

The Periodical Cicada *Magicicada septendecim* (L) in Indiana

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There are two races of the periodical cicada—race *septendecim*, which takes 17 years to complete its life cycle, and race *tredecim*, which takes 13 years. On the whole, the 13-year race is more southern in distribution, but the territory of the two races overlap, and both races occur in Indiana. There is no perceptible difference in the appearance of the individuals of the two races, but they have not been observed to mate when the individuals of the two races appear at the same time in the same place. The same broods of the two races will appear in the same year only once in every 221 years.

Two distinct forms of cicadas appear in both races—a large form and a small or “dwarf” one, which is about $\frac{2}{3}$ as large as the other. The larger form is always more numerous. The small form was described as a new species, *M. cassinii*, by Fisher in 1851. The writer, for the purposes of this paper, has followed Riley (1885) in considering this small form a variety instead of a distinct species. The body of the adults of both races of the species proper is about $1\frac{1}{8}$ inches long from the head to the tip of the abdomen, and $1\frac{1}{2}$ inches long from the head to the tip of the folded wings; the body color is black, except that either the entire underside of abdomen or the edge of the segments is a dull brownish-orange, and the last four or five dorsal segments, especially in the males, are edged with orange; the eyes are red, becoming orange in color after death; and the wings are orange. The small form (var. *cassinii*) is about $\frac{5}{8}$ inch long to the tip of abdomen and $1\frac{1}{8}$ inches to tip of folded wings. The color is the same as that in the main species except that the underside of the abdomen is usually entirely black and the dorsal segments are never marked with orange.

Although it takes 17 years and 13 years respectively for the individuals of the two races to complete their development, swarms, or broods, of the periodical cicada appear somewhere in the United States every year. Several systems of designating these broods have been proposed, but the one that is accepted is that proposed by Marlatt in 1898. He used the Roman numerals I through XVII to designate the various broods of the 17-year race and XVIII through XXX for those of the 13-year race. The brood of the 17-year race which appeared in 1893 was numbered I and that of the 13-year race which appeared that year was numbered XVIII. Seven of the 17-year broods and two of the 13-year ones have been reported as occurring in Indiana.

Although there have been over 600 papers published about the periodical cicada in the United States, only two have been devoted exclusively to the periodical cicada in Indiana. The first of these was by A. W. Butler (1886) in which he reported his observations on the outbreak of the periodical cicada in 1885 (Brood X) in southeastern Indiana. The other paper was by F. M. Webster (1899) in which he gave the distribution of Broods X, XIII, and XIV in the state. Of the other papers which mention the periodical cicada in Indiana, the following are probably the most

important. Riley (1885) listed the then known occurrence of this species in Indiana. He stated that the earliest instance of its being observed in the state was in Tippecanoe County in 1834 (Brood X). Marlatt (1907) published a splendid monograph on the species. Hyslop (1935 and 1940) gave complete distribution records of Broods X and XIV. J. J. Davis, in his series of papers "Insects of Indiana for the Year ——" which have appeared annually in the Proceedings of the Indiana Academy of Science since 1926, has noted the appearance of the various broods. Thomas Say, the father of American Entomology, makes no mention of the periodical cicada in Indiana. His one brief paper on this insect is a criticism of the use of the name "locust" for it.

The life history of the periodical cicada is well known (Marlatt, 1907). The last instar nymphs start to appear above ground in Indiana during the last half of May. They crawl up trees, fence posts, and other objects and molt. The females deposit their eggs in the twigs and small limbs of trees and shrubs, causing serious damage as the twigs and limbs die beyond the point of oviposition. The adults live for about three weeks and most of them have disappeared by the first part of July. The eggs hatch in about seven weeks. The nymphs emerge and drop to the ground where they dig in and construct cells along the roots in which they spend the rest of their nymphal lives.

The Broods of the Periodical Cicada Occurring in Indiana

Seven broods (I, II, VI, X, XII, XIII and XIV) of race *septendecim* have been reported as occurring in Indiana. Three of these (I, II, and XII) are represented only by isolated outposts of the main body of the brood.

Brood I (1944-19611).—This brood is a minor one. Its center of abundance being in eastern Pennsylvania, Maryland, Virginia and West Virginia.

Reported by Riley (1885, 1893) as occurring in Sullivan (1842, 1859), Knox (1842, 1859), and Posey (1859) counties. Riley obtained these records by personal correspondence and from the unpublished manuscript of Dr. Gideon Smith, an early student of the periodical cicada. No reports of this brood were obtained from Indiana in 1876, 1893, 1910, 1927, or 1944.

Brood II (1945-1962).—This is a major brood, the main body of which occurs along the Atlantic seaboard to the east and south of Brood I.

Recorded from Dearborn County (1843, 1860) and from Posey (1877) by Riley in 1885. From Dearborn County in 1894 by Marlatt (1907), and from Fountain County in 1911 (Insect Pest Survey Bulletin 8). The Fountain County report is open to question as Brood XXIII of the 13-year race also appeared in Indiana in 1911. There are no records of the appearance of this brood in Indiana in 1928 and 1945.

Brood VI (1949-1966).—This is a widespread, sparsely populated brood ranging from South Carolina and Georgia north to northern New York and Wisconsin.

¹ Numbers in parentheses following the brood refer to the dates of the last and next appearance of the brood.

In Indiana, this brood has been reported from 24 counties which are distributed throughout the state (Insect Pest Survey Bulletin 12). No dense swarms have been observed anywhere in the state; as a rule only a few specimens appear in each locality.

Brood X (1936-1953).—This is the largest of the 17-year broods, appearing in great swarms throughout its range which extends from Massachusetts to Georgia and west to the Mississippi river.

Dense swarms of this brood have been observed in every county of Indiana. However, it does not seem to occur in the northern half of Lake and Porter counties, and the northwest corner of LaPorte county. A. W. Butler (1886) studied the habits and natural enemies of this brood in southeastern Indiana and F. M. Webster (1899) reported on its distribution in the state. This is the brood which does so much damage to young orchards which have been planted near wooded areas.

Brood XII (1938-1955).—This is a small, sparsely populated brood which has been reported from a few localities in Maryland, West Virginia, Ohio, Indiana and Illinois.

In Indiana this brood was first reported from Allen County in 1887 (Marlatt, 1907) and was not reported again until 1938 when Professor Davis (Insect Pest Survey Bulletin 18) reported it from Orange County.

Brood XIII (1939-1956).—This is an abundant, compact brood occurring in eastern Iowa, southern Wisconsin, northern Illinois, northwestern Indiana and southern Michigan.

In Indiana this brood occurs only near the lake shore in Lake, Porter and LaPorte counties, occupying the territory just north of that occupied by Brood X (Webster, 1899).

Brood XIV (1940-1957).—This is a large brood which extends from Massachusetts to North Carolina and west to the Mississippi river. It is the brood which was observed by the Pilgrims in 1634.

It occurs throughout Indiana, but is more common from Tippecanoe County south. It has been recorded from 40 counties (Hyslop, 1940). It has not been observed in dense swarms except in Brown and Warrick counties.

Two broods (XIX and XXIII) of the race *tredecim* occur in Indiana.

Brood XIX (1946-1959).—This is the largest of the 13-year broods, occurring in the southern states and in the Mississippi valley north to southern Iowa and up the Ohio and Wabash valleys to western Indiana.

It does not appear in great numbers, but has been reported from eight counties in the western part of the state from Posey and Warrick on the south to Newton and Jasper on the north (Insect Pest Survey Bull. 13).

Brood XXIII (1950-1963).—This is the second largest brood of 13-year cicadas, occupying the Mississippi and Ohio valleys into northern Illinois and Indiana.

This brood reaches much farther north in Indiana than does the other 13-year brood. It has been recorded as occurring in 18 counties by Marlatt (1907), and the writer has seen specimens from three additional counties. It is much more abundant in southwestern Indiana where it did

much damage to fruit trees in 1950. The known northern limits in the state are Fountain, Tippecanoe and Fayette counties.

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