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T.E. Moore  
COPY #1

THE CICADAS OF MICHIGAN  
(HOMOPTERA: CICADIDAE)

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ALL species of cicadas have long life cycles, extending over four or more years (Beamer 1928). The longest life cycles are those of the three species of 17-year cicadas (Alexander and Moore 1962). Cicadas feed on sap from trees and other perennial plants, and the burrowing juveniles live underground and suck sap from the roots of similar plants. The adults of our Michigan cicadas feed both day and night on the sap of many green plants, and they are all associated with wooded areas. Calling songs of cicadas are species-specific and form the most reliable and quickest guide to identification. Cicadas ordinarily sing only during the daytime, and calls are produced only by males except in the Far Western genera *Neoplatypedia* and *Platypedia* in which both males and females signal by tapping the costal margins of their front wings beneath their bodies, and in which timbals are not functional.

*DICEROPROCTA* Stal

*vitripennis* (Say). Oak woods in sandy areas. Adults, June-July. Berrien County.

The calling song of this species sounds very similar to that of *Okanagana canadensis* below. This species can be recognized from other Michigan species by its covered timbals, small size (length 33-38 mm), all green posterior pronotal collar, white underside, and narrow wings. It is known only from the R. K. Warren Preserve in the Sawyer Dunes in Michigan, collected by T. H. Hubbell, 25 June 1919.

*MAGICADA* Davis

*cassini* (Fisher), Cassin's 17-year cicada. Oak-hickory and beech-maple woods. Adults, May-June. Washtenaw County.

Only one specimen of this species is known from Michigan, found amid several quarts of specimens collected 21 June 1936 in

Ann Arbor (Brood X) by I. J. Cantrall. However, this species may be fairly common here. No positive records for the third 17-year cicada, *M. septendecula* Alexander and Moore, have been discovered (cf. Cantrall 1937). The song of *cassini* consists of a rapidly delivered series of ticks lasting two to three seconds followed by a high-pitched, sibilant buzz lasting one to three seconds and noticeably rising, then falling, in both pitch and intensity.

17-year cicadas are the only Michigan species with red eyes and wing veins and an all-black dorsal thorax; males also have exposed timbals. This species is readily separated from the next by its all-black prothorax between the eyes and wing bases.

*septendecim* (Linnaeus). Linnaeus' 17-year cicada. Oak-hickory and beech-maple woods. Adults, May-June. Calhoun, Genesee, Kalamazoo, Lenawee, Livingston, Oakland, Ottawa, Washtenaw, and Wayne counties.

Broods VI and X, especially the latter, are definitely known for Michigan. Brood VI will appear next in 1966, and Brood X in 1970. The song of this species is the well known "pharaoh" call, a low pitched, somewhat musical song lasting one to three seconds which first rises in both pitch and intensity and then falls in both at the end. Specimens of this species can be distinguished from *cassini* by a red band on the prothorax between the eyes and wing bases.

There are literature records for 17-year cicadas—without species identification—for other counties of Broods VI and X, for Kalamazoo County for Brood II, and for several southernmost counties for Brood XIII (Marlatt 1923). Many of these records are likely based on emergences of *Okanagana rimosa*. Certainly all those above the Thumb are. Some of the others—particularly those for counties from which we have verified records of species occurrence for other broods—may have resulted from collectors seeing dead individuals on the ground in nonemergence years, or from seeing or hearing isolated straggling individuals which had gotten out of synchrony with their regular brood emergences (Alexander and Moore 1962). Stragglers are rare, and these scattered individuals have never been known to establish a successful new brood. The most recent verified straggling record is for probably a single individual of *M. septendecim* at Neotoma, Hocking County, Ohio, 6 September 1964, reported by Edward S. Thomas (in litt.) which preceded the expected emergence of Brood V in that area in May and June of 1965. These emergences are of particular interest and importance.

Suspected emergences of 17-year cicadas, particularly in unexpected years, should be reported immediately, and backed up with live-caught specimens or careful listening records if at all possible. Despite the examination of nearly 20,000 specimens of *Magicicada* from about 40 institutions, no specimens were located to confirm 17-year cicada emergences for other than the few localities for the two broods indicated on the maps.

OKANAGANA Distant

*canadensis* (Provancher). Pine-aspen woods in western counties of the Upper Peninsula. Adults, June-August. Baraga, Gogebic, Houghton, Iron, Marquette, and Ontonagon counties and Isle Royale.

The life cycle may be four years in this species. The calling song is a series of rapidly delivered, high-pitched lisps lasting up to a minute or more.

The Michigan species of *Okanagana* can be recognized from other cicadas by their dark eyes and reddish basal wing veins, black dorsal thorax marked with red, and exposed timbals in males. *O. canadensis* has the first abdominal sternite black laterally behind the opercula and the second and eighth abdominal tergites black dorsally. Males have 10 timbal ribs and the second abdominal tergite black directly behind the timbals.

*rimosa* (Say). Pine barrens and pine-aspen woods. Adults, May-September. Alcona, Alpena, Berrien, Cheboygan, Chippewa, Clare, Crawford, Dickinson, Genesee, Gogebic, Iron, Mackinac, Marquette, Missaukee, Montmorency, Ontonagon, Oscoda, Presque Isle, and Roscommon counties.

The life cycle may be four years in this species also (Kirby and McPhee 1963). The calling song is a high-pitched steady buzz lasting up to a minute, somewhat reminiscent of the night-time buzz of the cone-headed grasshopper *Neoconocephalus crepitans* (cf. Davis 1926).

This species has the first abdominal sternite red laterally behind the opercula and the second and eighth abdominal tergites red and black dorsally. Males have seven to eight timbal ribs (rarely, one timbal with a short ninth rib) and the second abdominal tergite red directly behind the timbals. *O. rimosa* often occurs in large aggregations, is red and black, and adults first become active about the same time as 17-year cicadas (Moore and Alexander 1958; species

misidentified as *O. canadensis*, p. 354). In addition, they even have a fungus similar in appearance to that of 17-year cicadas (Soper 1963). Therefore, it is not surprising that emergences of *O. rimosa* have often been confused for emergences of 17-year cicadas in latitudes north of southern Michigan.

#### TIBICEN Latreille

*auletes* (Germar). Oak woods. Adults, August-October. Allegan, Barry, Huron, Kent, Muskegon, Newaygo, Ottawa, and Roscommon counties.

The calling song of *auletes* sounds like the noise made by a hand-held roller skate rapidly and repeatedly pushed a few inches over a concrete sidewalk and briefly held in the air between strokes. Most singing takes place during the last half-hour of sunset.

The Michigan species of *Tibicen* can be recognized by their large size and robust appearance; green and black and white markings; by green and black wing veins with two infuscated, anterior, apical crossveins (the crossvein nearest the wing apex lies near the base of the first costal cell rather than near the middle of that cell as in *Diceroprocta*); and by covered timbals in males. These are the dog-day or harvest cicadas, singing most commonly from about the fourth of July until frost. *T. auletes* is our biggest Michigan cicada (length, 60-72 mm), has the underside pale with a whitish bloom, the opercula closing only the acoustical cavity and not extending over several additional abdominal sternites, the posterior pronotal collar pale, the mesonotal shoulders black up to and under the marginal whitish bloom, and several basal and apical abdominal tergites marked with a whitish bloom.

*canicularis* (Harris). Dog-day cicada. Oak woods-northern hardwood forests. Adults, June-November. Alcona, Alger, Alpena, Baraga, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Cheboygan, Chippewa, Clare, Crawford, Dickinson, Emmet, Genesee, Gogebic, Grand Traverse, Iosco, Iron, Jackson, Kalamazoo, Kalkaska, Kent, Leelanau, Livingston, Luce, Mackinac, Manistee, Marquette, Mason, Menominee, Midland, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Ontonagon, Oscoda, Otsego, Presque Isle, Roscommon, Schoolcraft, Shiawassee, St. Clair, St. Joseph, Van Buren, Washtenaw, Wayne, and Wexford counties.

This is clearly the most abundant and widespread cicada in Michigan. Its calling song is a high-pitched whine reminiscent of the whine of a distant buzz saw. Most singing usually occurs about noon and again in late afternoon, produced by males usually sitting in the treetops.

The species is the smallest *Tibicen* in Michigan (length, 37-42 mm) and rather resembles *T. linnei* below. Specimens of *canicularis* may be separated from the others by a median black stripe on the underside of the abdomen, by a green, posterior, pronotal collar, and by evenly and gently curving costal margins of the front wings.

Cicada species of similar appearance that live together throughout much of their geographical ranges, such as *canicularis* and *linnei*, are usually much more readily separated by differences in songs and acoustical behavior than by morphological differences.

*chloromera* (Walker), swamp ground cicada. Swampy woods.

Adults, July-October. Ingham, Lenawee, and Washtenaw counties.

This species usually occurs in wet woods, and individuals often sing in situations ranging from low weeds to tall trees. Most singing occurs in the morning. The calling song of this species is difficult to distinguish from that of *linnei*, below. Both species begin calling with a soft buzz which rises in intensity and then becomes soft again. The most intense part of the song pulsates 10 to 14 times per second in *chloromera*, and each song phrase normally lasts less than 20 seconds.

*T. chloromera* is readily separated from the other Michigan species by its black, posterior, pronotal collar and by its pale lower abdomen with a whitish bloom sometimes concealing a narrow and incomplete median, black stripe (body length, 46-52 mm). The opercula in males are distinctive in extending posteriorly over two or three abdominal sternites in addition to closing the acoustical cavity.

*linnei* (Smith and Grossbeck). Linne's cicada. Oak-hickory and beech-maple woods. Adults, June-November. Allegan, Berrien, Branch, Genesee, Ingham, Jackson, Kalamazoo, Kent, Lenawee, Livingston, Midland, Van Buren, Washtenaw, and Wayne counties.

This species sings mostly during the brightest sunlit portions of the day from trees in woodlots, roadsides, and towns. The pulsa-

tions in the loudest portion of its calls are delivered at a rate of 5 to 10 per second, and song phrases normally last 20 to 50 seconds.

Specimens look very much like *T. canicularis* but can be recognized by a greater amount of green on the mesonotum and by sharply angled costal margins of the front wings (body length, 43-49 mm).

*lyricen* (DeGeer), lyric cicada. Oak woods. Adults, July-September.

Berrien, Jackson, Kalamazoo, Livingston, St. Joseph, Van Buren, and Washtenaw counties.

In Michigan, these cicadas apparently occur in oak woods that also have maples and beeches. This species sings mostly from tree-tops from mid-morning to mid-afternoon. Its song is a coarse, steady buzz lasting up to a minute or more.

This is the only Michigan species with a black, posterior, pronotal collar and with a broad, prominent, black, longitudinal stripe on the lower abdomen.

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FIG. 1. Distribution in Michigan of *Diceroprocta vitripennis*.



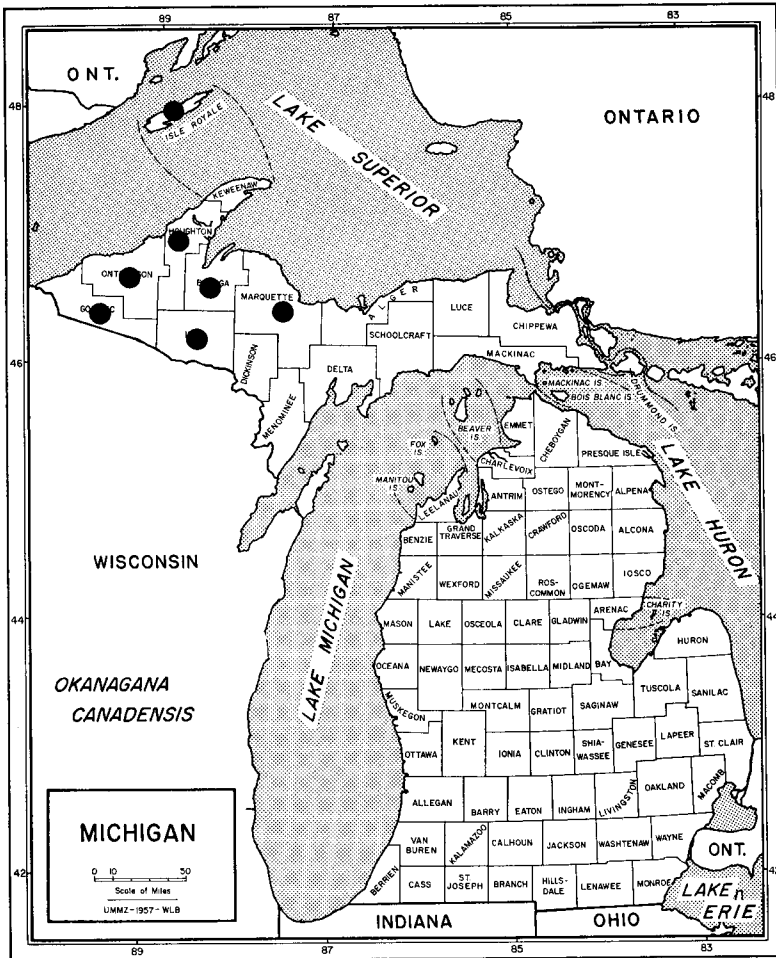


FIG. 2. Distribution in Michigan of *Okanagana canadensis*.



FIG. 3. Distribution in Michigan of *Okanagana rimosa*.



FIG. 4. Distribution in Michigan of *Magicicada*, species unknown—literature records (Brood II: 1945-1962-1979).



FIG. 5. Distribution in Michigan of *Magicicada septendecim* (circle), species unknown—literature records (squares) (Brood VI: 1949-1966-1983).



FIG. 6. Distribution in Michigan of *Magicicada septendecim* (solid circles), *septendecim* and *cassini* (Washtenaw Co.), species unknown—literature records (squares) (Brood X: 1953-1970-1987).



FIG. 7. Distribution in Michigan of *Magicicada*, species unknown—literature records (Brood XIII; 1956-1973-1990).

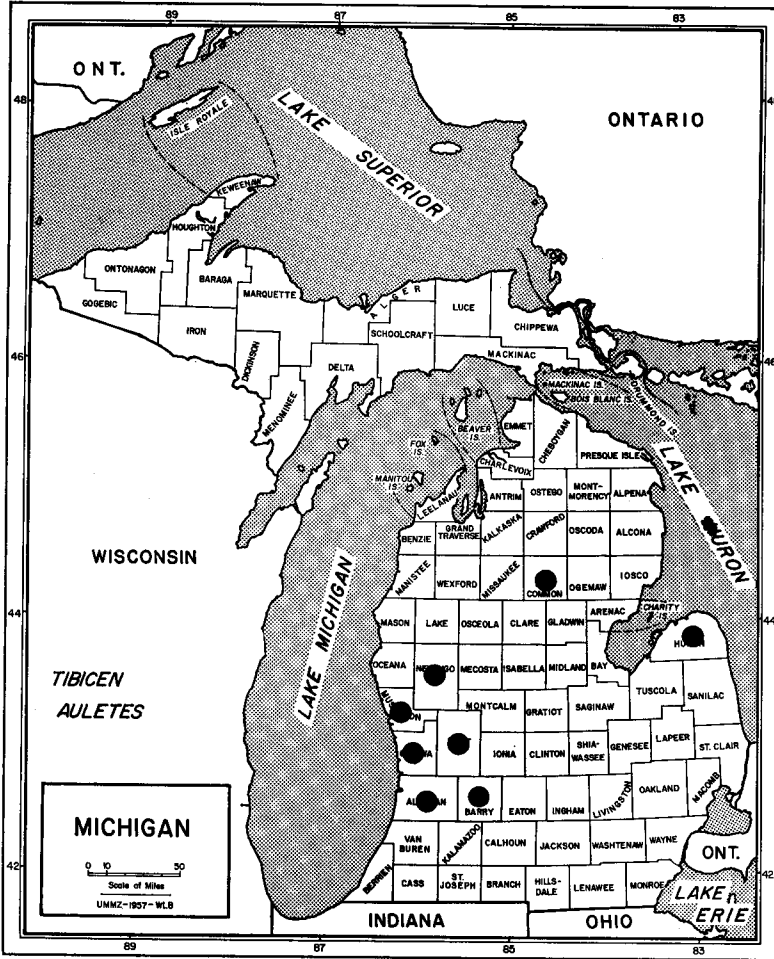


FIG. 8. Distribution in Michigan of *Tibicen auletes*.







FIG. 10. Distribution in Michigan of *Tibicen chloromera*.



FIG. 11. Distribution in Michigan of *Tibicen linnei*.

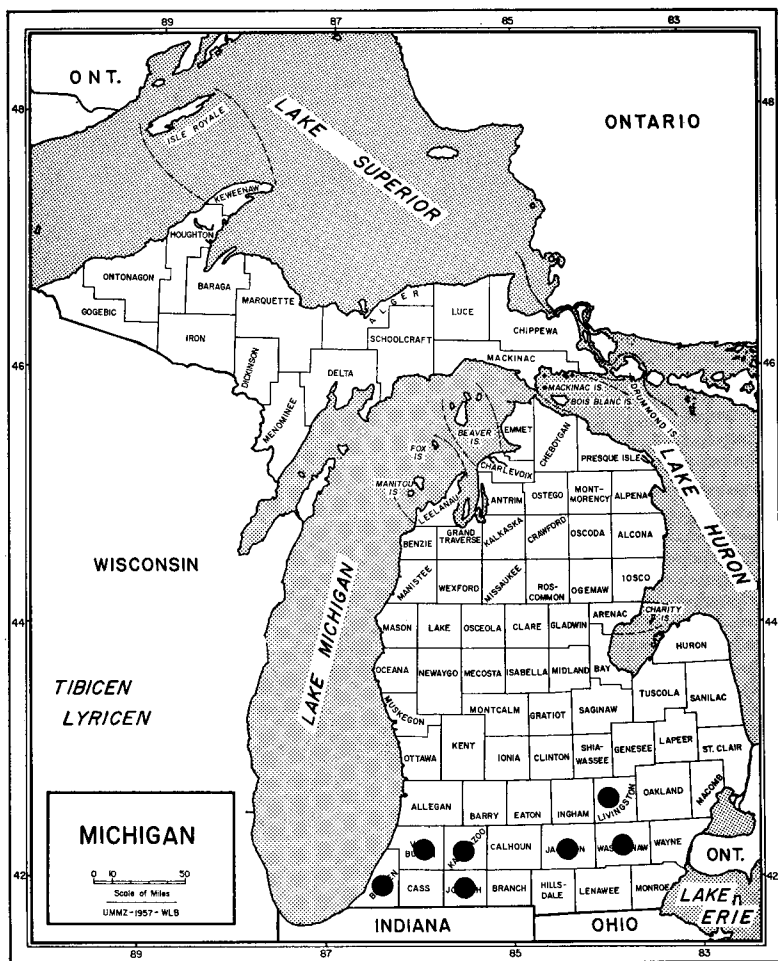


FIG. 12. Distribution in Michigan of *Tibicen lyricen*.

## EXPLANATION OF PLATE I

A, male, B, female, in each figure; dorsal aspect, left, ventral aspect, right, in each figure.

FIG. 13. *Diceroprocta vitripennis* (Say).

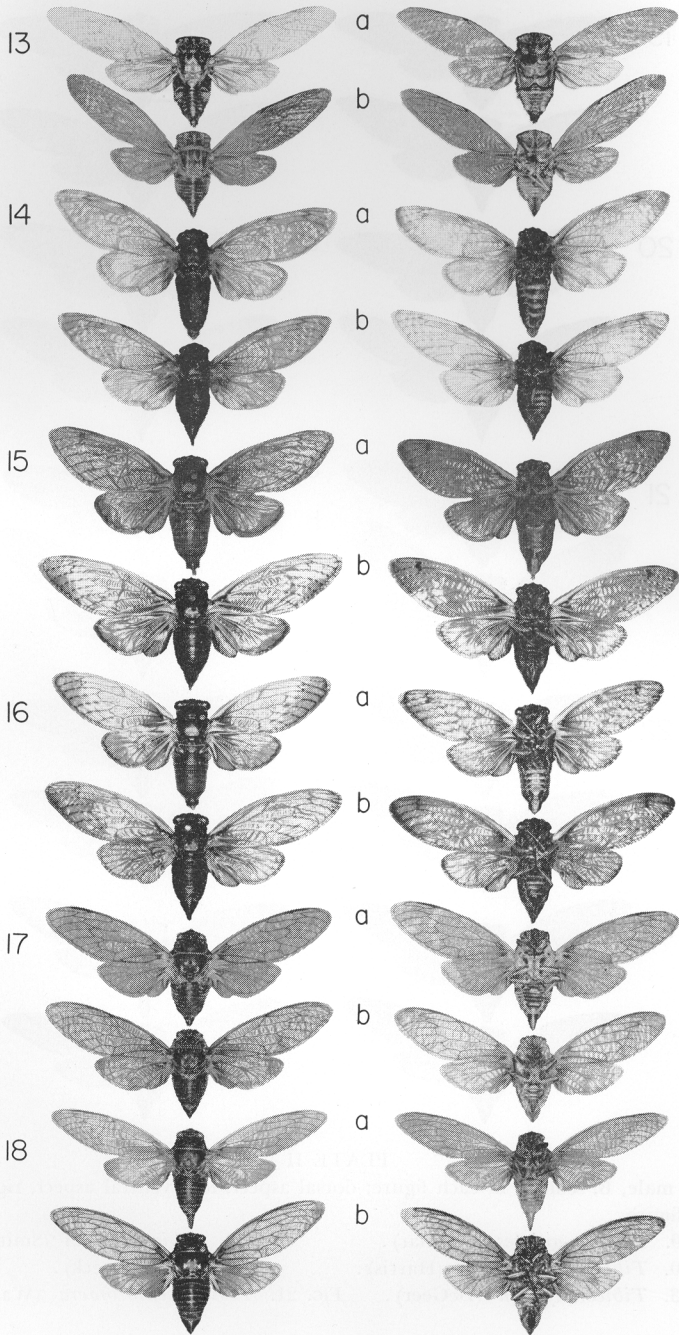
FIG. 14. *Magicicada cassini* (Fisher).

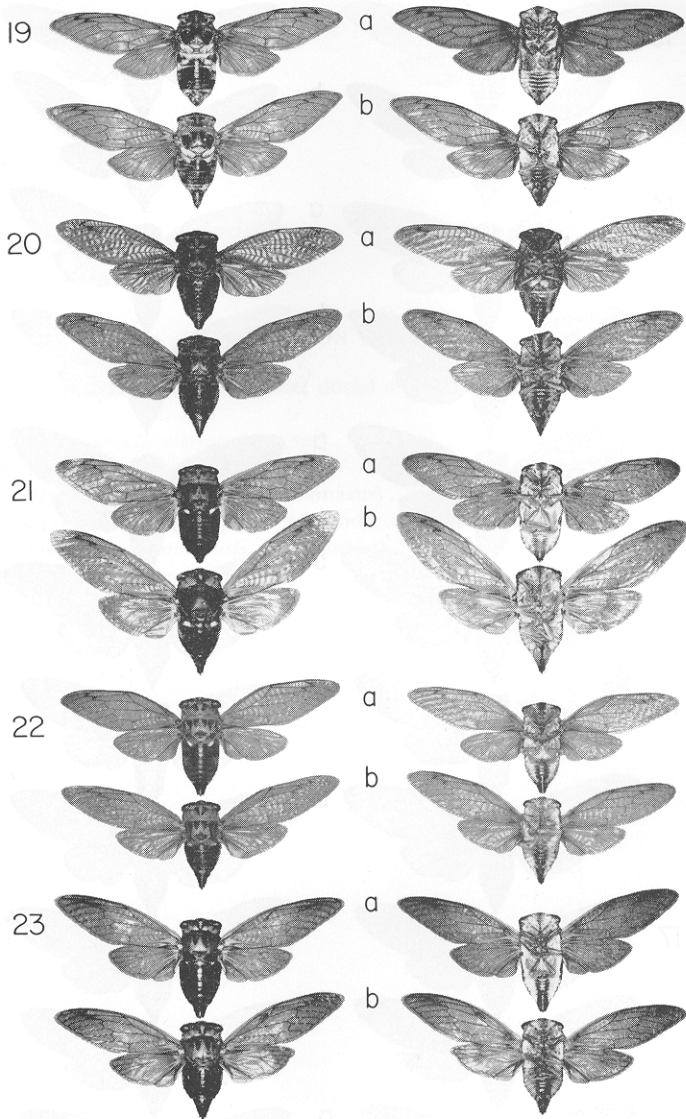
FIG. 15. *Magicicada septendecim* (Linnaeus).

FIG. 16. *Magicicada septendecula* Alexander and Moore.

FIG. 17. *Okanagana canadensis* (Provancher).

FIG. 18. *Okanagana rimosa* (Say).





## PLATE II

A, male, B, female, in each figure; dorsal aspect, left, ventral aspect, right, in each figure.

FIG. 19. *Tibicen auletes* (Germar).

FIG. 22. *Tibicen linnei* (Smith and Grossbeck).

FIG. 20. *Tibicen canicularis* (Harris).

FIG. 23. *Tibicen lyricen* (DeGeer).

FIG. 21. *Tibicen chloromera* (Walker).