SOME EGGS OF MOTHS AMONG THE SPHINGIDAE, SATURNIIDAE, AND CITHERONIIDAE (LEPIDOPTERA)[1]

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Since 1961 the author has published a series of papers on eggs of moths in THE FLORIDA ENTOMOLOGIST. To date papers have appeared on types of eggs among moths (1961), and eggs of the Geometridae (1962), Amatidae, Arctiidae and Notodontidae (1963a), Pyralidae and Phycitidae (1963b), Noctuidae (1964a), and Olethreutidae and Tortricidae (1965).

This report describes some egg types seen among three well known families of the Macrolepidotera—Sphingidae, Saturniidae and Citheroniidae. The adults in these three families are generally moderate to very large moths. They produce large eggs deposited singly or in clusters.

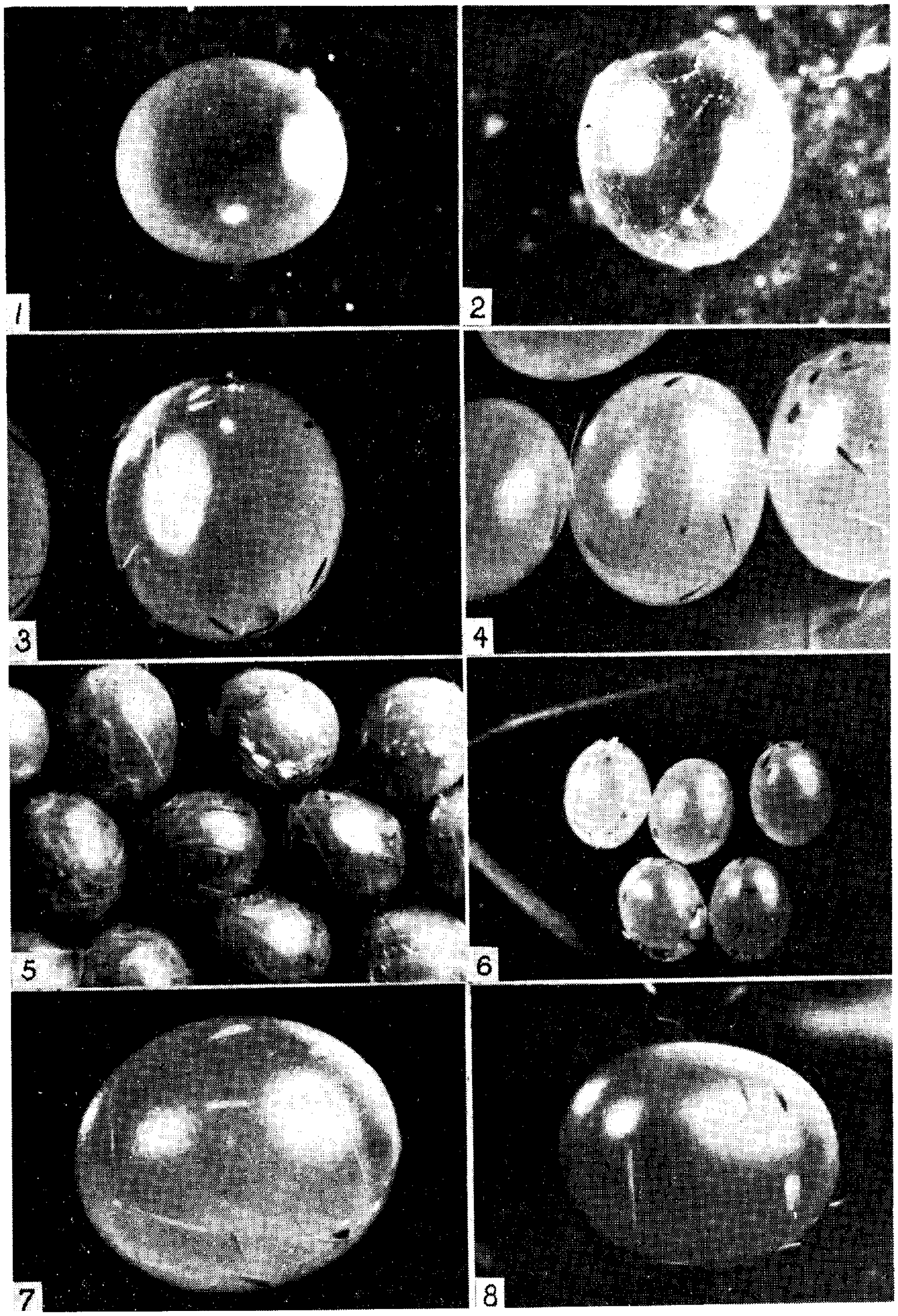
McDunnough (1938) records 107 species for Sphingidae, 42 species for Saturniidae, and 29 species for Citheroniidae. The author has seen the eggs of 14 species of Sphingidae, 7 species of Saturniidae, and 4 species of Citheroniidae. Most of these are figured.

The majority of the eggs described in this publication came from gravid females captured in traps located below black-light lures or taken from a white cloth adjacent to a light lure. Captured females were placed singly in medium to large size polyethylene or paper bags or in paper-lined wide mouth quart or two-quart glass jars covered with gauze. Egg depositories, such as plant foliage, rough or smooth light colored paper, pieces of bark, and other objects were included in some of the containers. Some moths were very active in confinement and shed many of their scales. The adhesive eggs deposited by the moths were often coated with shed scales. To reduce the number of scales adhering to the eggs, the wings of the female were sometimes cut off near their attachments. This amputation did not materially reduce the number of eggs deposited.

Some unknown eggs were found in the field on plant foliage. These were held until they hatched and the larvae were fed the foliage on which they had been deposited until they became large enough to identify to family, genus, or species. Some large saturniids or citheroniids may deposit eggs on various inert objects, such as wire screens, painted wood, and other places. For more details concerning techniques used in this study consult previous papers by the author published in THE FLORIDA ENTOMOLOGIST since 1960, and *Entomological Techniques, How to Work with Insects*, 10th edition (Peterson 1964b).

All figures are top views of eggs resting on a given substrate. The explanation of each figure includes the scientific name, the common name (Laffoon 1960), egg color and color changes, chorion consistency, and other significant facts. The egg sizes, given in millimeters, are the greatest length, width and depth, especially when the eggs are somewhat disc-like.

[1] This investigation and cost of publication of results were supported by a grant from the National Science Foundation assigned to the Ohio Historical Society Museum, Columbus, Ohio. The author is indebted to C. P. Kimball for the determination of all but a few of the species of moths in this publication.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Most eggs are deposited on their sides. Among the Sphingidae the width and depth are nearly the same.

Most moths among the Sphingidae, often called sphinx or hawk-moths, are very robust, medium to large insects, and are strong fliers. They are most active during twilight or at night. A few are daytime fliers, especially species that visit flowers to obtain nectar in a manner similar to that of a hummingbird.

Eggs of most Sphingids (Fig. 1 to 11) are large, oval, smooth, shiny, and adhesive. They adhere closely to the substrate on which they are deposited. If this substrate is very smooth, like polyethylene, most of the eggs can be removed without injury (Fig. 5 and 6). The size of the eggs varies with the species. Their lengths may be 1.4 to 2.1 mm and their widths and depths 1.8 to 1.1. Their color varies from a distinct grass green to near white or yellowish. Eggs of some species take on a dark color a day or more before they hatch. All species studied deposited their eggs singly and scattered on the host foliage or the cage substrate.

Fig. 1 and 2. *Protoparce sexta* (Joh.), tobacco hornworm, eggs are 1.5 x 1.3, light grass green with chorion smooth, shiny, and translucent with very tiny indentations visible about the margin of Fig. 1. Fig. 1 is an egg on tobacco foliage; Fig. 2, a hatched egg showing an exit opening.

Fig. 3. *Dolba hylaeus* (Drury) eggs are 1.6 x 1.4, light cream color with chorion smooth, shiny, translucent with scattered tiny, irregular depressions on the surface.

Fig. 4. *Sphinx canadensis* Bdv. eggs are 1.8 x 1.5, light cream color with chorion smooth, shiny, translucent with scattered tiny irregular dimples on the chorion.

Fig. 5. *Sphinx sequoiae* Bdv. eggs are 2.0 x 1.7, light bluish-green with chorion smooth and shiny. Eggs in this photograph were removed from a polyethylene bag and placed in a glass dish. Some of the eggs are upside down and show remanents of the adhesive ring.

Fig. 6. *Paeonias myops* A. and S. eggs are 1.8 x 1.5, very light greenish cream color, with chorion smooth, shiny, and translucent. Two eggs toward the left are upside down and show the remains of the adhesive clear rings.

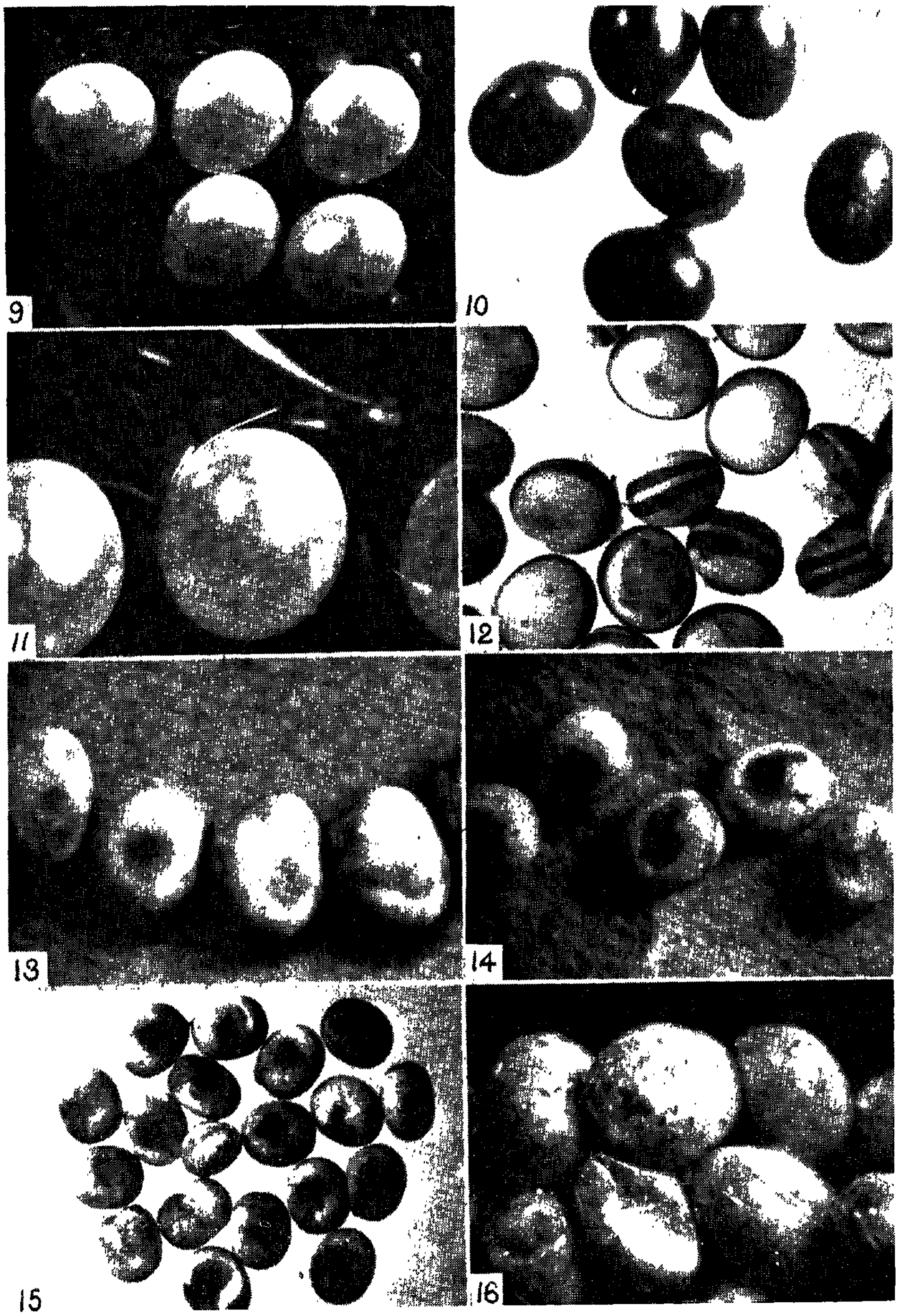
Fig. 7. *Paeonias exaecata* A. and S. eggs are 2.0 x 1.7, cream color with chorion smooth, shiny, translucent and having tiny dimples on the surface.

Fig. 8. *Lapara bombycoides* Wlk. eggs are 2.0 x 1.5, bright grass-green color with chorion smooth, somewhat shiny and translucent. Very tiny faint and scattered depressions occur on the surface.

Fig. 9 and 10. *Pachysphinx modesta* Harr., poplar sphinx, eggs are 2.1 x 1.9, light green color (Fig. 9) when deposited, changing to a deep reddish brown (Fig. 10) during the prehatch period. Chorion smooth, translucent, and somewhat shiny.

Fig. 11. *Celerio lineata* (Fab.), white-lined sphinx, eggs are 1.4 x 1.1, bright grass-green with chorion smooth, shiny, and possessing very faint, tiny and scattered depressions on the surface.

The families Saturniidae, giant silkworm moths (Fig. 12-20), and the Citheroniidae, royal moths (Fig. 21-24), possess some of the largest and most ornate species in North America. Most species are nocturnal and deposit their eggs on foliage and elsewhere at night. Their eggs may occur



in clusters or are scattered singly on the host plant. The chorion of the egg of most species is completely opaque and may possess pigment spots or irregular colored areas. Many species show little or no color change during incubations. Some exceptions occur among the eggs of the io moth (Fig. 17 and 18), the imperial moth (Fig. 23), and the pink-striped oakworm (Fig. 24).

Fig. 12. *Antheraea polyphemus* (Cram.), polyphemus moth, eggs are 2.4 x 2 x 1.5, opaque, light cream color and possess one or two distinctive medium to dark brown rings about their entire outer edge. In cages the eggs are deposited singly or in irregular clusters.

Fig. 13. *Hyalophora cecropia* (Linn.), cecropia moth, eggs are 3.0 x 2.3 x 1.8, somewhat flattened and cream colored with an irregular brown blotch on the upper surface of each egg. They are deposited singly or in clusters especially when the female is located in a cage.

Fig. 14. *Callosamia promethea* (Drury), promethea moth, eggs are 1.9 x 1.7 x 1.3, somewhat flattened cream colored ovals each with a deep depressed area on the upper surface which possesses an irregular reddish-brown blotch. The eggs may be scattered or in small irregular clusters.

Fig. 15. *Actias luna* (Linn.), luna moth, eggs are 1.9 x 1.6 x 12 distinctly cream-colored ovals with considerable brown pigment near the center and elsewhere on the eggs. Females in captivity deposit eggs singly or in irregular clusters.

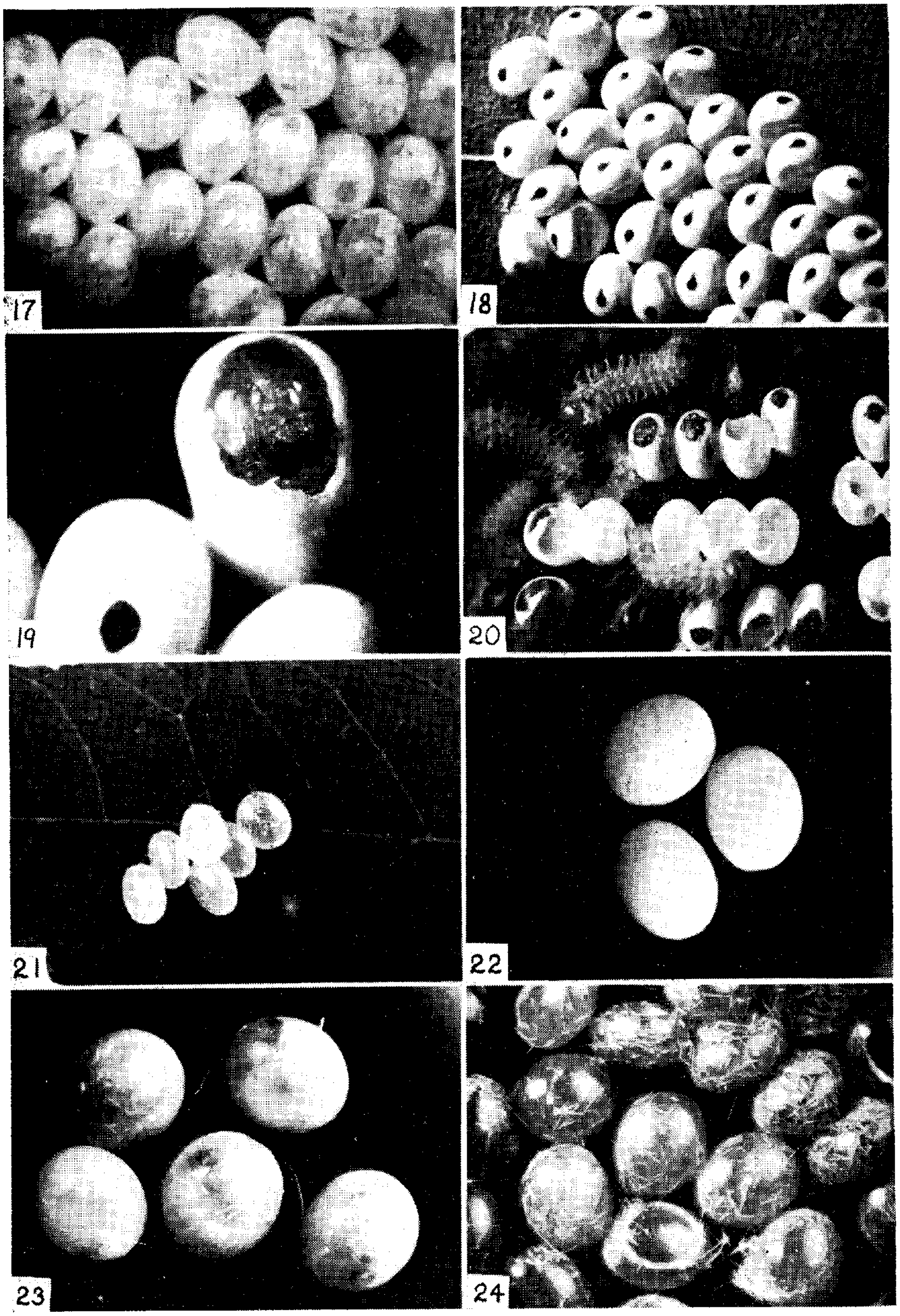
Fig. 16. *Hemileuca maia* (Drury), buck moth, female in a polyethylene bag deposits murky green eggs in an irregular cluster. According to Dr. Lintner (E. P. Felt 1905) the buck moth deposits its eggs in an upright cluster or in a belt encircling a small oak twig. Each mass contains 70 to 200. The eggs are about 1/20 inch long, obovate, compressed on the sides and at the apex reddish brown and yellowish white below. The belt of eggs about a twig resembles that of the fall canker worm moth, *Alsophila pometaria* (Hbn.) (Peterson 1962).

Fig. 17-20. *Automeris io* (Fab.), io moth, eggs are 1.7 x 1.3 x 1.1. The chalk-white, opaque eggs of this species are distinctive in that they are deposited in upright clusters of 20 to 35 or more on foliage and possess unique marks. The spot at the top of each egg is yellow when deposited (Fig. 17). It becomes near black three to five days after deposition (Fig. 18). Also on the two sides of each egg and near the top, single, translucent, transverse, yellow to orange areas exist. Through these areas the color of the embryo within may be seen. Fig. 17 shows newly deposited eggs; Fig. 18, color change in top spots on eggs three to five days old; Fig. 19, an egg with a larva chewing an exit opening; Fig. 20, eggs in various stages of hatching including first instar larvae.

Fig. 21-22. *Citheronia regalis* (Fab.), regal moth, eggs are 3.0 x 2.5 x 2.0, light yellow, smooth, and shiny (Fig. 21). Preserved specimens are chalk white (Fig. 22). Caged females deposit eggs in small irregular clusters (Fig. 21) on foliage.

Fig. 23. *Eacles imperialis* (Drury), imperial moth, eggs are 2.9 x 2.5 x 2.0. Their color is near yellow when deposited changing to a reddish orange previous to hatching. In captivity the female deposits eggs singly and in irregular clusters.

Fig. 24. *Anisota virginiensis* (Drury), pink-striped oakworm, eggs are 1.7 x 1.2 x 1+, yellow when deposited, and change to a slightly reddish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brown previous to hatching. Females in captivity deposit their smooth, shiny eggs singly and scattered or in small clusters.

SUMMARY

The moths of the Sphingidae, Saturniidae, and Citheroniidae produce large eggs, some exceeding 3 mm in length. All are distinctly adhesive when deposited and are firmly attached to their host plants and to each other if deposited in clusters.

Eggs of the Sphingidae, except for size and color, resemble one another rather closely. They are elongated ovals with their width and depths nearly equal. When located on host tissue they are deposited on their sides. If deposited on polyethylene they can be removed without injury. The chorion of the egg is smooth, shiny, and translucent and may possess tiny dimples or irregular areas usually visible only under high magnification. Their color varies from a distinct green, bluish-green to light yellow or cream color. Eggs of some species undergo an overall color change during incubation.

Eggs of the Saturniidae and the Citheroniidae resemble each other to a limited extent. For the most part they are large, opaque and somewhat flatted ovals usually deposited on their sides. In captivity most females deposit their eggs singly, scattered, or in clusters. When deposited in clusters the eggs are placed on end and firmly attached to each other (Fig. 18). Their basic color varies from near white or cream to a murky green. Pigment areas or spots may be present on the eggs of most species. A color change during incubation may occur among a few species.

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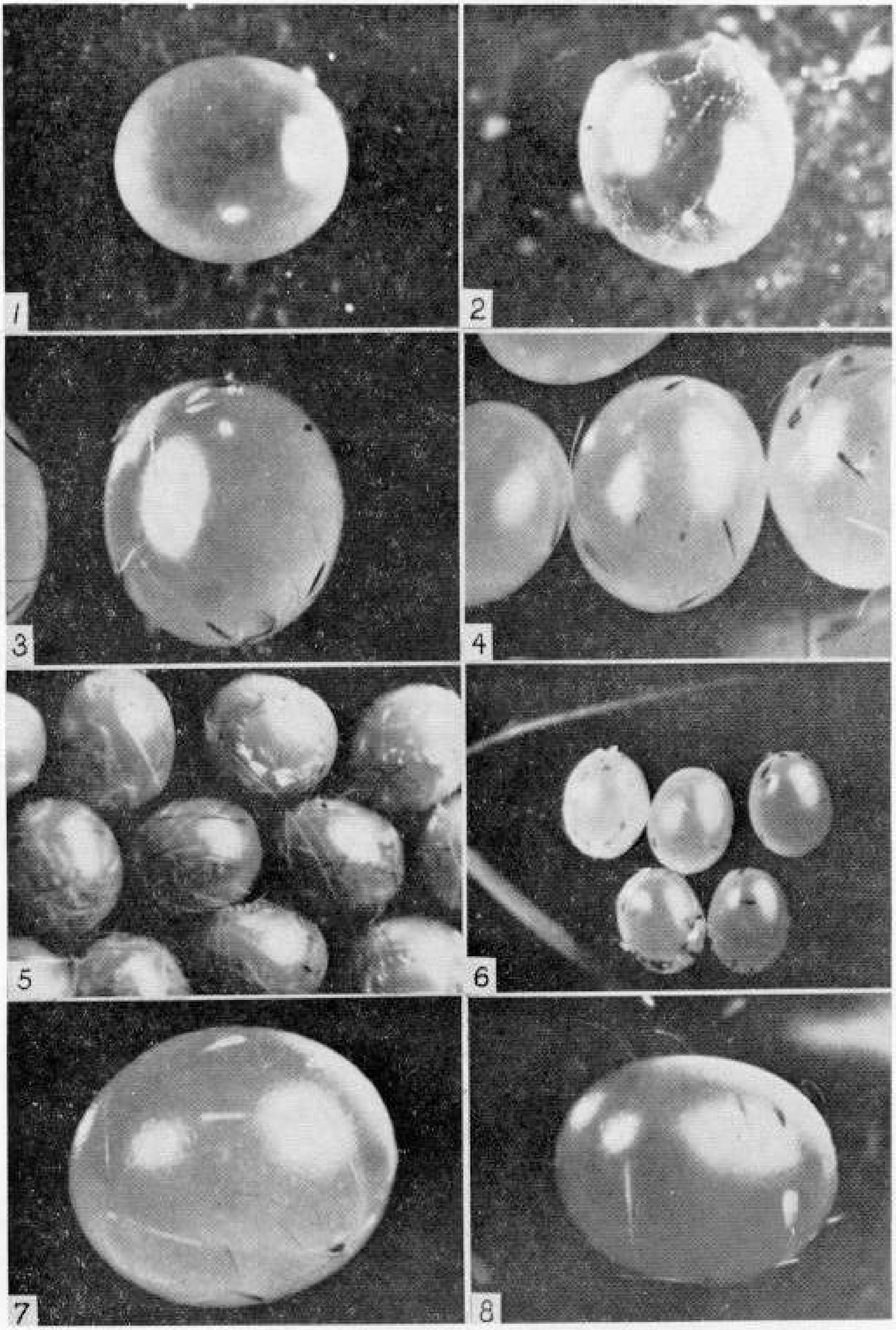
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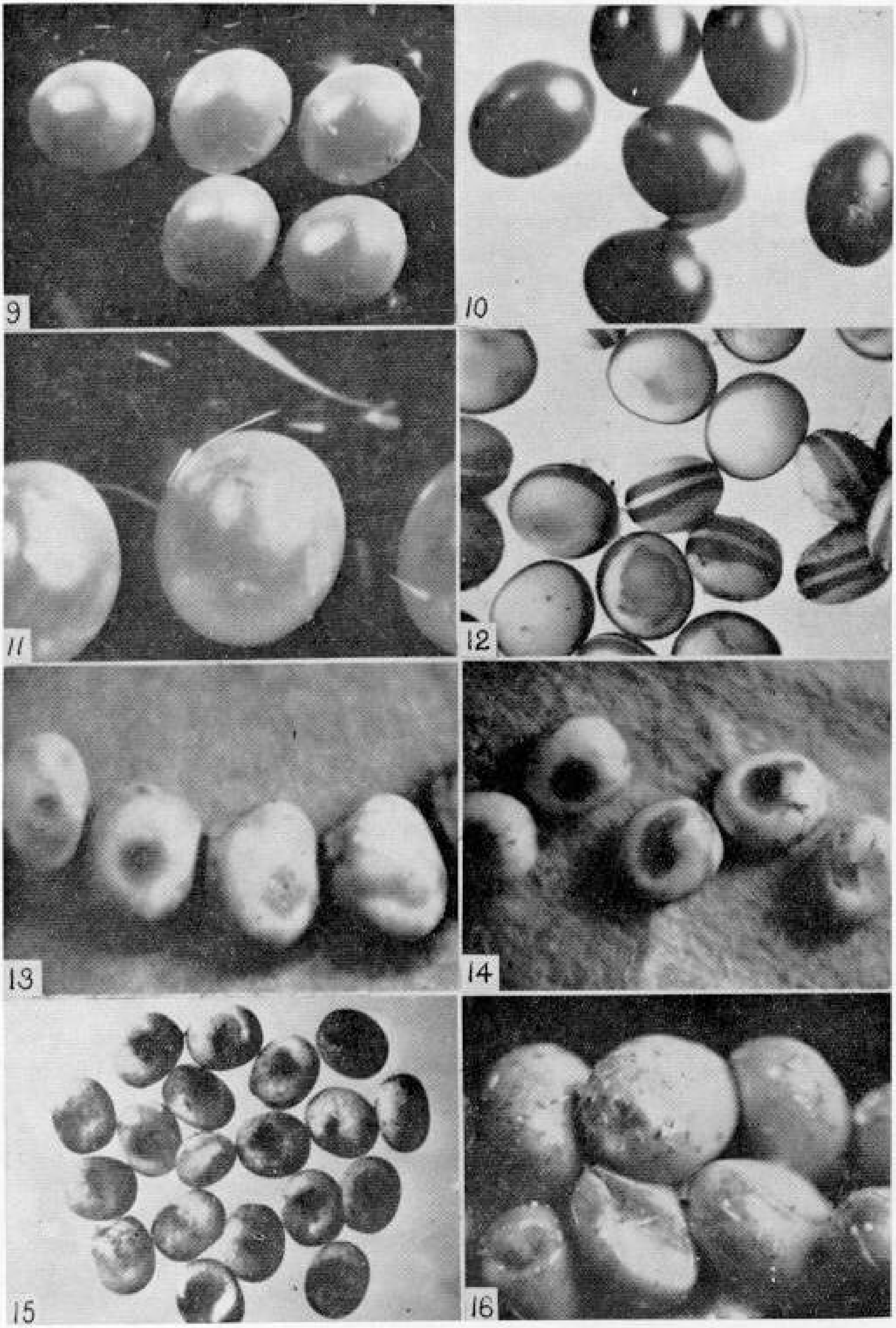
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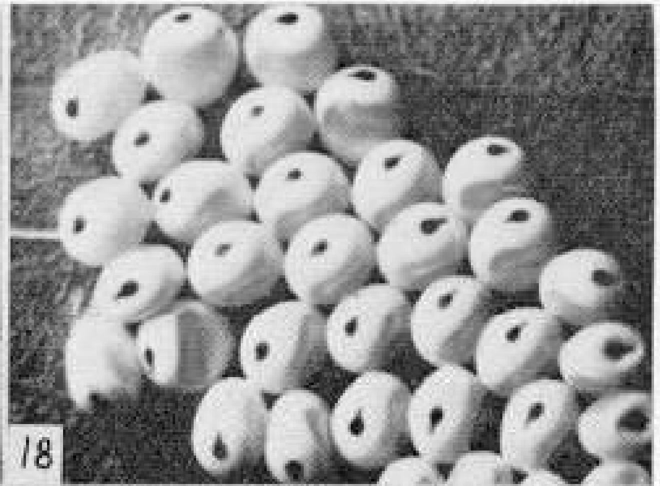
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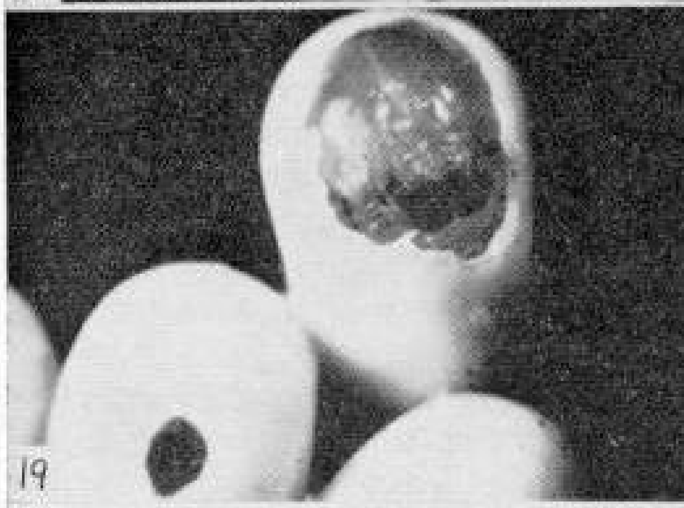
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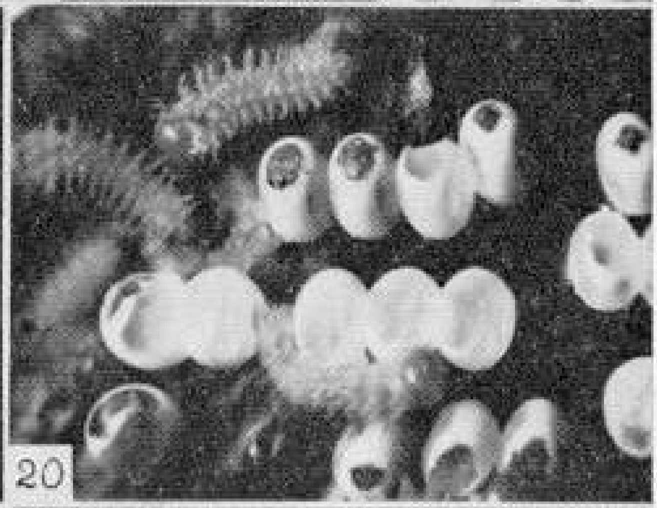
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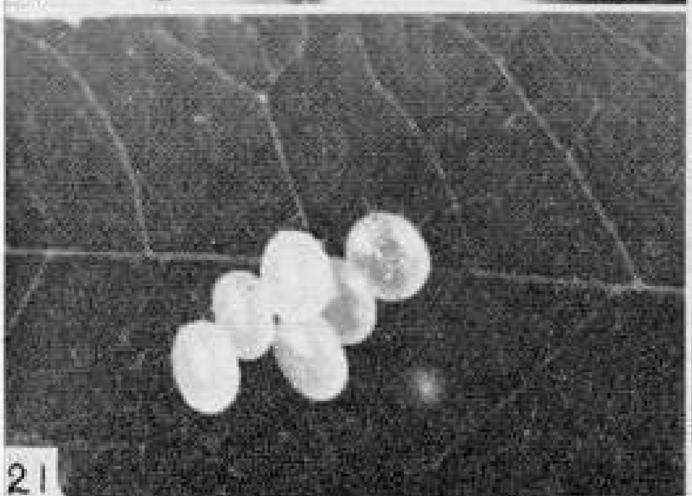
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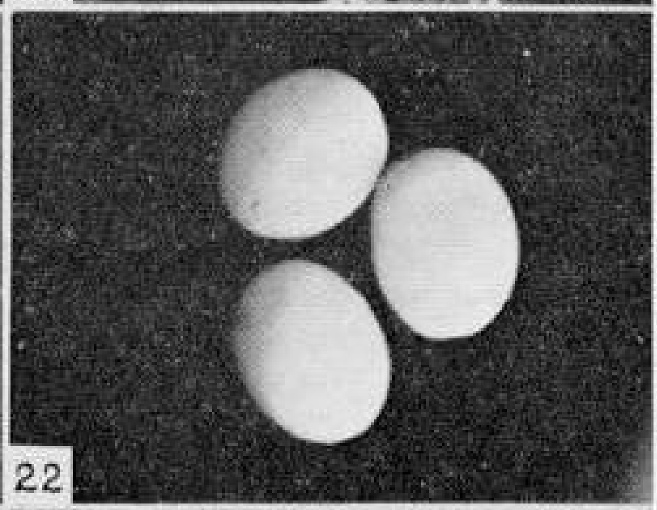
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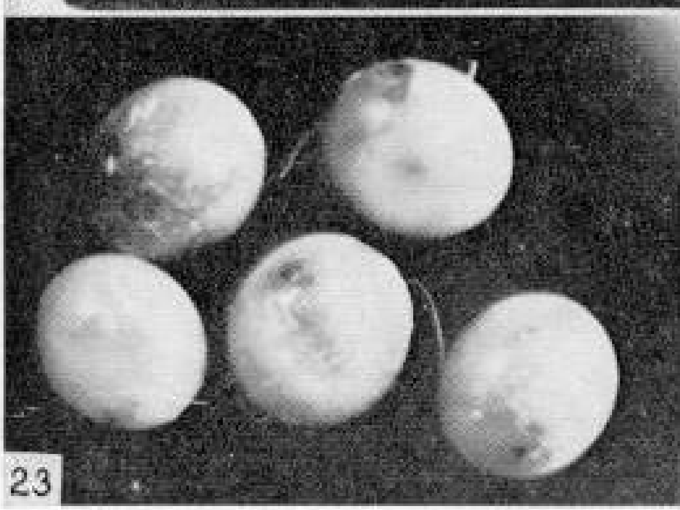
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