

1937

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Henry S. Conard
Grinnell College

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Recommended Citation

Conard, Henry S. (1937) "The Banana Floatingheart (*Nymphoides aquaticum*)," *Proceedings of the Iowa Academy of Science*: Vol. 44: No. 1, Article 9.
Available at: <https://scholarworks.uni.edu/pias/vol44/iss1/9>

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THE BANANA FLOATINGHEART (*Nymphoides aquaticum*)

HENRY S. CONARD¹

It is well known that *Nymphaea mexicana* Zucc. and *Nymphoides aquaticum* (Walt.) produce brood bodies, hibernating bodies or organs of vegetative propagation. In both species the bodies consist of a cluster of fleshy roots more or less resembling a "hand" or a small bunch of bananas (fig. 1).

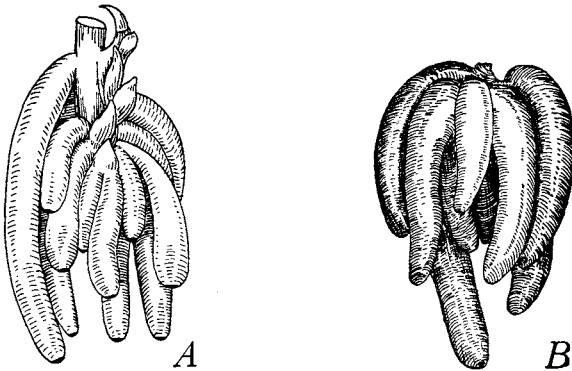


Fig. 1. The brood bodies. A, *Nymphaea mexicana*, from Conard 1905. B, *Nymphoides aquaticum*, drawn by Miss Phyllis Haglund from a specimen sent by Davis & Gist, February, 1937. Both natural size.

Since the publication of United States Department of Agriculture Bull. 58, "Five important wild-duck foods," the brood bodies of *Nymphaea mexicana* have been sought as a food for wild ducks, and a commercial market for them has sprung up. This waterlily spreads very rapidly by runners, and often produces a considerable crop of brood bodies. Commercially they are sold for planting in ponds in the spring so that a food crop may be ready for the ducks by autumn. This is possible as far north as Massachusetts, Wisconsin, and Minnesota. The plant has wintered successfully out of doors at Philadelphia.

Nearly every spring the writer has been asked to identify samples of brood bodies offered as banana waterlily. And always they

¹ Since this paper was presented I have examined material from the stomachs of ducks, furnished by the U. S. Biological Survey. This material consisted of the banana-like roots of *Nymphaea mexicana*, and one whole caudex. Thanks to the Survey are extended. — H. S. C.

prove to belong to *Nymphoides aquaticum*. Hence, it has seemed desirable to place on record the following notes on arrangement, structure and composition of the objects in question.

BROOD BODIES OF

Nymphaea mexicana

Nymphoides aquaticum

OCCURRENCE

On geotropic shoots 4-6 in. down in mud; only escaping by erosion or burrowing by birds or other animals. Difficult for collectors to find.

On petioles near surface of water; released by decay of petiole; naturally found floating on surface of water. Available by the bushel at margins of ponds.

OUTER MORPHOLOGY

Fleshy roots dangling from *one side* of a short axis, the axis and one or more buds being visible. End of root rounded, with a flattened root cap, never growing any more.

Fleshy roots in a cluster *all round* a central point or short axis, which remains hidden by the roots. End of root rounded, or more often continued as a slender soil root.

INNER STRUCTURE

Epidermal cells thin-walled, slightly larger than sub-epidermal cells. Cells of cortex circular to oval in cross section, very irregularly arranged, with thin walls and large intercellular spaces. Endodermis indistinct, thin walled, with simple Casparian band. Stele 7-arch, 1/6 the diameter of the root; leptom indistinct; hadrom ducts clustered.

Epidermal cells thick-walled, 1/2 to 2/3 the diameter of subepidermal cells. Cells of cortex quadrangular in cross section, exquisitely arranged in circular and radial rows. Intercellular spaces small, quadrangular. Endodermis distinct, thin walled, with distinct Casparian band. Stele 7-arch, 1/10 the diameter of the root; leptom large; hadrom ducts radially arranged.

CONTENTS

Cortex cells loaded with starch, in round concentric grains.

Cortex cells loaded with inulin, conspicuous when precipitated with 95 per cent alcohol.

A number of fresh storage roots of *Nymphoides* proved to be 26 per cent solids, when dried near 100°C. to constant weight. Dried roots were weighed, soaked three days in warm water (with a trace of chloroform to prevent bacterial growth), then for three days in 50 per cent alcohol, to remove inulin. When again dried, these roots had lost 56.9 per cent of their former dry weight. The greater part of this loss doubtless represents inulin.

It is plain that the brood bodies of *Nymphoides* contain an

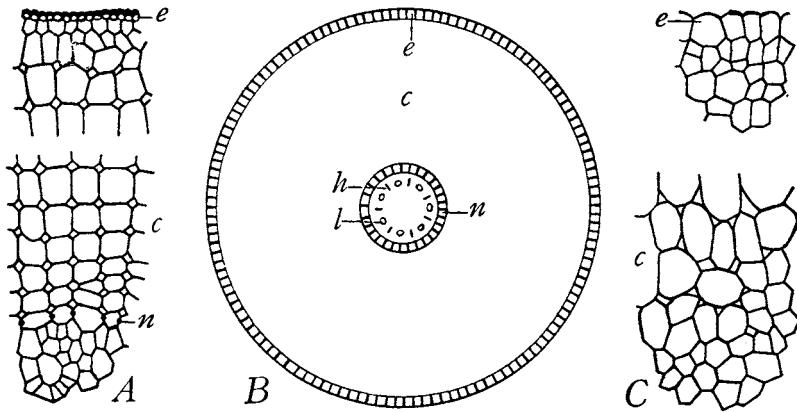


Fig. 2. Root structure. A, *Nymphoides aquaticum*. B, generalized root section. C, *Nymphaea mexicana*. c, cortex; e, epidermis; h, hadrom; l, leptom; n, endodermis. Drawn from the microscope by Mr. R. Hagan.

abundance of good carbohydrate food. They are very much more readily available than are the starchy brood bodies of *Nymphaea mexicana*. My correspondents assure me that the brood bodies of *Nymphoides* appear to be at least played with a good deal by ducks in the waters of Florida. If it can be shown that ducks actually eat the *Nymphoides* roots in quantity, this species is to be recommended for game preserves rather than *Nymphaea*. The plant is quite hardy in a pond at Philadelphia.

The difference in the structure of the roots of the two species can be easily seen in thin sections cut with a pocket knife and examined with a good hand lens. Application of a drop of iodine solution (or tincture) to a cut root will show the blue-black reaction of starch in the root of *Nymphaea*, and the absence of such a reaction in *Nymphoides*.

Curiously enough neither McAtee nor Mabbott, in the three bulletins on duck foods, makes any mention of *Nymphoides* (*Limnanthemum*). Did they distinguish between *Nymphaea* and *Nymphoides*? Is it certain that the materials recovered from the stomachs of ducks were not *Nymphoides*? During the winter of 1937 collectors repeatedly tried to get brood bodies of *Nymphaea* both in Florida and at Avery Island, La., without success. Only one small body from *Nymphaea* was secured. The question is open, therefore, as to whether the storage roots of *Nymphoides* are actually eaten by ducks.

In view of the wide use of the name "banana waterlily," proposed by McAtee in 1914, we here propose for *Nymphoides aqua-*

ticum (*Limnanthemum trachyspermum* A. Gray) the name "Banana Floatingheart."

For the opportunity to make this study I am indebted to Mr. Clyde B. Terrell of Oshkosh, Wis., and to Messrs. Davis and Gist of McIntosh, Florida.

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DEPARTMENT OF BOTANY,
GRINNELL COLLEGE,
GRINNELL, IOWA.