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KEY TO THE GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE) OF FLORIDA

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ABSTRACT

A dichotomous key is presented to aid in the identification of the adult stage of the 71 grasshopper species known to occur in Florida. Reflecting recent research one subspecies, *Schistocerca alutacea rubiginosa* (Scudder), has been elevated to species status *Schistocerca rubiginosa* (Harris) in this key.

Key Words: Acrididae, key, Orthoptera, morphology, systematics, taxonomy.

RESUMEN

Se presenta una clave dicótoma para ayudar en la identificación del estadio adulto de 71 especies de saltamontes conocidos que ocurren en Florida. Una subespecie, *Schistocerca alutacea rubiginosa* (Scudder), ha sido elevada al nivel de especie, *Schistocerca rubiginosa* (Harris) en esta clave.

Grasshoppers comprising the family Acrididae (Orthoptera) are easily identifiable and are quite common in Florida. Seventy-one species of grasshopper belonging to five subfamilies are known to exist in Florida (Table 1). While this group of insects contains some dramatic variation, there are a few morphological features that remain fairly consistent. All acridids have 3-segmented tarsi, short ovipositors, tympana found on the sides of the first abdominal segment, and the antennae are almost always shorter than the body. Adults of some species are winged, while other species are wingless or have extremely reduced wings. Eggs are usually deposited in soil and in clusters or pods with as many as 100 eggs. Grasshoppers are hemimetabolous insects, and therefore go through a gradual metamorphosis. Each instar looks like a smaller version of the adult, with wings not fully formed until adulthood (in the winged species). All grasshoppers are plant feeders, but will occasionally feed on dead insects, leaf litter, or even dung.

Because of their economic importance, grasshoppers have been the subject of thousands of publications, many with identification keys included. One of the most comprehensive of these was attempted by Otte (1981, 1984) in which he developed keys to all the species of North America within the subfamilies Acridinae, Gomphocerinae, and Oedipodinae. However, most identification keys are regional in nature (e.g., Blatchley 1920; Dakin & Hays 1970; Capinera & Sechrist 1982; McDaniel 1987; Richman et al. 1993; Pfadt 1994) and only one was dedicated solely to the grasshoppers of Florida (Capinera et al. 2001). A key to the grasshoppers of Florida is particularly useful considering that 18 species are endemic and six more are found almost exclusively in Florida, with a range also including extreme southern Georgia or Alabama. Thus, these species are absent from most other regional keys. While adequate for field identification, "Grasshoppers of Florida" (Capinera et al. 2001) does not contain a species-level key.

Schistocerca rubiginosa (Harris) has been an enigma in that it has been considered a species (Hubbell 1960; Helfer 1972), a subspecies of *Schistocerca alutacea* (Harris) (Morse 1904; Blatchley 1920), and a color phase of *S. alutacea* (Rehn 1901, 1902; Rehn & Hebard 1916). As mentioned by Blatchley (1920), the authors have found differences in the habitat preferences of *S. rubiginosa* and *S. alutacea* as well as significant morphological differences as mentioned in the key. *Schistocerca rubiginosa* is usually limited to dry sandy areas associated with scrub and turkey oaks whereas *S. alutacea* inhabits both xeric and mesic areas. Recently, a cladistic analysis of the *alutacea* group based on 22 morphological features found that *S. alutacea* and *S. rubiginosa* are, in fact, two separate species (Song 2004). This is a departure from the recent treatment of Florida grasshoppers by Capinera et al. (2001), so this change has been included.

Other species, such as *Melanoplus furcatus* and *M. symmetricus*, warrant additional study. They seem to represent different species based on the shape of the male cercus, normally a reliable character for differentiation of *Melanoplus* species. A related species or subspecies, designated as *M. clypeatus* (Blatchley 1920), has cerci intermediate in form, however, and because its status is uncertain, it is not recognized in this key. Blatchley differentiated *M. clypeatus* principally based on wing length, which often is a variable character in this genus. Suppression of *M. clypeatus* in this key follows Capinera et al. (2001). The other confusing

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TABLE 1. GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE) KNOWN TO OCCUR IN FLORIDA ARRANGED BY SUBFAMILY.

Subfamily	Genus	Species
Acridinae	*Metaleptea*	*brevicornis* (Johannson)
Cyrtacanthacridinae	Aptenopedes	*aptera* Scudder
		sphenarioides Scudder
	Eotettix	*palustris* Morse
		pusillus Morse
		signatus Scudder
	Gymnoscirtetes	*morsei* Hebard
		pusillus Scudder
	Hesperotettix	*floridensis* Morse
		osceola Hebard
		viridis (Thomas)
	Leptysma	*marginicollis* (Serville)
	Melanoplus	*adelogyrus* Hubbell
		apalachicolae Hubbell
		bispinosus Scudder
		davisi (Hebard)
		forcipatus Hubbell
		furcatus Scudder
		gurneyi Strohecker
		impudicus Scudder
		indicifer Hubbell
		keeleri (Thomas)
		nanciae Deyrup
		ordwayae Deyrup
		propinquus Scudder
		puer (Scudder)
		punctulatus Scudder
		pygmaeus Davis
		querneus Rehn and Hebard
		rotundipennis Scudder
		sanguinipes (Fabricius)
		scapularis Rehn and Hebard
		scudderi (Uhler)
		strumosus Morse
		symmetricus Morse
		tepidus Morse
		tequestae Hubbell
		withlacoocheensis Squitier and Deyrup
	Paroxya	*atlantica* Scudder
		clavuliger (Serville)
	Schistocerca	*alutacea* (Harris)
		americana (Drury)
		ceratiola Hubbell and Walker
		damnifica (Saussure)
		obscura (Fabricius)
		rubiginosa (Harris)
	Stenacris	*vitreipennis* (Marschall)
Gomphocerinae	*Achurum*	*carinatum* (F. Walker)
	Amblytropidia	*mysteca* (Saussure)
	Dichromorpha	*elegans* (Morse)
		viridis (Scudder)
	Eritettix	*obscurus* (Scudder)
	Mermiria	*bivittata* (Serville)
		intertexta Scudder
		picta (F. Walker)
	Orphulella	*pelidna* (Bermeister)

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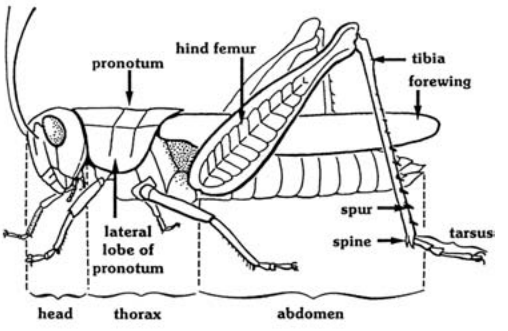
TABLE 1. (CONTINUED) GRASSHOPPERS (ORTHOPTERA: ACRIDIDAE) KNOWN TO OCCUR IN FLORIDA ARRANGED BY SUBFAM-

Subfamily	Genus	Species
	Syrbula	*admirabilis* (Uhler)
Oedipodinae	*Arphia*	*granulata* (Saussure) *sulphurea* (Fabricius) *xanthoptera* (Burmeister)
	Chortophaga	*australior* (Rehn and Hebard)
	Dissosteira	*carolina* (Linnaeus)
	Hippiscus	*ocelote* (Saussure)
	Pardalophora	*phoenicoptera* (Burmeister)
	Psinidia	*fenestralis* (Serville)
	Spharagemon	*bolli* Scudder *crepitans* (Saussure) *cristatum* (Scudder) *marmorata* (Scudder)
	Trimerotropis	*maritima* (Harris)
Romaleinae	*Romalea*	*microptera* (Beauvois)

species complex needing further study is *Gymnoscirtetes morsei* and *G. pusillus*. These relatively rare grasshoppers are difficult to distinguish.

Having fresh specimens is helpful because much of the key involves the color of grasshoppers. Grasshopper specimens tend to lose much of their color, with the green colors turning brown after drying and preservation. However, wing color remains fairly distinct, with only slight fading after preservation. In the Oedipodinae, the left wing should be spread immediately after capture; however, very old specimens can be relaxed and the wings spread. While occasionally the abdomen will shrivel, this is relatively unimportant because the abdomen usually is not an important taxonomic feature. The cerci, supra-anal plate, and the sub-genital plate, which are very important in identification, are usually unaffected by this shriveling. Many of the melanopline species, and some others, are only identifiable based on male genitalia. For this reason, it is very important that males be collected from each population to associate with the females of the same species.

The following key only treats adult acridids, but can be used to identify all species currently known to occur in the state of Florida. Females are not always indentifiable, so it is important to acquire males and identify females by association. In this key, length, when not specified otherwise, refers to the distance from the front of the head to the tip of the wings in long-winged species. In short-winged species, length refers to the distance from the front of the head to the tip of the abdomen. If the abdomen is shrunken or curved, the tips of the femora can be used instead, as this approximates the abdomen length.



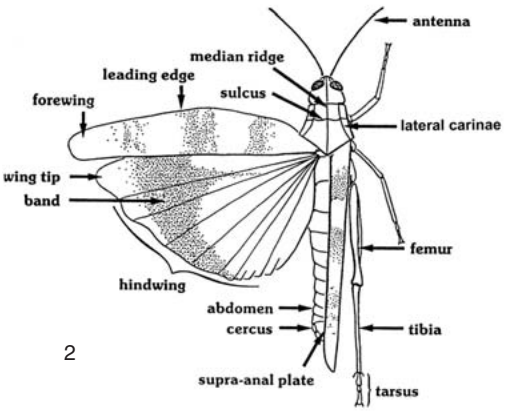


Fig. 1. Lateral view of a typical grasshopper.
Fig. 2. Dorsal view of a typical grasshopper.

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KEY TO THE ADULT GRASSHOPPERS OF FLORIDA

1. Wings lacking, or apparently no wings 2

1'. Wings present 5

2(1). Small in size (12-22 mm in length); black stripe running along the sides of the body from the eyes to the tip of the abdomen; gold or brown in color; eyes round 3

2'. Medium in size (15-33 mm in length), green or brown in color, eyes oval 4

3(2). Males with dorsal edge of cerci strongly curved (Fig. 4B); tubercle at tip of subgenital plate about twice as high as wide (Fig. 4C) . . . . . *Gymnoscirtetes morsei*

3'. Males with dorsal edge of cerci not strongly curved (Fig. 5B); tubercle at tip of subgenital plate about as wide as high (Fig. 5C) . . . . . *Gymnoscirtetes pusillus*

4(2). No evidence of wings . . . . . *Aptenopedes aptera*

4'. Wings extremely reduced to small linear pads (If body is exceptionally long and narrow see *Achurum carinatum*) . . . . . *Aptenopedes sphenarioides*

5(1). Wing length short; wings distinct but less than, or about equal to, length of pronotum 6

5'. Wing length longer than length of pronotum. 32

6(5). Body form exceptionally long and narrow (Fig. 6) (If body is not long and narrow see *Aptenopedes sphenarioides*) . . . . . *Achurum carinatum*

6'. Body form not long and narrow 7

7(6). Body usually with a bold white stripe dorsally on pronotum or abdomen, or with distinct white lines running along the lateral ridges of pronotum 8

7'. Body does not have a bold white stripe on pronotum and abdomen 9

8(7). Body green in color; all antennal segments rounded; depression in the middle of vertex; small spine present ventrally between the forelegs (Fig. 7A) . . . . . *Hesperotettix osceola*

8'. Body color brown; first 9-10 segments of antennae flattened; vertex extending out beyond head to form a rounded point; spine not present between the forelegs. . . . . *Eritettix obscurus*

9(7). Body color uniformly bright green with, at most, a weak red stripe dorsally on pronotum 10

9'. Body color other than bright green. 11

10(9). Heavy-bodied species with large pronotum; texture of pronotum rough; no stripes on wings . . . . . *Hesperotettix floridensis*

10'. Body form normal; texture of pronotum smooth; bold stripe running down the center of each wing; white and red stripe running along dorsal portion of the abdomen. . . . . *Hesperotettix osceola*

11(9). Small spine not present ventrally between forelegs . . . . . *Eritettix obscurus*

11'. Small spine present ventrally between base of forelegs (Fig. 7A) 12

12(11). Body color iridescent yellowish, gold, or brown, sometimes with a black spot on pronotum; frontal costa raised and very pronounced all the way to the edge of the clypeus, frontal sutures also very pronounced (Fig. 8); uncommon. 13

12'. Body color indistinct brownish, reddish, or grayish, and with a black stripe or spot on side of pronotum; frontal costa not very pronounced and not running all the way to the edge of the clypeus, frontal sutures not pronounced 15

13(12). Forewings slightly longer than pronotum, tibiae bright red. . . . . *Eotettix signatus*

13'. Forewings shorter than pronotum, tibiae orange, yellow, or pinkish 14

14(13). Forewings nearly round. . . . . *Eotettix pusillus*

14'. Forewings oval. . . . . *Eotettix palustris*

15(12). Male with distinct conical structure (pallium) pointing upward near tip of abdomen (Fig. 9C, 10C) 16

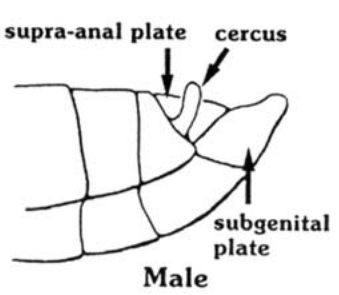
15'. Male without distinct conical structure at tip of abdomen 17

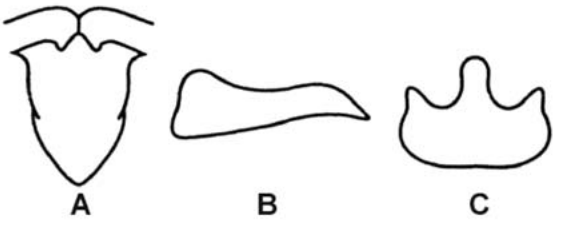
16(15). Cerci expanding at tip but flattened, lacking ventral point (Fig. 9B). . . . . *Melanoplus rotundipennis*

16'. Cerci expanded and swollen at tip, with small ventral point (Fig. 10B) . . . . . *Melanoplus withlacoocheensis*

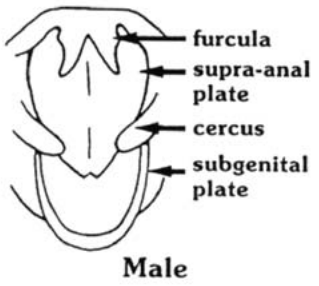
17(15). Tip of cerci forked with at least one branch or with tooth. 18

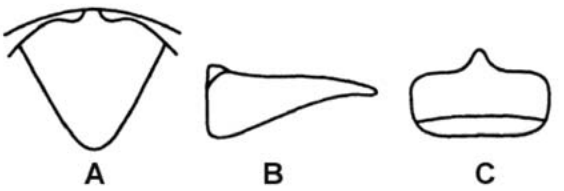
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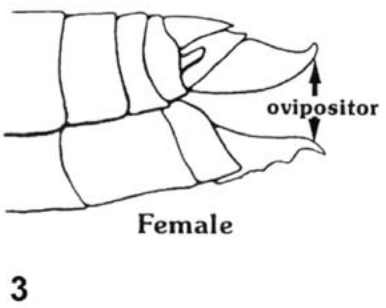


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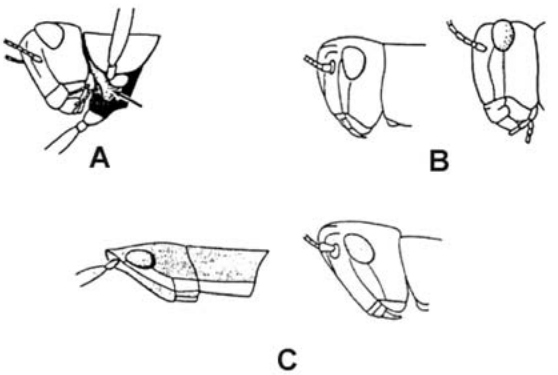


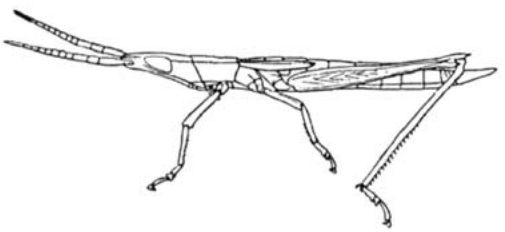


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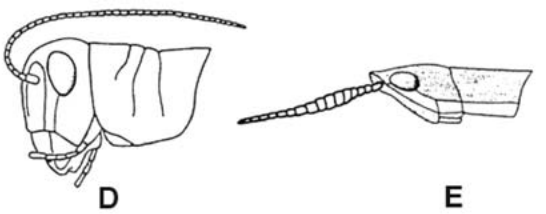


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6



7

Fig. 3. Tip of abdomen in adult male and female gr asshoppers.
Fig. 4. Male *G. morsei*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 5. Male *G. pusillus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 6. *Achurum carinatum*.
Fig. 7. Ventral view of grasshopper showing spine between front legs (A), examples of grasshoppers with face not strongly slanted (B), examples of grasshoppers with a strongly slanted face (C), examples of threadlike antenna (D) and sword-shaped antenna (E).

17'. Tip of cerci not forked or branched 22

18(17). Cerci forked or split, with branches pointed dorsally and ventrally. 19

18'. Cerci not forked, tooth pointed ventrally 21

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19(18). Cerci expanding from base before dividing into dorsal and ventral projections (Fig. 11B). . . . . *Melanoplus scapularis*

19'. Cerci tapering slightly before dividing into dorsal and ventral projections. 20

20(19). Cerci divided into dorsal and ventral projections near the tip (Fig. 12B) . . . . . *Melanoplus furcatus*

20'. Cerci divided in the center into a long spine dorsally and a rounded lobe ventrally (Fig. 13B) . . . . . *Melanoplus nanciae*

21(18). Cerci with large ventral tooth and small dorsal teeth on upper and inner surfaces (Fig. 14B); found in scrub habitats throughout central Florida. . . . . *Melanoplus forcipatus*

21'. Cerci with ventral tooth slender, lacking teeth on inner surface (Fig. 15B); found only in sandy habitats along the southeastern coast of Florida, north of West Palm Beach . . . . . *Melanoplus indicifer*

22(17). Cerci tapering to a point 23

22'. Cerci not tapering to a point. 28

23(22). Furcula visible (Fig. 3). 24

23'. Furcula not visible (Fig. 20A, 21A). 27

24(23). Cerci tapering rapidly, and triangular (Fig. 16B) . . . . . *Melanoplus davisi*

24'. Cerci very narrow and not triangular 25

25(24). Stripe on lateral lobe of pronotum narrows posteriorly; dorsal surface of subgenital plate with a triangular point (Fig. 17C) . . . . . *Melanoplus puer*

25'. Stripe on lateral lobe of pronotum expands posteriorly; dorsal surface of subgenital plate rounded 26

26(25). Cerci taper abruptly on dorsal margin (Fig. 18B) . . . . . *Melanoplus apalachicolae*

26'. Cerci taper equally on dorsal and ventral margins (Fig. 19B) . . . . . *Melanoplus gurneyi*

27(23). Found only in north-central Florida in Putnam and Clay counties; cerci longer than supra-anal plate (Fig. 20A,B). . . . . *Melanoplus ordwayae*

27'. Found only in south-central Florida, from Orlando south to Lake Okeechobee; cerci about as long as supra-anal plate (Fig. 21A,B). . . . . *Melanoplus tequestae*

28(22). Cerci broad, tapering only slightly (Fig. 22B) . . . . . *Melanoplus scudderi*

28'. Cerci expanding slightly beyond middle or spoon shaped (Fig. 23B) 29

29(28). Furcula short and rounded, or not visible 30

29'. Furcula evident and pointed. 31

30(29). Furcula very short (Fig. 24A) . . . . . *Melanoplus adelogyrus*

30'. Furcula not visible (Fig. 25A) . . . . . *Melanoplus pygmaeus*

31(29). Furcula large, about 1/2 the length of the supra-anal plate (Fig. 26A) . . . . . *Melanoplus strumosus*

31'. Furcula short, about 1/4 the length of the supra-anal plate or less (Fig. 23A) . . . . . *Melanoplus tepidus*

32(5). Wing length intermediate; wings appreciably longer than pronotum but not attaining tip of abdomen . . . 33

32'. Wing length long; wings nearly attaining tip of abdomen or extending beyond the tip 37

33(32). Size small (16-28 mm); color usually grass green 34

33'. Size medium to large (typically >28 mm); not green. 36

34(33). Purple or purple and white dorsal stripe present on pronotum . . . . . *Hesperotettix viridis*

34'. Dorsal stripe normally absent from pronotum; if present, stripe is brownish. 35

35(34). Lateral carinae on the pronotum cut by a single sulcus; head enlarged (Fig. 27B). . *Dichromorpha elegans*

35'. Lateral carinae on the pronotum cut by two sulci; head not enlarged (Fig. 27A) . . . . . *Dichromorpha viridis*

36(33). Size medium (22-40 mm); color usually grayish or brownish; hindwings transparent; subgenital plate deeply notched (Fig. 28C) . . . . . *Melanoplus querneus*

36'. Size large (43-70 mm); forewing color some combination of black, yellow, and reddish; hindwings brilliant red . . . . . *Romalea microptera*

37(32). Hindwings distinctly pigmented, usually brightly colored with transverse black band 38

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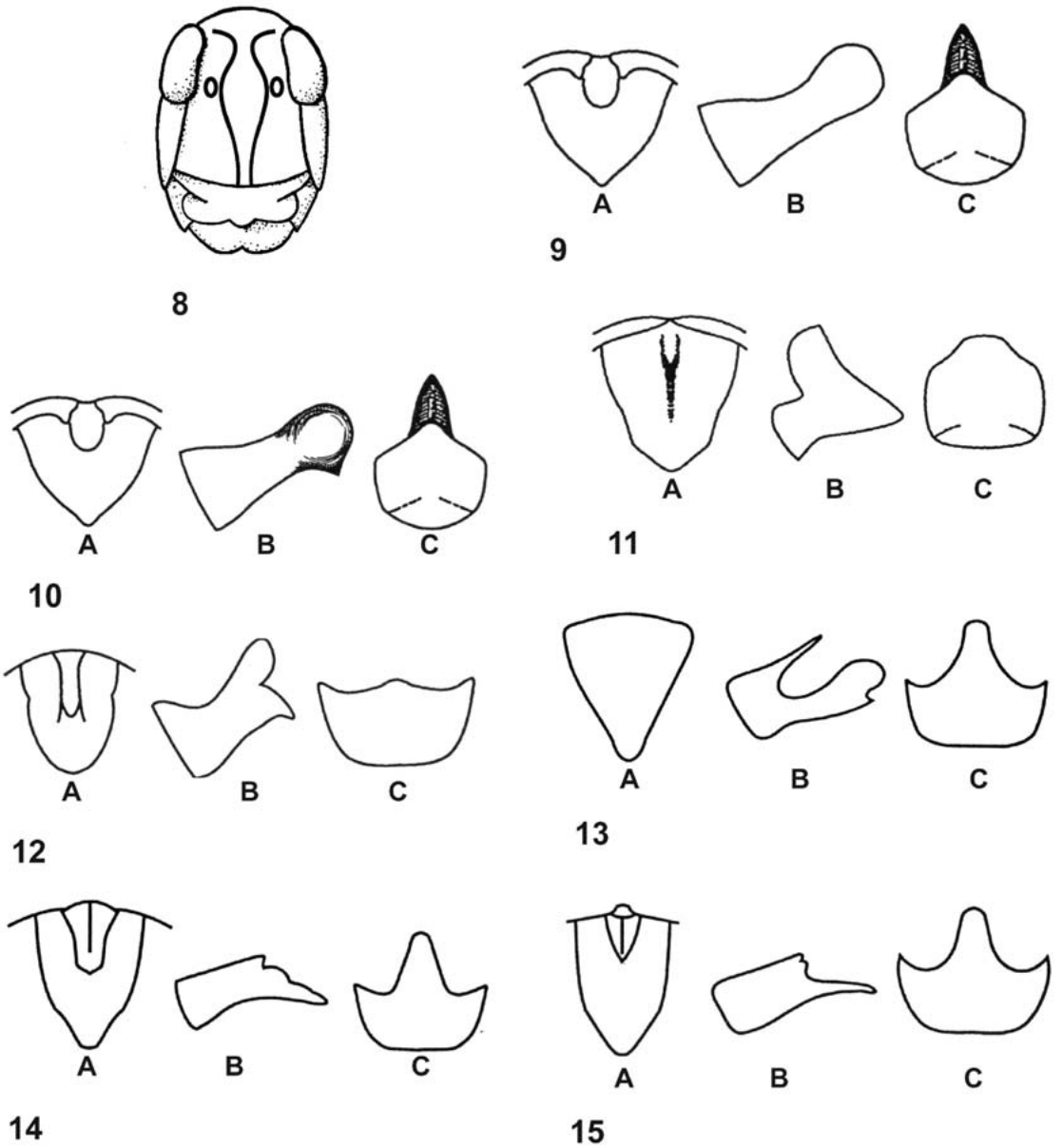


Fig. 8. Face of *Eotettix* spp.
Fig. 9. Male *M. rotundipennis*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 10. Male *M. withlacoocheensis*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 11. Male *M. scapularis*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 12. Male *M. furcatus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 13. Male *M. nanciae*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 14. Male *M. forcipatus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 15. Male *M. indicifer*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).

37'. Hindwings not distinctly pigmented, usually transparent except for wing veins 53

38(37). Hindwings orange or pinkish 39

38'. Hindwings other than orange or pink 42

39(38). Transverse black band of hindwings wide, about 1/3 the width of the wing, and crossing near the center of the wing 40

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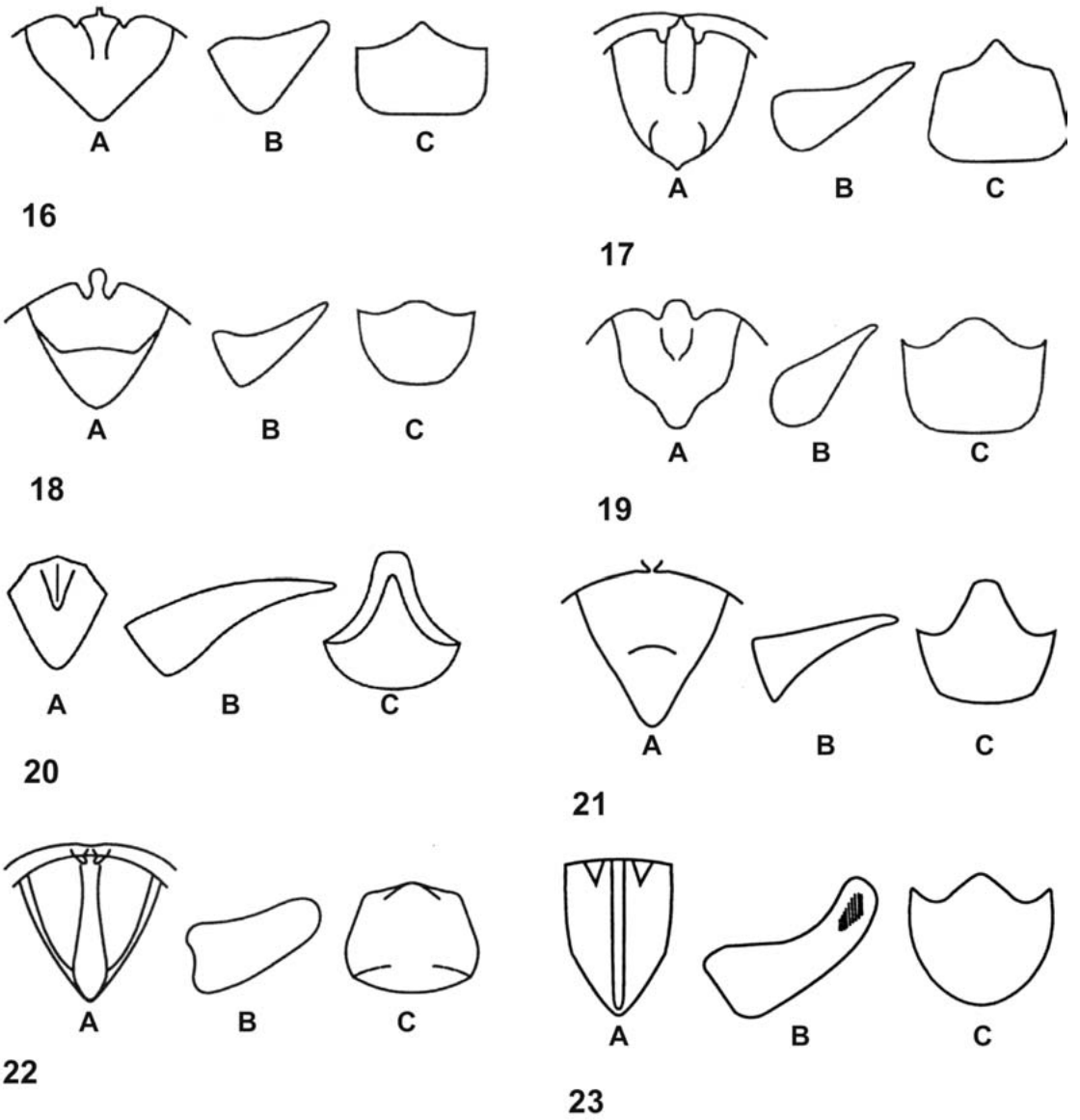


Fig. 16. Male *M. davisi*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 17. Male *M. puer*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 18. Male *M. apalachicolae*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 19. Male *M. gurneyi*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 20. Male *M. ordwayae*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 21. Male *M. tequestae*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 22. Male *M. scudderi*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 23. Male *M. tepidus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).

39'. Transverse black band of hindwings not wide, about 1/4 the width of the wing or less, and not located centrally 41

40(39). Hind tibiae yellowish with black band; basal segments of antennae strongly flattened . . . . . *Psidinia fenestralis*

40'. Hind tibiae orange or red, yellow basally; basal segments of antennae weakly flattened . . . . . *Spharagemon marmorata*

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41(39). Hind tibiae yellow; inner face of hind femora yellow and black . . . . . *Hippiscus ocelote*

41'. Hind tibiae orange; inner face of hind femora orange, blue, and black . . . . . *Pardalophora phoenicoptera*

42(38). Hindwings yellow. 43

42'. Hindwings black or largely transparent 52

43(42). Hindwings pale yellow basally, tips usually cloudy 44

43'. Hindwings pale yellow basally, tips usually transparent 48

44(43). Median pronotal ridge weak; hind tibiae orange or red; hindwing with dark band centrally . . . . . *Spharagemon marmorata*

44'. Median pronotal ridge pronounced; hind tibiae yellow, or yellow and black; hindwing with dark band near margin 45

45 (44). Forewings with large dark spots and transverse yellow stripe . . . . . *Hippiscus ocelote*

45'. Forewings without large dark spots; hind margin of front wings may be pale yellow, forming yellow line along back 46

46(45). Frontal costa not narrowed markedly above antennae (Fig. 29B) 47

46'. Frontal costa markedly narrowed above antennae; uncommon in Florida (Fig. 29A) . . . . . *Arphia sulphurea*

47(46). Forewings with pale yellow hind margin; median carina less elevated than in *A. xanthoptera*; common in Florida . . . . . *Arphia granulata*

47'. Forewings lacking yellow hind margin: median carina more elevated than *A. granulata*; uncommon in Florida . . . . . *Arphia xanthoptera*

48(43). Hind tibiae uniformly colored yellow to red 49

48'. Hind tibiae yellow basally and orange to red distally 50

49(48). Forewings with large dark spots and transverse yellow line . . . . . *Hippiscus ocelote*

49'. Forewings with small dark speckles, lacking transverse yellow line . . . . . *Trimerotropis maritima*

50(48). Short black band separating orange and yellow portions of hind tibiae . . . . . *Spharagemon bolli*

50'. Hind tibiae lacking black band, or with broad black band 51

51(50). Moderately elevated median carina; body usually lacking spotted or mottled pattern (if forewing heavily spotted and with transverse yellow line, see *Hippiscus ocelote*); hind tibiae subdued orange . . . . . *Spharagemon crepitans*

51'. Greatly elevated median carina; body spotted or mottled, hind tibiae bright red or orange . . . . . *Spharagemon cristatum*

52(42). Hindwings black, with yellow margin . . . . . *Dissosteira carolina*

52'. Hindwings largely transparent, with diffuse blackish area centrally . . . . . *Chortophaga australior*

53(37). Face strongly slanted (Fig. 7C); spine present or absent from between front legs 54

53'. Face not strongly slanted (Fig. 7B); spine present between front legs (Fig. 7A) 64

54(53). Tips of forewings sharply pointed; spine present between front legs 55

54'. Tips of forewings not pointed; spine absent from between front legs. 56

55(54). Head as long as pronotum, or longer; body brown, usually with a white stripe running along the base of the pronotal lateral lobe . . . . . *Leptysma marginicollis*

55'. Head shorter than pronotum; body green . . . . . *Stenacris vitreipennis*

56(54). Tips of forewings flattened, but forming sharp angle (Fig. 30) . . . . . *Metaleptea brevicornis*

56'. Tips of forewings rounded 57

57(56). Antennae clearly flattened and sword-shaped (Fig. 7E) 58

57'. Antennae not clearly flattened and sword-shaped (Fig. 7D). 60

58(57). Dorsal stripe absent from pronotum; lateral ridges absent from pronotum (Fig. 31B); white stripe may be on forewings. . . . . *Mermiria bivittata*

58'. Dorsal stripe usually present on pronotum 59

59(58). White stripe at base of forewings; lacking lateral carinae on pronotum (Fig. 31B). . . . *Mermiria intertexta*

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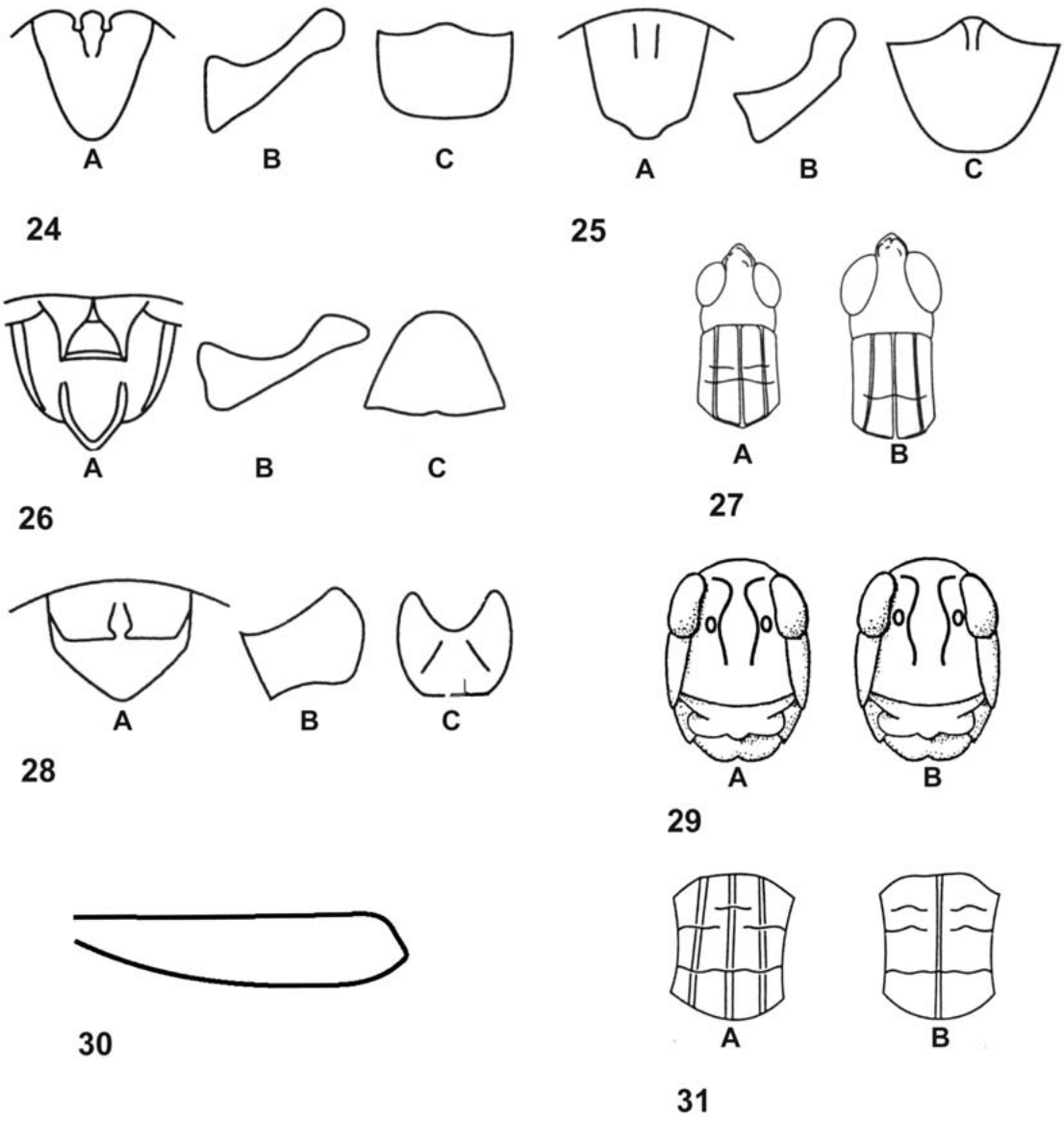


Fig. 24. Male *M. adelogyrus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 25. Male *M. pygmaeus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 26. Male *M. strumosus*; supra-anal plante and furcula (A), cercus (B) and subgenital plate (C).
Fig. 27. Two crevices or cuts in the lateral carinae on the pronotum present on *D. viridis* (A), and absent on *D. elegans* (B).
Fig. 28. Male *M. querneus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 29. Face of *A. sulphurea* (A) and *A. granulata* and *A. xanthoptera* (B).
Fig. 30. Lateral view of the forewing of *M. brevicornis*.
Fig. 31. Lateral carinae present on pronotum of *M. picta* (A), and absent on *M. intertexta* and *M. bivittata* (B).

59'. White stripe lacking from base of forewings; lateral carinae present on pronotum (Fig. 31A) . *Mermiria picta*

60(57). Lateral edge of dorsal surface of pronotum well marked with white lines 61

60'. Lateral edge of dorsal surface of pronotum not marked with white lines 62

61(60). Lateral pronotal ridges strongly compressed (Fig. 32); forewings spotted or speckled . . *Orphulella pelidna*

61'. Lateral pronotal ridges weakly compressed; forewings with a wavy pattern (Fig. 33); forewings may have distinct markings but not spotted or speckled . . . . . *Syrbula admirabilis*

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62(60). Brownish, normally (in fresh specimens) with dorsal yellowish stripe on head and pronotum; males without enlarged front and middle femora; ventral surface of hind femora reddish . . . . . *Amblytropidia mysteca*

62'. Usually green, sometimes brown; lacking yellowish stripe on head and pronotum; males with enlarged front and middle femora; ventral surface of hind femora not reddish 63

63(62). Lateral carinae cut by single sulcus; head enlarged (Fig. 34B) . . . . . *Dichromorpha elegans*

63'. Lateral carinae cut by two sulci; head not enlarged (Fig. 34A) . . . . . *Dichromorpha viridis*

64(53). Male cerci broad, flat, with tip wider than base 65

64'. Male cerci with tip width about the same size or narrower than the base width 68

65(64). Male cerci with tip notched, one or both branches pointed 66

65'. Male cerci with tip not notched, bluntly rounded (Fig. 36B, 37B) 67

66(65). Male cerci with dorsal branch large and rounded, 3 times as wide as the small and pointed ventral branch (Fig. 35B); furcula visible . . . . . *Melanoplus keeleri*

66'. Male cerci with dorsal branch only slightly longer than ventral branch, and not 3 times as wide; furcula not visible (Fig. 12B). . . . . *Melanoplus furcata*

67(65). Body gray with numerous dark spots; inside of femur blood red . . . . . *Melanoplus punctulatus*

67'. Body brownish, lacking spots; inside of femur not red . . . . . *Melanoplus symmetricus*

68(64). Male cerci distinctly wider at base than at tip (e.g., Fig. 38B) 69

68'. Male cerci with width at tip about same as width at base (e.g., Fig. 42B, 44) 74

69(68). Cerci expanded at tip. 70

69'. Cerci with blunt or rounded tip, but not expanded 72

70(69). Cerci only slightly expanded at the tip (Fig 38B); black band usually indistinct; forewings with row of small spots . . . . . *Melanoplus impudicus*

70'. Cerci spoon-shaped; black band behind eye distinct on pronotum; forewings usually lacking spots 71

71(70). Black stripe normally fading on lobe of pronotum; size small: males 16-24 mm, females 22-28 mm, male cerci spoon-shaped (Fig. 39A) . . . . . *Paroxya atlantica*

71'. Black stripe normally crossing lobe pronotum, not fading; size moderate: males 20-30 mm, females 29-40 mm, male cerci spoon-shaped with small notch at tip forming an obscure lower lobe (Fig. 39B). . . . . *Paroxya clavuliger*

72(69). Body green, sometimes with purple . . . . . *Hesperotettix viridis*

72'. Body yellowish brown 73

73(72). Furcula at least 1/2 the length of supra-anal plate (Fig. 40A) . . . . . *Melanoplus propinquus*

73'. Furcula at least 1/4-1/3 the length of supra-anal plate (Fig. 41A) . . . . . *Melanoplus sanguinipes*

74(68). Cerci expanded, usually spoon-shaped at tip (Fig. 42B) 75

74'. Cerci about equal in width throughout (Fig. 44), and often flattened at tip 77

75(74). Forewings with row of small spots; dorsal surface of femur with 2-3 distinct transverse black bars . . . . . *Melanoplus bispinosus*

75'. Forewings lacking spots; femur lacking black bars 76

76(75). Black stripe normally fading on lobe of pronotum; size small: males 16-24 mm, females 22-28 mm; male cerci spoon-shaped (Fig. 39A) . . . . . *Paroxya atlantica*

76'. Black stripe normally crossing lobe of pronotum, not fading; size moderate: males 20-30 mm, females 29-40 mm; male cerci spoon-shaped but with small notch at tip forming an obscure lower lobe (Fig. 39B) . . . . . *Paroxya clavuliger*

77(74). Forewings with large dark spots. . . . . *Schistocerca americana*

77'. Forewings with small spots or lacking spots 78

78(77). Body size moderate: males 28-32 mm, females 36-40 mm; spots on forewings distinct; only found on or in close proximity to Florida Rosemary, *Ceratiola ericoides* Michx.; (if lacking spots on wings, or spots minute, see *S. damnifica*) . . . . . *Schistocerca ceratiola*

78'. Body size usually large: males often 30-40 mm, females often 42-67 mm; spots on forewings minute if present 79

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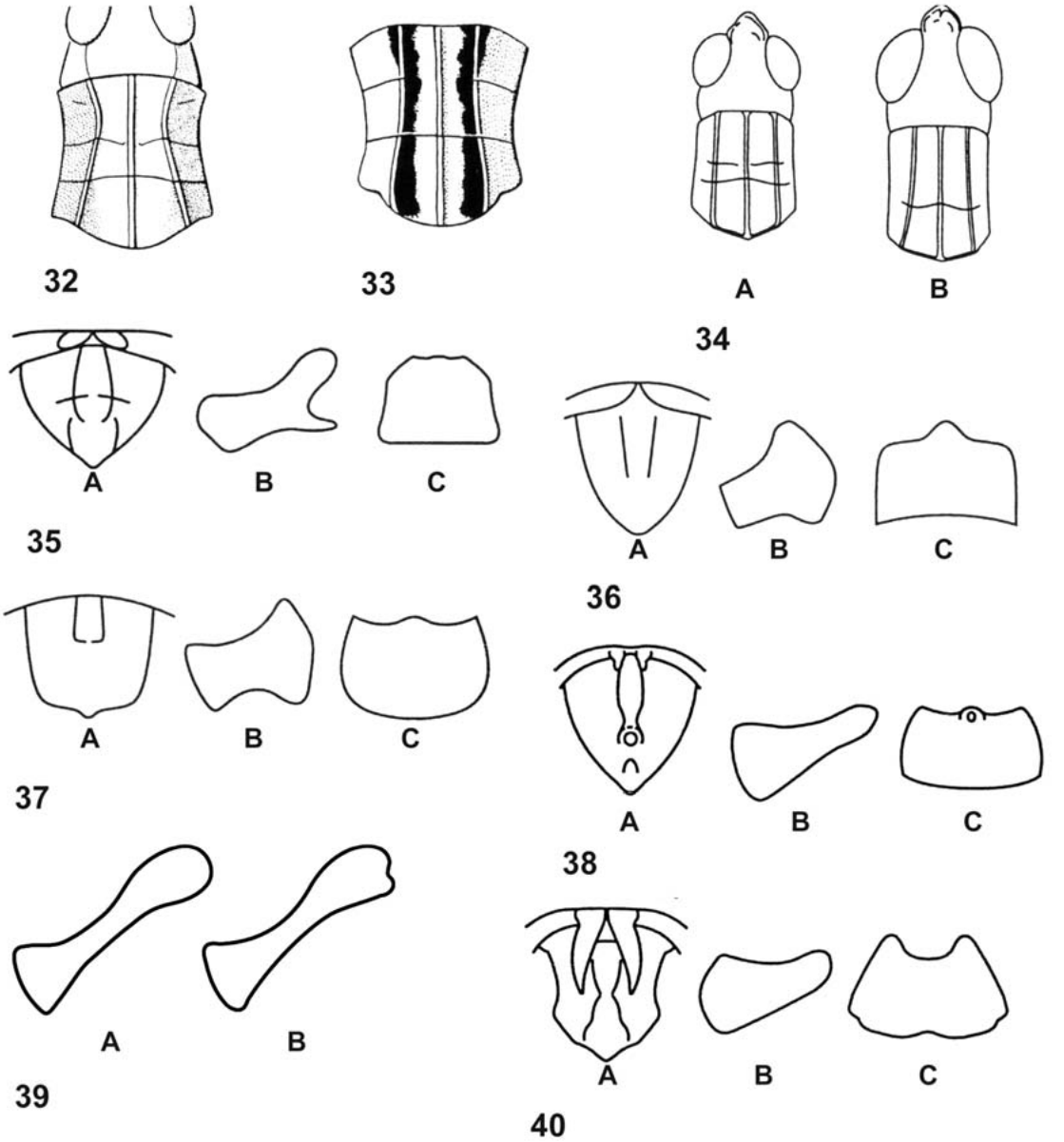


Fig. 32. Strongly compressed lateral carinae, *O. pelidna*.
Fig. 33. Weakly compressed lateral carinae, *S. admirabilis*.
Fig. 34. *D. viridis* (A) and *D. elegans* (B).
Fig. 35. Male *M. keeleri*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 36. Male *M. punctulatus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 37. Male *M. symmetricus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 38. Male *M. impudicus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 39. Male cerci of *P. atlantica* (A) and *P. clavuliger* (B).
Fig. 40. Male *M. propinquus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).

79(78). Median ridge on pronotum elevated, often lacking dorsal yellowish line on head and pronotum; antennae shorter than head and pronotum; body size moderate: males 25-35 mm, females 28-52 mm . . . *Schistocerca damnifica*

79'. Pronotum lacking elevated medial ridge; antennae much longer than head and pronotum, especially in males; body size large; males 30-46 mm, females 42-67 mm 80

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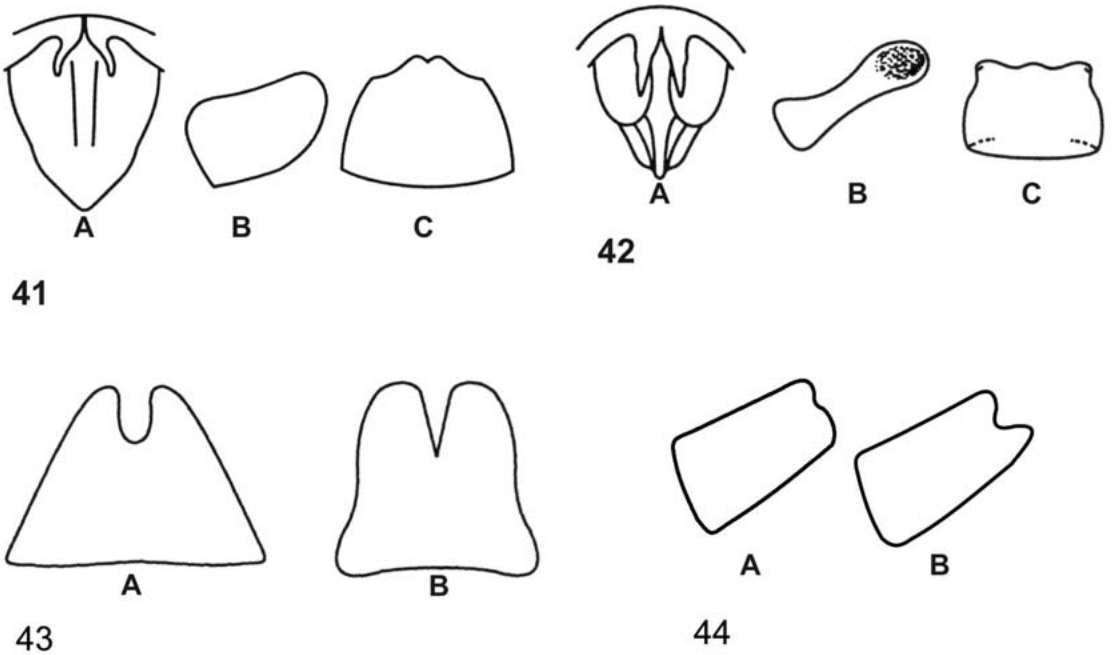


Fig. 41. Male *M. sanguinipes*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 42. Male *M. bispinosus*; supra-anal plate and furcula (A), cercus (B) and subgenital plate (C).
Fig. 43. *S. alutacea* with a U-shaped notch at the tip of the males abdomen (A) and *S. obscura* with a V-shaped notch at the tip of the males abdomen (B).
Fig. 44. Male cerci of *S. rubiginosa* (A) and *S. alutacea* (B).

80(79). Tip of male abdomen, viewed from rear, with V-shaped notch in the subgenital plate (Fig. 43B); females usually over 55 mm in length . . . . . *Schistocerca obscura*

80'. Tip of male abdomen, viewed from rear, with U-shaped notch in the subgenital plate (Fig. 43A); females usually less than 55 mm in length. 81

81(80). Dorsal stripe always present; ventral lobe at tip of male cerci longer than dorsal lobe (Fig. 44B). . . . . *Schistocerca alutacea*

81'. Dorsal stripe usually absent; both lobes at tip of male cerci about equal in length (Fig. 44A). . . . . *Schistocerca rubiginosa*

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