

On Hydrothrix, a new genus of Pontederiaceae.

BY

SIR J. D. HOOKER, K.C.S.I., F.R.S.

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With Plate VII.
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FLORES minuti, axillares, per paria spatha propria et bracteis 2 primum inclusi. *Perianthium* hyalinum, 6-lobum, lobis linearibus inaequilongis, postico latiore, *Stamen* 1, tubo perianthii insertum, lobo dorsali oppositum, filamento subulato; anthera basifixta, breviter oblonga, rimis lateralibus dehiscens; pollen minutissimum. *Ovarium* fusi-forme, in stylum alabastro deflexum angustatum, 1-loculare, stigmatibus minuto subflabellatim 2-3-lobo; ovula plurima, placentis 3 parietalibus funiculis brevibus affixa, adscendentia, anatropa, micropyle infera. *Capsula* fusiformis, follicularis, stylo persistente terminata, polysperma, rima ventrali dehiscens, demum in valvas 3 lineares seminiferas loculicide fissâ. *Semina* oblonga, teretiuscula; testa coriacea, pallide brunnea, tenuissime striata et transversim striolata; albumen sat copiosum, dense farinosum; embryo rectus, longitudine fere albuminis, bacillaris, versus extremitatem radicarem paullo dilatatus truncatus, plumula minutissima, cavitate laterali radiculæ propius immersa.—Herba Brasiliensis *aquatica, immersa, caespitosa, dichotome ramosa, glaberrima, dense foliosa*; caulibus *gracilibus*, radicibus *densissime fibrosis*. Folia *fastigiatim verticillata, verticillis polyphyllis, basi vagina communi circumdati, filiformia, flaccida, integerrima, nervis parallelis valde obscuris et canalibus resiniferis percursa; vagina infundibuliformi-campanulata, hyalina, basi folio elongato recurvo stipata, enervis*. Flores *apice pedunculi brevis v. elongati*

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sessiles; spatha propria tenuissima, hyalina, basi v. medio pedunculi inserta, folio stipata, primum ovoidea clausa, demum apice rupta truncata v. lacera; bractee oblongae, obtusae, hyalinae, valvatim cohaerentes, canalibus resiniferis interruptim striolatae. Perianthium infra medium 6-fidum, lobis linearibus obtusis, majoribus 3-nerviis, minoribus 1-nerviis. Stylus alabastro supra medium deflexum, stigmathe antherae applicito.

H. Gardneri, Hook. f. (Tab. vii).

HAB. BRASILLÆ TROPICÆ, prov. Ceara; in alveo arenoso fluvii Rio Sulgado dicti, inter Ico et Crato. Gardner, Aug. 1838 (No. 1863).

This remarkable plant has lain buried for just half a century in the many herbaria which possess Gardner's collections, and probably in all, under the category of 'Plantae dubiae affinitatis.' Though the Kew specimens had been submitted to various botanists, its relations were not recognized until the analyses which accompanied it in the Herbarium at Kew were shown to Professor Asa Gray, who suggested a comparison with the North American *Schollera graminea*¹. Following up this suggestion for the purpose of preparing an account of the plant for the Annals, I find ample confirmation of this view; for though in all respects of habit, foliage, inflorescence and flowers, it is totally unlike any known genus of Pontederiaceae, it is unquestionably a member of that order; and a reference to the Conspectus of the Monocotyledonous families in the 'Genera Plantarum' shows that, in respect of diagnostic characters, it can belong to no other. It is evidently a flaccid annual, growing deeply rooted in the sand by its mass of capillary fibres, and by branching repeatedly from the base and upwards forming patches of considerable extent five to eight inches high. The stems are about $\frac{1}{2}$ in. in diameter, and the filiform leaves $\frac{3}{4}$ to 1 in. long by $\frac{1}{10}$ — $\frac{1}{8}$ in. broad in the middle. The

¹ A. Gray, Man. Bot. North. United States, 483 (syn. *Leptanthus gramineus*, Michaux, Fl. Bor. Am. i. 25, t. 5, f. 2; Hook. Exot. Flor. t. 94). *Schollera* is now reduced to *Heteranthera*, Ruiz. et Pav. (Gen. Plant. iii. 839; Solms-Laub. in A. De Candolle, Monog. Phanérog. iv. 517).

bracts with the included flowers are about $\frac{1}{10}$ in. long, the ripe carpels, including the styles, $\frac{1}{10}$ – $\frac{1}{8}$ in., and the seeds $\frac{1}{80}$ – $\frac{1}{40}$ in.

Referring to the most recent monograph of the Pontederiaceae, that of Solms-Laubach in the fourth volume of Alphonse de Candolle's Monographs, it is evident that *Hydrothrix* must be regarded as either a section of the order, or as an aberrant member, characterized by foliage, inflorescence and the solitary stamen. Hitherto it has not been usual in taxonomic works to segregate individual genera as aberrant, even when monotypic, but rather to elevate them into representatives of tribes or suborders. If conceded that aberrant genera should be universally appended as such to the order of which they are regarded as members, it is impossible to lay down any rules as to the number or value of the characters that should entitle them to such local dissociation. Much must depend on the homogeneity or the contrary of the other members of the order, and something on the extent of the aberrant genus. Were *Clematis* monotypic (that is consisting of one species only), it might be better considered as an aberrant Ranunculaceous genus; but whereas it contains many species distributed over all the continents, and these form a very considerable proportion of that order, its claims are irresistible to be regarded either as a tribe, or as a separate order. The matter resolves itself into a question of convenience or expediency. Nymphaeaceae, in its larger sense, consists of six oligotypic genera, all of which are aberrant in respect of the seventh, the assumed type, *Nymphaea*. Hamamelidae¹ is another order of heterogeneous contents; it consists of about twenty genera, of which none have more than three species. But whereas in Nymphaeaceae the seven genera are all grouped under three tribes so distinct as to be considered orders by some, of Hamamelidae no genus can be considered more aberrant than another, nor can they

¹ To the fifteen genera of this order, described in the 'Genera Plantarum' in 1865, there are now to be added *Disanthus*, Maxim., *Davidia*, Baill., *Ostrearia*, Baill., and *Maingaya*, Oliv. On the other hand, *Tetrathyrium*, Benth., falls into *Loropetalum*.

be grouped under well-limited tribes. Returning to *Hydrothrix*, it differs from other Pontederiaceae quite as much or more than *Clematis* does from other Ranunculaceae, but, having regard to its habit and characters, and to its being monotypic, I prefer to regard it as an aberrant genus, rather than as constituting a tribe of the order.

Owing to the minuteness and extreme tenuity of the floral organs of this plant, and the difficulty of analysing them in herbarium-specimens, it is probable that errors in detail may be found in both the above description and in the drawing. I have, however, no reason to doubt their general accuracy. Mr. Gardner, in a note appended to the specimens sent to Sir W. Hooker, described the flowers as yellow, placed in pairs in a two-leaved membranous sheath, the perianth as 6-lobed, with the three lobes that are next the other flower more than half narrower than the other three. He further states that the plant is submerged and only flowers when the water has nearly left it. Having regard to the minute size and inconspicuous nature of the corolla in comparison with that of other Pontederiaceae, to the fact that I find pollen emitted when the flowers are still enclosed in the bracts, and that in this state the stigma is applied to the anther, it may well be that the plant is self-fertilised¹, and these flowers cleistogamous. The figures 4, 5 and 6 represent the inflorescence in this stage: it will be observed in these that the anthers appear to be opposite the ventral face of the ovary, which is, I suspect, due to distortion of the organs under compression.

Hydrothrix was elaborately studied by Mr. Benjamin Clarke, F.L.S., in 1858, who prepared analyses of it for Sir W. Hooker. Of these I have availed myself in preparing the accompanying drawing for the Annals, which is the result

¹ In Kerguelen's Land, in 1840, I found *Limosella* in flower in a lake under two feet of water and several inches of ice, with the corolla closely folded over the sexual organs, and containing a bubble of air. The anthers were full of well-developed pollen, and the ovules apparently fertilized (Flora Antarctica, vol. ii. p. 334).

of repeated dissections by myself of all the organs. Mr. Clarke describes the embryo as occasionally doubled on itself in a slight degree at the extremity most remote from the hilum, a character I have not found in the numerous seeds examined. He was at first disposed to refer the plant to Podostomaceae, but subsequently to regard it as a near ally of *Halophila*. The position of the plumule was ascertained by Mr. Clarke, and verified for me by Mr. W. Fawcett, F.L.S.

It remains to offer a few notes on the anatomy of this singular plant, which in the matter of the morphology and histology of its organs requires a more complete investigation. The stem is cylindric and terete, invested by one layer of epidermal cells with a thickish cuticle, and the epidermis is traversed by long red resin-canals. Beneath the epidermis are two or three layers of very large thin-walled cells of the cortex, which give off vertical rays enclosing air-spaces to the similar cells surrounding the central axis. The latter is very indistinctly vascular, and has a few thick-walled cells in its periphery. Very feebly developed isolated vascular bundles also occur at the outer extremities of the cellular rays. Dr. Balfour, who has kindly prepared sections showing these tissues for me, informs me that this very simple structure is what occurs in many Naiads, Hydrocharids and other water-plants, and that reservoirs of a similar red resin are found in *Eichhornia*, also a Pontederiad. The leaves, which are slightly compressed from back to front, present similar tissues to the stem, including the long resin-canals. In the delicate membrane of the spatha I find no resin-canals, but bundles of cystoliths; the latter occur also in the bracts, together with short scattered resin-canals. In the corolla still shorter resin-canals are seen. Spiral vessels are most readily detected in the bases of the leaves and in the placental tissue.

THE CAMP, SUNNINGDALE.

EXPLANATION OF FIGURES IN PLATE VII.

Illustrating Sir Joseph Hooker's paper on *Hydrothrix*.

All figures but Fig. 1 greatly enlarged.

- Fig. 1. Portion of a plant of *Hydrothrix* of the natural size.
- Fig. 2. Portion of a stem and branch with flowers (partly from a drawing by Mr. Clarke).
- Fig. 3. Upper part of peduncle with the pair of flowers and their bracts enclosed in the spathe.
- Fig. 4. Another inflorescence with the pair of flowers still enclosed in the bract, but after protrusion through the spathe.
- Fig. 5. A pair of flowers enclosed in the bracts.
- Fig. 6. Corolla laid open showing the leaf and stamen, with the stigma applied to the anther.
- Fig. 7. Another corolla laid open and stamen.
- Fig. 8. More advanced flowers with the bracts open and (the corollas having disappeared) the follicles advancing to maturity.
- Fig. 9. Ripe follicles and bracts.
- Fig. 10. Portion of wall of ovary, placenta and ovules.
- Fig. 11. Ovule.
- Fig. 12. Mature follicle.
- Fig. 13. The same laid open.
- Figs. 14 and 15. Seeds.
- Fig. 16. Longitudinal section of seed showing the albumen and embryo.
- Fig. 17. Longitudinal section of embryo showing the plumule, from a drawing by Mr. Clarke.
- Fig. 18. Portion of embryo with young plumule, from a drawing by Mr. Fawcett.
- Fig. 19. Section of a portion of stem.
- Fig. 20. Transverse section of portion of stem, showing, *a*, position of the peripheral vascular bundles and, *b*, resin-canals.
- Fig. 21. Superficial view of portion of leaf, showing the vascular bundle *a* and the resin-canals *b*.
- Fig. 22. Portion of tissue of the vagina showing cystoliths.
- Fig. 23. Portion of tissue of bract showing resin-canals and cystoliths.



J. D. H. del.

HYDROTHRIX VERTICILLARIS, Hook. f.



