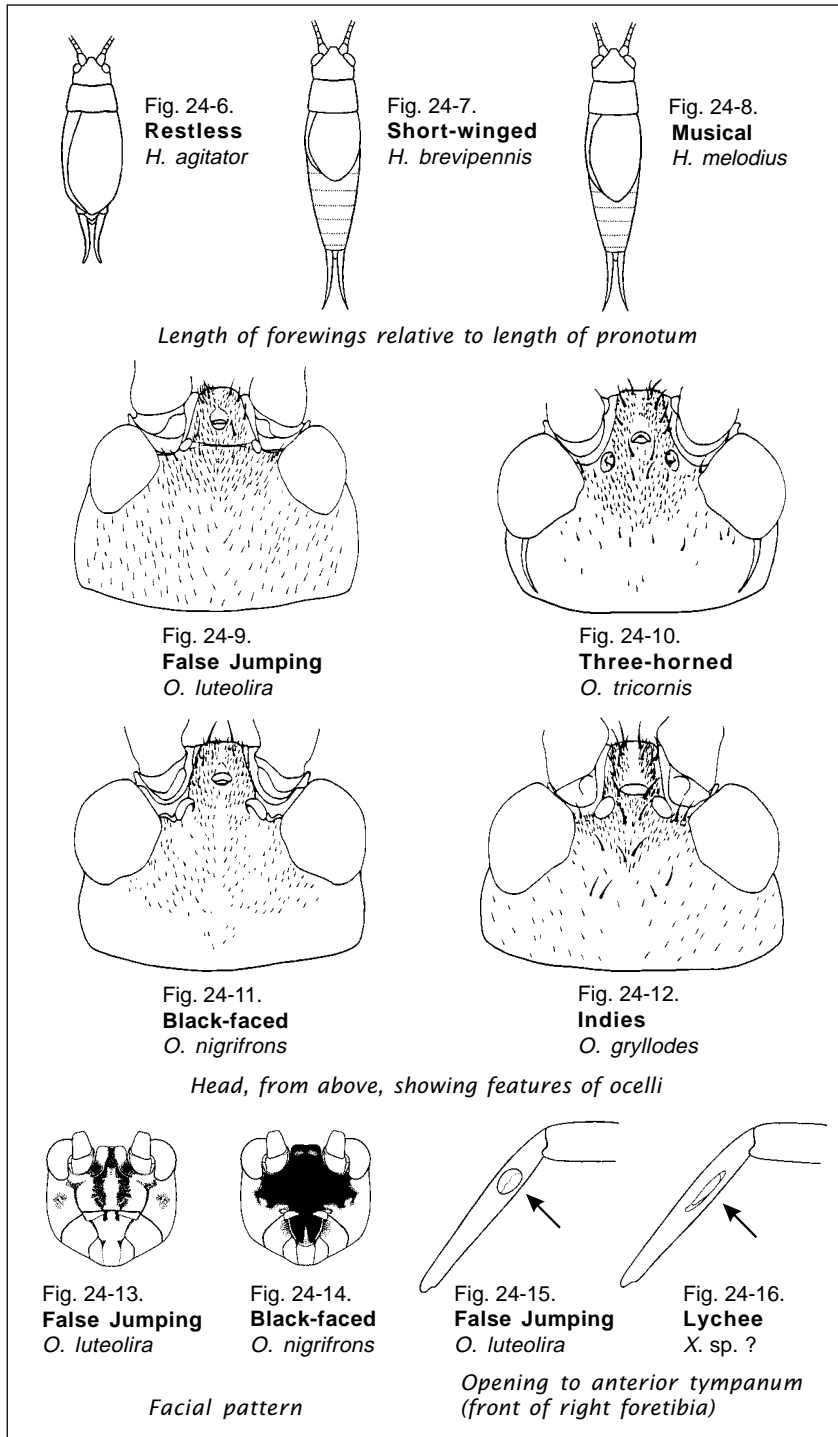
**Life cycles:** Except for the restless bush cricket in south Florida, U.S. species have one generation each year; eggs are the overwintering stage.

RESTLESS BUSH CRICKET *Hapithus agitator* Map 24-1

**Identification:** (9-14 mm) Short, compact crickets. Forewings covering more than two-thirds of abdomen (Fig. 24-4) (male forewings sometimes partially eaten away). Stridulatory file with fewer than 45 teeth, shorter than 0.85 mm.

**Habitat:** Undergrowth in moist or wet wooded areas; roadside weeds.

**Season:** Aug.-Nov. (Ind.), July-Dec. (n. Fla.), Mar.-Dec. (s. Fla.).



**Song:** (Song 24-1, 2) Sequences of 5 to 20 buzzy chirps at a rate of 1-2/sec. Northern populations do not call (Map 24-1). Courtship song sounds a bit like someone twirling a halloween noise maker.

**Similar species:** Loud-singing bush crickets (*Orocharis*)—hindwings longer than forewings; body length greater (15-22 mm).

**Remarks:** In peninsular Florida and eastern Texas, males of the restless bush cricket produce a loud distinctive song. Elsewhere they make no calling songs. Little is known of how sexual pairs are formed in populations of non-calling crickets. Since non-calling restless bush crickets live in compact colonies, the males may simply roam about until they contact a female or are alerted to her presence by chemical cues. Once a female is located the male stays with her, sometimes producing soft courtship sounds by rubbing together his forewings. If the female accepts a spermatophore from him, he puts his forewings to unique use: he allows the female to feed on them while the externally attached spermatophore is emptying into the female's sperm-storage sac. During one copulation a male may sacrifice a quarter of his forewings, and males are found that have nothing but stubs remaining. Copulating females of many other crickets feed on products of the male—e.g., secretions from dorsal thoracic glands in tree crickets and blood from bleeding spines on the hindtibiae in ground crickets. Only in non-calling populations of restless bush crickets is the sexually successful male prominently mutilated. The nutritive value of the male's forewings and the consequences of a non-calling male averting mutilation are uninvestigated. The reproductive results of a male allowing a female to eat his forewings surely depend in part on whether the forewings can be used to call additional mating partners. Similarly the reproductive consequences for a female inseminated by a male that allows her to eat his forewings depend in part on her sons behaving like their father.

#### SHORT-WINGED BUSH CRICKET *Hapithus brevipennis* Map 24-2

**Identification:** (12-17 mm) Forewings covering less than two-thirds of abdomen; length of forewings generally less than 2.3 (males) or 2.2 (females) times medial length of pronotum (Fig. 24-7). Stridulatory file with 45-70 teeth, 0.9 to 1.5 mm long.

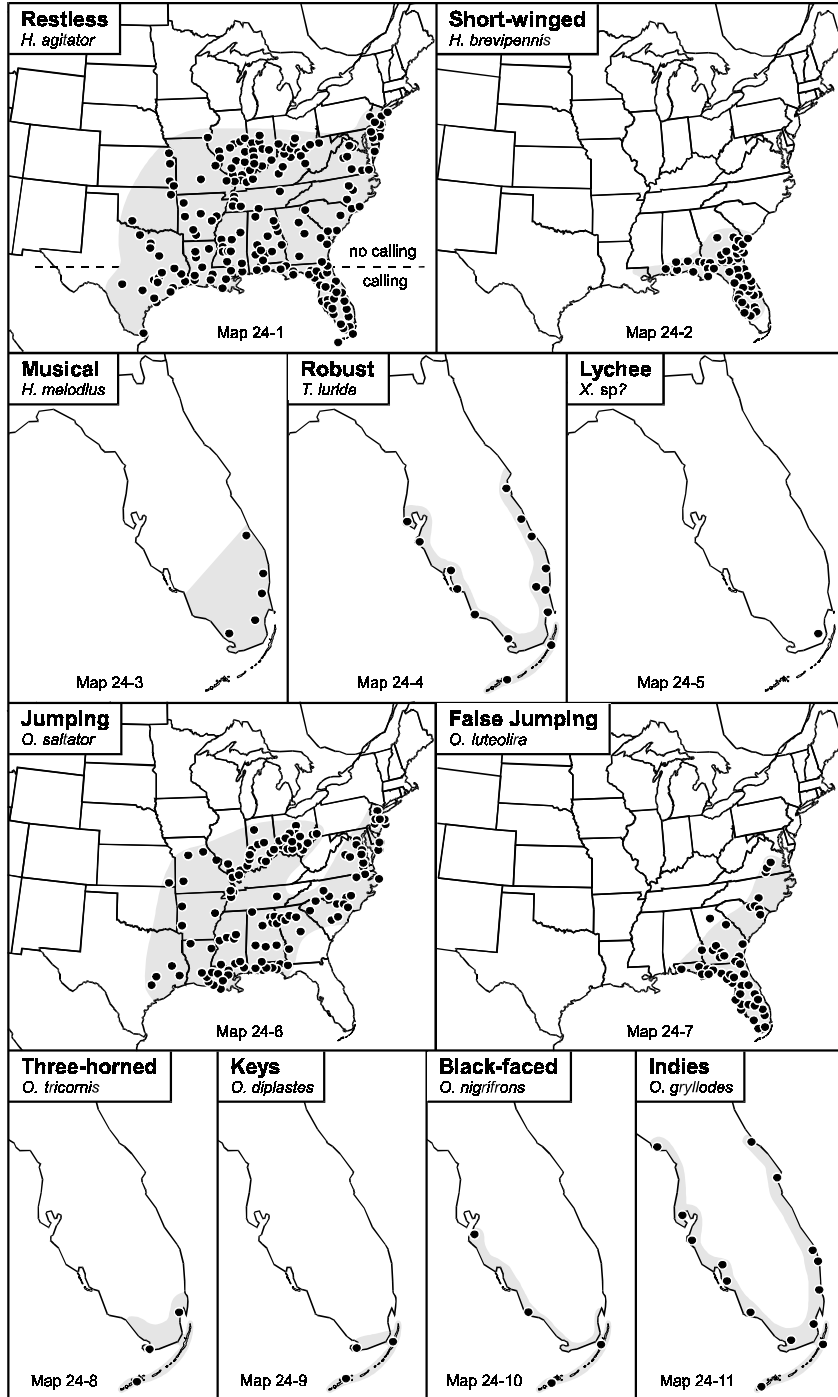
**Habitat:** On grass and shrubby undergrowth, especially in pine flatwoods.

**Season:** Aug.-Dec.

**Song:** No calling song. No courtship sounds known, but courtship never observed. The tympana and stridulatory file are well developed.

**Similar species:** Musical bush cricket—wings longer (Fig. 24-8); more than 70 teeth in stridulatory file; loud calling song.

### Maps for Bush Crickets: *Eneopterinae*



MUSICAL BUSH CRICKET *Hapithus melodius*

Map 24-3

**Identification:** (15-19 mm) Forewings covering less than two-thirds of abdomen; length of forewings generally more than 2.3 (males) or 2.2 (females) times medial length of pronotum (Fig. 24-8). Stridulatory file with more than 70 teeth, 1.5 to 1.8 mm long.

**Habitat:** On grass and shrubby undergrowth, especially in pinewoods and in sawgrass marshes.

**Season:** June-Oct.

**Song:** (Song 24-3) A musical, irregular *tink, tink, tink* that speeds up and becomes a trill of ca. 14 p/s. Each such sequence lasts 8-20 sec., with the carrier frequency gradually increasing by several hundred Hertz. Courtship singing resembles calling except that the tinks are more irregular and no trills are produced.

**Similar species:** Short-winged bush cricket—wings shorter (Fig. 24-7); fewer than 70 teeth in stridulatory file; no calling song.

**Remarks:** This and the preceding species are closely related. They have not been found together, but specimens of the two collected 50 miles apart maintain their distinctive features.

***Orocharis:* Loud-singing Bush Crickets**

These are arboreal crickets that occur only in the New World. Their songs are loud and distinctive, but they are usually difficult to collect. Most tropical species have yet to be distinguished and named. Four of the six U.S. species were not recognized until 1969.

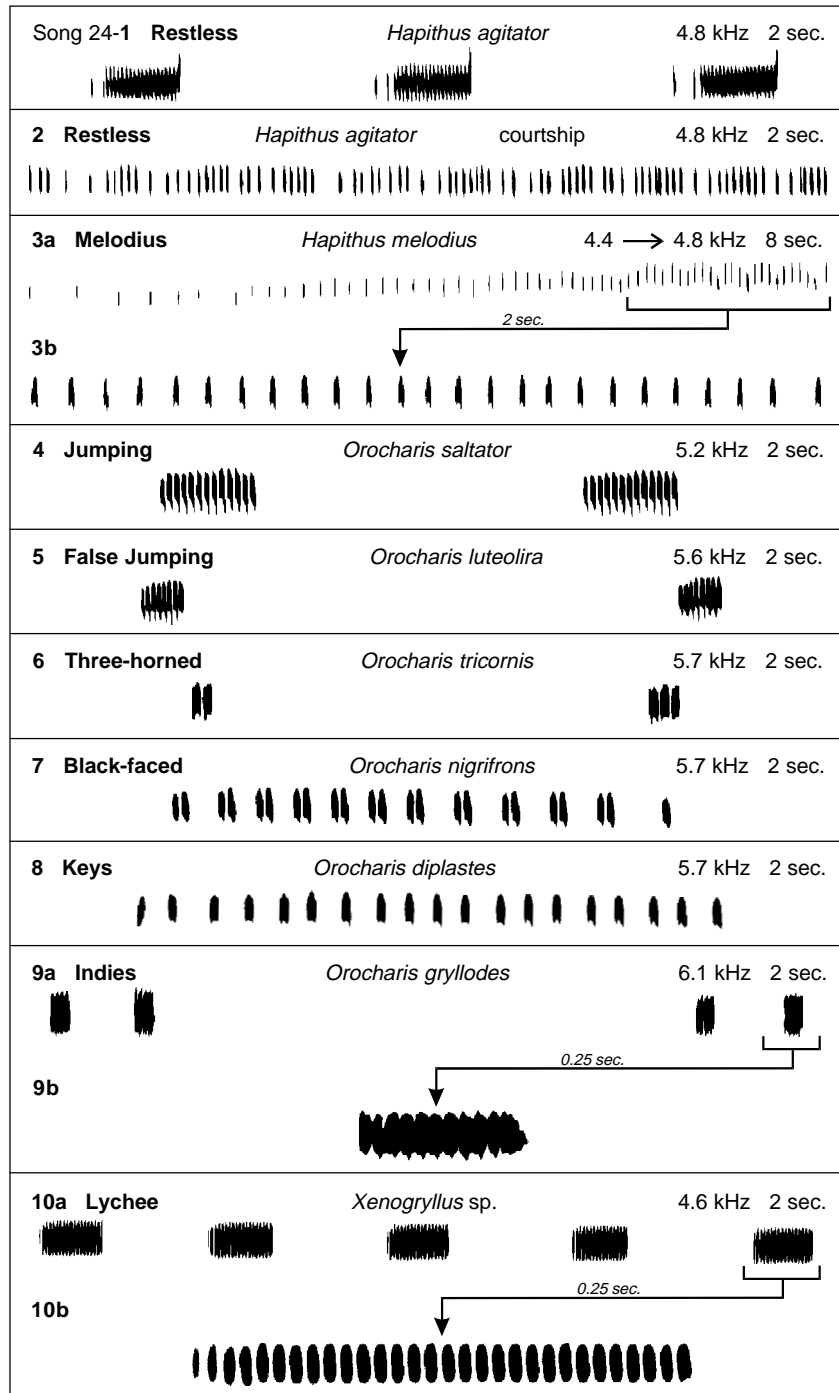
**Identification:** (Fig. 24-2) (15-22 mm) Hindwings longer than forewings; foretibia with anterior and posterior tympana. Anterior tympanum fully exposed; posterior tympanum smaller and sometimes scarcely evident. Male forewings not much wider near tips; greatest width of right forewing no more than 20% greater than width at file. Ovipositor >10 mm; shaft cylindrical.

**Remarks:** Three of the U.S. species are dimorphic in color. In jumping, false jumping, and keys bush crickets some individuals are conspicuously darker than others and intermediates are rare or lacking. The frequencies of dark individuals in the three species are approximately 50, 10, and 80% respectively.

JUMPING BUSH CRICKET *Orocharis saltator*

Map 24-6

**Identification:** (15-20 mm) The only species of its genus in most of its range. Where it overlaps with the false jumping bush cricket, it can be identified most reliably by song and season. Stridulatory file has 70-85 teeth.

Songs of Bush Crickets: *Eneopterinae*



**Habitat:** Broadleaved trees; occasionally in herbaceous undergrowth, shrubs, and pine trees.

**Season:** Aug.-Oct. (Ind.), July-Dec. (La.) Throughout its distribution the jumping bush cricket apparently has but one generation a year and overwinters as eggs.

**Song:** (Song 24-4) Loud, clear chirp repeated at irregular, 1.5-3 sec. intervals. Difficult to localize. Chirps have 10-18 pulses at 55 p/s. Carrier frequencies decline by more than 1 kHz at temperatures below 77°F.

**Similar species:** False jumping bush cricket—no distinguishing morphological features; chirps shorter (0.15 sec.) with fewer pulses (4-9) and faster pulse rate (71/sec.). *In area of overlap:* Two generations each year; adults numerous Apr.–June and mid-Aug.–Oct.; most abundant in well-drained open woodland.

FALSE JUMPING BUSH CRICKET *Orocharis luteolira* Map 24-4

**Identification:** (15-21 mm) Ocellar diameter less than distance between lateral and median ocellus; no conical projections at lateral ocelli; sometimes one at median ocellus; some bristles longer than 0.1 mm on head behind lateral ocelli (Fig. 24-9). Facial pattern varies but median light area reaches midpoint of epistomal suture (Fig. 24-13). Stridulatory file has 66-82 teeth.

**Habitat:** Broad-leaved trees; occasionally in herbaceous undergrowth, shrubs, and pine trees. Southernmost records are from broad-leaved woody undergrowth of pine and cypress forests.

**Season:** Year-round in peninsular Florida with peaks of singing at Gainesville in Nov.-Dec. and May-June. Two generations apparent farther north, with adults peaking in early and late summer (June and Aug.-Sept.).

**Song:** (Song 24-5) Loud *peep* emitted at irregular 1.5-3 sec. intervals. Difficult to localize. Neighbors seem to alternate and are often noticeably different in pitch. Chirps have 4-9 pulses at 72 p/s. Carrier frequencies decrease more than 1 kHz at lower temperatures.

**Similar species:** (1) Jumping bush cricket—no distinguishing morphological features; chirps longer (0.15 sec.) with more pulses (10-18) and slower pulse rate (55/sec.). *In area of overlap:* one generation each year; adults Aug.-Oct.; most abundant in dense, lowland woods. (2) Three-horned bush cricket—conical projections over the lateral ocelli (Fig. 24-10).

**Remarks:** The geographical distributions of this species and the morphologically-as-yet-indistinguishable jumping bush cricket overlap extensively. In the areas of overlap there is no evidence of hybridization (e.g. intermediate calling songs) or of greater differences in calling songs (as might be expected of two interacting species if their calling songs were confusingly similar). They maintain distinctive one-and-two-generation life cycles, but their mating seasons coincide in late summer.

THREE-HORNED BUSH CRICKET *Orocharis tricornis* Map 24-8

**Identification:** (17-21 mm) Ocellar diameter less than distance between lateral and median ocellus; conical projections at each ocellus; some bristles longer than 0.1 mm on head behind lateral ocelli (Fig. 24-10). Facial pattern varies but if there is a median light area it does not reach the epistomal suture. Stridulatory file has 110-130 teeth.

**Habitat:** Mangroves and subtropical hammocks.

**Season:** Probably year round (records Mar.-Aug. and Dec.).

**Song:** (Song 24-6) Brief chirp repeated at 0.5-2 sec. intervals. Chirps have 2-3 pulses at 40 p/s. Carrier frequency drops more than 1 kHz at lower temperatures.

**Similar species:** (1) False jumping bush cricket—no conical projections at lateral ocelli; stridulatory file has 66-82 teeth. (2) Keys bush cricket—no conical projections at ocelli; stridulatory file has 125-145 teeth.

KEYS BUSH CRICKET *Orocharis diplastes* Map 24-9

**Identification:** (15-19 mm) Ocellar diameter less than distance between lateral and median ocellus; no conical projections at ocelli; some bristles longer than 0.1 mm on head behind lateral ocelli. Face usually dark medially but if there is a median light area it is shaped like an inverted V, and the median portion of the face just above the light band along the epistomal suture is dark. Stridulatory file has 125-145 teeth.

**Habitat:** Black and white mangroves.

**Season:** Year round.

**Song:** (Song 24-8) Tinkling melodious trills lasting 0.5-2 sec. Pulses within trill are not paired and have two modes of spacing that correspond to 11 and 14 p/s.

**Similar species:** (1) Black-faced bush cricket—no bristles longer than 0.1 mm on head behind lateral ocelli (Fig. 24-11); stridulatory file has 98-110 teeth. (2) Three-horned bush cricket—conical projections at ocelli; stridulatory file has 110-130 teeth.

BLACK-FACED BUSH CRICKET *Orocharis nigrifrons* Map 24-10

**Identification:** (15-18 mm) Ocellar diameter less than distance between lateral and median ocellus; weakly developed projections at ocelli; no bristles longer than 0.1 mm on head behind lateral ocelli (Fig. 24-11). Face entirely black medially (Fig. 24-14). Stridulatory file has 98-110 teeth.

**Habitat:** Black mangrove; occasionally other mangroves.

**Season:** Perhaps year-round (records are Mar.-Sept.).

**Song:** (Song 24-7) Tinkling, melodious trills lasting 1-3 sec. Pulses within trill are paired. Rates are 10 pr/s and (within pairs) 42 p/s.

**Similar species:** Keys and three-horned bush crickets—some bristles longer than 0.1 mm on head behind lateral ocelli (Fig. 24-9); stridulatory file with 110-145 teeth.

INDIES BUSH CRICKET *Orocharis gryllodes* Map 24-11

**Identification:** (17-22 mm) Ocellar diameter greater than distance between lateral and medial ocellus; no conical projections at ocelli; some bristles longer than 0.1 mm on head behind ocelli (Fig. 24-12). Stridulatory file has 23-31 teeth.

**Habitat:** Mangroves and subtropical hammocks.

**Season:** Year-round.

**Song:** (Song 24-9) Buzzy chirps usually produced in groups of 2 or 3 with groups at intervals of 2-3 sec. Chirps have 10-14 pulses at 216 p/s, the fastest wingstroke rate known for crickets.

**Similar species:** All other U.S. species—ocellar diameter less than distance between lateral and median ocellus; stridulatory files have more than 60 teeth.

**Remarks:** This species is abundant and widespread in the West Indies and probably spread from there to south Florida. The previous three species may also have had a West Indian origin—but have yet to be found in the West Indies.

### ***Xenogryllus:* Lychee Bush Cricket**

This Old World genus currently has five species known from localities ranging from Africa to Taiwan and Japan. One species, identity yet uncertain, has recently become established in southern Florida.

LYCHEE BUSH CRICKET *Xenogryllus* species? Map 24-5

**Identification:** (Fig. 24-3) (16-20 mm) Antennal flagellum black. Anterior tympanum well developed but only partially visible through narrow slit (Fig. 24-16); posterior tympanum well defined and exposed. Lateral ocelli flat, lacking lenses, twice diameter of median ocellus, which has a lens and looks forward; lateral ocellar diameter less than distance between lateral and median ocellus. Male forewings conspicuously wider near tips; greatest width of right forewing more than 30% greater than width at file. Ovipositor <6 mm; shaft more than twice as wide as deep.

**Season:** Perhaps year-round (records of adults are Aug. and Oct.-Nov.)

**Song:** (Song 24-10) Sequences of buzzy chirps sometimes delivered at a regular rate of 2-3/s. Chirps have 25-35 pulses at 200 p/s.

**Similar species:** None.

**Remarks:** This species was detected in 1993 because it was severely damaging young lychee trees near Homestead, Florida, by laying eggs in the small branches. It may have arrived as eggs in nursery stock imported to replant groves destroyed by hurricane Andrew. In August 1994, a nighttime song-based census revealed that it occupied a 20 sq mi area that included Naranja and Aladdin City.

### ***Tafalisca*: Robust Bush Cricket**

Males in this genus have no stridulatory specializations on the fore wings and produce no songs. Of the 15 New World species, one has spread from the West Indies into the warmest areas of Florida.

ROBUST BUSH CRICKET *Tafalisca lurida*

Map 24-4

**Identification:** (Fig. 24-1) (22-35 mm) Foretibia without tympanum; male forewings lacking stridulatory modifications. Hindtibia stout; combined length of hindtibia and first tarsel segment no greater than length of hindfemur. Hindwings slightly longer than forewings.

**Habitat:** Red and white mangroves; more rarely on other coastal vegetation and inland on undergrowth in subtropical hammocks.

**Season:** Probably year-round (no Feb. or March records).

**Song:** Mute.

**Similar species:** None.

**Remarks:** These crickets are most easily collected by examining appropriate foliage with a light at night. They may spend daylight hours in tunnels gnawed into soft wood. A caged specimen burrowed into a cork and retreated inside during the days, expertly coiling its antennae so that they did not protrude from the entrance. Short hind tibiae are typical of tunnel-inhabiting crickets.