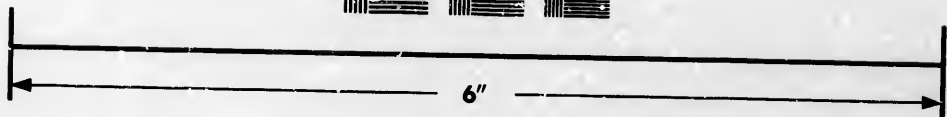
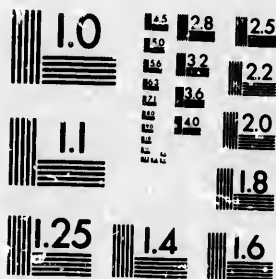


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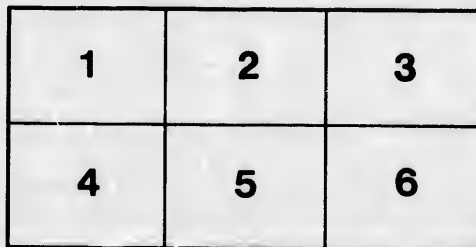
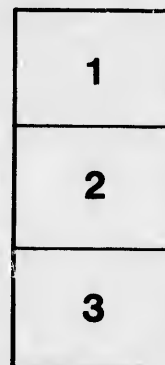
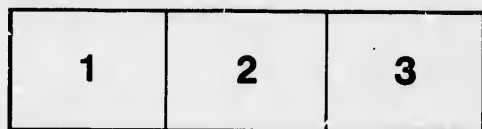
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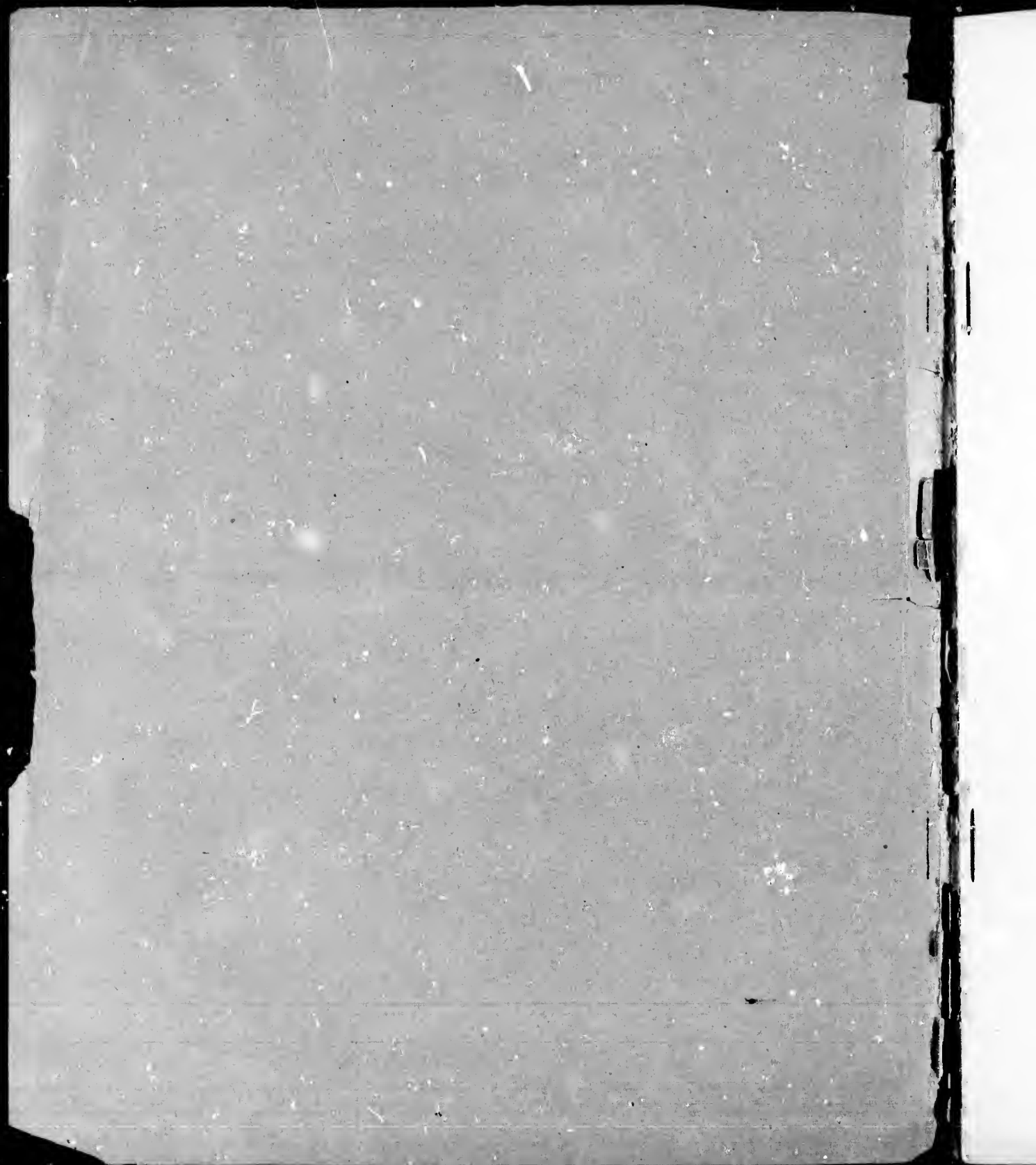
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IX.—*On the Nymphaeaceae.*

By GEORGE LAWSON, Ph.D., LL.D.

(Read May 22, 1888, with subsequent additions.)

PART I.

Structure of VICTORIA REGIA, Lindley.

(Abstract.)

An account was given of the general conformation, and of the arrangement of tissue systems in the organs, of plants belonging to the Natural Order *Nymphaeaceae*, or Water Lilies, and of special features in their organization and minute anatomy. The South American Water Lily, *Victoria regia*, had been, many years ago, fully described and illustrated, in respect to its general botanical characters and history, successively, by Dr. Lindley, Sir William Jackson Hooker, Mr. Thomas Moore, and the author of the present paper. As regards its minute structure, it was more carefully studied by M. Planchon, whose researches were published in the *Flore des Serres*, Vol. VI, p. 249, etc., and by M. A. Trécul, who illustrated the more important facts of its structure and development of organs in the *Annales des Sciences Naturelles, Botanique*, ser. 4, I, pp. 145–172. Some of the facts well known a quarter of a century ago seem to be forgotten now. Lately, De Bary, in the “Comparative Anatomy of Phanerogams and Ferns,” and J. H. Blake, of Cambridge, in Balfour’s “Annals of Botany,” August, 1887, questioned the explanations given of the structure of the prickle in the *Victoria*, so far as regards the nature and function of the ostiole or depression at its apex. The author of the present paper had shown, as long ago as 1855, the true character of these prickles, and that the so-called ostiole had no special function, as had been argued (and inferentially was not pathological, as now suggested by Blake), but that it was “a simple depression in the apex of the prickle of no physiological importance,” (*Proceedings Bot. Soc. Edinburgh*, November, 1855.) In the same paper it was shown that the stomatodes, or perforations of the leaf, were not mere holes caused by insects, as argued by Trécul, and now accepted on his statement by Blake, but special structures of uniform size, formed by a surrounding margin of modified cells; further, that they were comparable with the more complete reduction of parenchymatous tissue seen in many submerged plants, and especially in *Ovinandra fenestralis*; moreover, their probable special function, as a contrivance for securing the drainage of water from the upper surface of the gigantic, tray-like leaf, with upturned margin, was indicated.

A series of large, coloured drawings, illustrating the microscopical structure of the

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Victoria regia was shown. These drawings were prepared by Dr. Lawson, from observations made partly on the Royal Water Lily that was so successfully grown in an open air pond, in Knight and Perry's Nursery, King's Road, Chelsea, in the autumn of 1851, and partly on material obtained from a plant that flowered in the Botanic Garden of Glasgow, in 1855, and of which an account was given in Section D of the British Association at the meeting held that year in Glasgow. These drawings showed the epidermis and stomata, with their chlorophyll granules, of the upper surface of the leaf; the surface-cells, hairs, and what were regarded as the basal cells of aborted hairs, of the under surface; the prickles in several aspects and sections, exhibiting their cellular structure, the ostiole, etc.; the intercellular air-spaces of the leaves, and the large, stellately branched processes projecting into them, with bead-like markings on their surface; colouring matter of the under surface leaf-cells, the depth of colour markedly different in contiguous cells; the so-called stomatodes or perforations of the leaf, margined by more or less oblong, flat-sided cells, filled exclusively with red or rosy colouring matter; the upper surface petal-cells, with thick, translucent, slightly plicate or crimped cell-walls, and filled with colouring matter of a rose-colour of diverse depths of shade in different parts of the petal.

PART II.

Nomenclature of NYMPHÆACEÆ.

In the Bulletin of the Torrey Botanical Club, of New York, for September, 1887 (X' V, p. 177), Prof. Edward L. Greene, of the California University, called attention to the circumstances attending the separation from the old genus *Nymphaea* of the yellow-flowered Water Lilies, or "Pond Lilies," as they are usually called in Canada, into a, distinct genus, the *Nuphar* of Smith, who published it in Sibthorp's "Flora Græca" in 1806. Prof. Greene pointed out, what he supposed was unknown to English botanists that Salisbury's work in separating the white from the yellow-flowered Water Lilies was published prior to the appearing of Smith's generic name *Nuphar* for these plants, for the plate in "Paradisus Londinensis" bearing the figure and the name of Salisbury's *Castalia magnifica* was issued in October, 1805. He accordingly urged the restoration of Salisbury's generic names: *Nymphaea* for the yellow-flowered or nuphar species (= *Nuphar*, Sm.), and *Castalia* (= *Leuconymphaea*, Børnhave, pre-Linnæan) for the more showy kinds with red, white, or blue flowers.

In the Torrey Bulletin for December, 1887 (XIV, p. 257), Prof. Greene returned to the subject, further establishing the priority of Salisbury's division of the genus by additional references. In that communication he contended that the oldest Linnæan or post-Linnæan names are those which genera must bear,¹ and that *Castalia*, of Salisbury, is the oldest name, not pre-Linnæan, for the genus that botanists have been calling *Nymphaea*. He quotes, from Sir James Smith's published correspondence, the letter of the latter to Dr. Samuel Goodenough, Bishop of Carlisle (Sir James's adviser in classical matters),

¹ It is not to be forgotten that certain genera which have come down to us from pre-Linnæan times are the result of the accumulated observations and sagacity of successive generations of botanists.

proposing to replace Salisbury's name *Castalia* by *Nymphæa*, and to give to the yellow Water Lilies the name *Blephara*: the Bishop did not approve of this last name, and recommended *Nuphar* or *Madonia* for the yellow kinds. Prof. Greene, not having Salisbury's original paper in the *Annals* to refer to, nor apparently any publication relating to the treatment of the question by Salisbury's contemporaries, except the published correspondence of Smith, was unfortunately led into the mistake of supposing that "the action of Smith was a deliberate attempt to suppress—relegate to oblivion, if he might—Salisbury's monograph as a whole, and to banish his name, in so far as might be possible, from all connection with the nomenclature of these plants." Such a charge, if sustained, would form an indelible stain upon the history of botany in England, for to no botanist is England more indebted than to Smith, who devoted his life, energy and fortune to the advancement of English botany, at an opportune time when such devotion and services could not fail to yield conspicuous results. Botanical science then made rapid progress, a taste for it was widely spread throughout Great Britain, and preparation made for the still more advanced and extended work of the Hookers. I am sure that English botanists entertain grateful feelings towards the memory of Sir James Edward Smith, who was, in his time, the leader in English botany, author of the best works (with exception, possibly, of that of Withering), that had appeared descriptive of English plants, and he moreover conferred lasting benefits upon science by purchase of the Linnaean Herbarium and establishment of the Linnaean Society.

Mr. James Britten, F.L.S., took up Prof. Greene's suggestions, in the *Journal of Botany, British and Foreign*, for January, 1888, (of which he is editor), and was enabled, by judicious use of the abundant literary material under his hand, to supply the references requisite for completion of the proofs of priority, and to place the whole subject in a clear and concise form before English botanists. He did not, however, explain fully the facts bearing upon the charge made, evidently under misconception, by Prof. Greene against Sir James Smith. He also alluded to Prof. Greene's statements, probably in haste of writing, as the "latest discovery" in regard to priority of nomenclature, forgetful of the fact that there is no trace in our botanical literature of any one having ever doubted that Salisbury's generic names were prior, in point of time, to those of Smith, which have been generally followed. The repeated expression "latest discovery," coming from a botanist with such ample facilities of reference as an officer of the British Museum, would naturally favor the assumption implied in Prof. Greene's communications that Salisbury's memoir had lain a dead letter, unknown or uncared for by his contemporaries and successors, and had been specially "suppressed," "relegated to oblivion" by Smith. These charges against the botanists of England in general, and Sir James Smith in particular, are apparently further fortified by a quotation from M. Planchon's paper in *Annales des Sciences Naturelles, Botanique*, ser. 3, XIX, p. 59, characterising Smith's action as unjust, and probably prompted by a spirit of antagonism.¹ All these writers have overlooked the facts, abundantly recorded, and of which proofs are offered in this paper: (1) that the separation of the two generic groups, *Castalia* and

¹ "On doit blâmer Smith d'avoir, probablement par esprit d'antagonisme contre l'ingénioux Salisbury, bouleversé à plaisir la nomenclature proposée par ce dernier botaniste. Il est trop tard sans doute, pour revenir sur cette injustice qui fut en même temps une maladresse: les termes resteront comme ils sont, à cause que l'usage les a consacrés, mais on saura du moins de quel côté se trouvaient le droit et la raison." Planchon.

Nymphæa, as he called them, was acknowledged by his contemporaries to be due to the sagacity of Salisbury; (2) that the name *Castalia* was at first adopted by Woodville and Wood, in Rees's Cyclopædia, and by other authors, under protest as to the reason for its choice, with correction of the needless changes which Salisbury made in specific appellations, and restoration of the already established ones; and (3) that the generic names proposed subsequently by Smith have been preferred, not from any feeling of antagonism to Salisbury, or desire to lessen his merit, but for reasons that were freely expressed at the time, and held weight subsequently with botanists, so long as every other consideration was not swept away by the now all-prevailing priority idea. Even now, some who incline to accept the name *Castalia*, in itself unobjectionable, in deference to the desire to give preference to priority, may not appreciate Mr. Salisbury's reasons for its selection, which no doubt formed the real obstacle to its adoption at a time when descriptive suitability and propriety of sentiment were thought to be of consequence.

Mr. Britten says: "In 1808 (or 1809) Smith (Fl. Græc. Prodr., I, p. 361) adopted Salisbury's division of the Linnæan genus *Nymphæa*, but did not follow Salisbury's nomenclature. He restricts the name *Nymphæa* to Salisbury's *Castalia*, while he bestows upon the yellow-flowered species, for which Salisbury retained the name *Nymphæa*, a new name *Nuphar*." It is shown that the part of the Prodrômus containing *Nuphar* did not appear until the end of 1808, or, more likely, the beginning of 1809.

Mr. Britten, unlike Prof. Greene, acquits Smith from "displaying any animus against Salisbury personally." He indeed points out Smith's recognition of the correctness of Salisbury's division of *Nymphæa*, in the "Introduction to Botany," to which Mr. Joseph F. James has also called attention, in Torrey Bulletin, Feb. 1888. "I believe," says Smith, "Mr. Salisbury's *Castalia* is well separated from *Nymphæa*." Smith wrote to Bishop Goodenough stating his wish to retain *Nymphæa* for the showy-flowered species, and to adopt *Blephara* for the yellow-flowered ones. Britten quotes Goodenough's reply: "You must and you do reject Salisbury's *Castalia* upon irrefragable [here Britten interjects, 'i.e., classical'] grounds." Not being able to refer to the Smith correspondence at present, I cannot ascertain how far this interpolation is justifiable, but apparently the real ground was notorious at the time and did not need reference in correspondence between Goodenough and Smith. That Salisbury's nomenclature, weighted with so many needless changes, should not have been adopted with alacrity by his contemporaries will not surprise anyone acquainted with the spirit and literature of the time. Salisbury's antagonism to certain Linnæan ideas, and his attempts to belittle Linnæus and repudiate Linnæan names, his constant desire to change specific names (at that time regarded as more inviolable than generic ones), and the special objection to *Castalia*, not as a name, but on account of the analogy with which he sought to justify it, and which brought down upon him the rebuke of the authors of the article in Rees's Cyclopædia, are quite sufficient to explain why Salisbury's proposed nomenclature was not at once adopted, and to show that the responsibility did not lie with Smith, but with the botanists of the time, who, then few in number, were more disposed to consult and act in concert in such matters than is the custom, or is indeed practicable, now. What could be more frank than Sir James's acknowledgment of Salisbury's merits, as expressed in the quotation already cited from his Introduction to Botany, and in the article NYMPHÆA in Rees's Cyclopædia (XXV.) After noticing the varying views of Linnæus at different times as to the

affinities of the order, Smith says: "We heartily concur with Mr. Salisbury's decision concerning the affinities of the genus, though not in the name, which he has transferred from the true plant of the ancients, and replaced by *Custalia*, a word incorrect in etymology as well as meaning, and altogether superfluous."

It is not desirable that space should be occupied here with discussion of the laws of nomenclature, which will need to be dealt with by botanists ere long on wider principles than have been hitherto recognised. It may be remarked, however, that the "law of priority" is no doubt, as has been expressed, "the only sound principle." The difficulty is to secure agreement as to what is meant by priority, and whether it should apply to generic and specific terms separately, or only when these are united or combined as names, and how far authorities for them are to be used in cases where terms are not strictly equivalent. Many subsidiary questions arise, rendering uniformity difficult. Mr. Beeby justly observes, that something more is required than the hunting-up of the oldest name ever applied, but sometimes applicable only in the most general way; the far more difficult task remains of finding out the oldest name which is sufficiently exact in meaning to be applicable in a strict sense to the plant it is intended to represent. The fact is, that while general rules are useful as a guide, individual cases must be judged on their own merits. Bentham, as a classicist and philologist, adopted the idea that a specific term, being usually an adjective, was not in itself complete without the substantive generic word; that the combination of the two formed the name, to which alone the law of priority would consequently apply. Prof. D. C. Eaton, in his magnificent work on the Ferns of North America, lays down the same rule. The way in which Linnæus indexed his books, giving first an Index Generum, then an Index Synonymorum, and lastly an Index Triviale, does not lend favour to this view, neither does his custom of joining together generic and specific names of different genders. But there is a strong and a practical argument against it in the practice adopted by chemists, with results so satisfactory, in the naming of the elements, and of their chemical compounds—of groups, radicals, bases, acids, and the salts and complex compounds formed by their union. The names of the elements, or of simple or, as we may call them, Elementary groups (radicals), are always treated as complete terms, even when used in adjective forms, and are, as far as conveniently possible, expressed, in form suitably modified, in the name of the more complex compound, just as symbols are treated as perfect, complete and immutable terms in the construction of formulæ. We shall never have a permanent system of nomenclature of plants, until generic and specific names (so called) are treated in the same way as separate terms, essentially complete in themselves, and available for permanent use by combination in the construction of binary names.

As Mr. Britten states, the second volume of *Annals of Botany*, in which Salisbury's paper was printed, is dated on the title page 1806 (there are no dates of publication on the parts as bound in volumes); "but internal evidence shows that this first part was issued in 1805." As the internal evidence is not very obvious, and the *Annals* contain other important memoirs bearing on questions of priority, it may be worth while to determine, with some approach to accuracy, the actual date of publication. This work is styled on its title page "*Annals of Botany*. Editors, Charles König, F.L.S., and John Sims, M.D., F.L.S." (London. "Vol. I, 1805." "Vol. II, 1806.") These dates of publication are so quoted in DeCandolle's "*Systema Naturale*." The complete work forms two

octavo volumes of nearly 600 pages each, with plates. It was issued in form of periodical parts, each part containing a number of memoirs, followed by "Miscellaneous Articles," consisting of correspondence, botanical news, etc. This division of matter affords the only key to distinguish the separate parts in the bound volumes. The first part (of Vol. I) probably appeared on May 1st, 1804, which is the publication date on the frontispiece portrait of John Ray. The Edinburgh Review for July, 1804, acknowledges receipt of Annals of Botany, No. 1, price 7s. 6d., in list of publications received from April 18th to July 7th, 1804. The third and last part of Vol. I contains an obituary notice of Prof. Allioni of Turin, who died July, 28th 1804. The next part, the fourth (being first of Vol. II) is the one that contains Salisbury's paper. This fourth part is acknowledged in the Edinburgh Review for July, 1805; it contains a letter from Dr. Smith (Sir J. E.), dated Norwich, March 24th, 1805, and one from Dawson Turner, dated Yarmouth, May 17th, 1805,—a short communication not likely to have lain over long for publication. These facts indicate that the part could not well have been issued before the end of May, or later than the end of June, 1805. Thus, as nearly as can now be ascertained, Salisbury's "Description of the Natural Order of *Nymphaeace*" was published in June, 1805.¹ In this paper he divided the genus *Nymphaea* of Linnaeus into three distinct genera, of which, with some others that Linnaeus had no knowledge of, he constituted the Natural Order "*Nymphaeace*," placing it between the orders *Ranunculaceae* and *Papaveraceae* of Jussieu. His genera and species are as follows, the genus *Cyamus* being adopted from Smith:—

<i>Nymphaea umbilicalis</i> ,	= <i>Nymphaea lutea</i> , <i>Linn.</i>
<i>arifolia</i> ,	= <i>N. advena</i> , <i>Sims.</i>
<i>sagittifolia</i> ,	= <i>N. longifolia</i> , <i>Michx.</i>
<i>Castalia pudica</i> ,	= <i>N. odorata</i> , <i>Kenn.</i>
<i>speciosa</i> ,	= <i>N. alba</i> , <i>Linn.</i>
<i>scutifolia</i> ,	= <i>N. caerulea</i> , <i>Sims.</i>
<i>stellaris</i> ,	= <i>N. stellata</i> , <i>Kenn.</i>
<i>Castalia ampla</i>	= <i>N. fol. amplioribus</i> , etc., <i>Brown, Jam.</i>
<i>mystica</i>	= <i>N. Lotus</i> , <i>Sims.</i>
<i>edulis</i>	= <i>N. Coteka</i> , <i>Roxb. MS.</i>
<i>Euryale ferox</i> .	
<i>Hydropeltis pulla</i>	= <i>Hydropeltis purpurea</i> , <i>Michx.</i>
<i>Cyamus mysticus</i> ,	= { <i>Nymphaea Nelumbo</i> , <i>Linn.</i>
	{ <i>Nelumbium speciosum</i> , <i>Willd.</i>
<i>flavicomus</i> ,	= <i>Nelumb. luteum</i> , <i>Michx.</i>

The following formed a list of "Species Dubiae":—*N. lutea* β . *Kalmiana*, Michx.; *N. pentapetala*, Walt; *N. Nelumbo*, Walt; *N. reniformis*, Walt.

In the same year, as Mr. Britten informs us, Mr. William Hooker, a London artist (whose memory is perpetuated in the water-color called "Hooker's Green"), published in the Paradisus Londinensis the plate lettered *Castalia magnifica*, and dated October 1st, to which Mr. Salisbury supplied the letterpress.

¹ The explanation of the year 1806 appearing on the title page, is seen in the fact that the last part of the volume, and final part of the work, was delayed, and could not have been issued until that year, for it contains a letter dated Irkutsk, April 24, 1806.

As already stated, Sir James Smith, in 1808 or 1809, adopted Salisbury's division of *Nymphaea*, but not his nomenclature, retaining the name *Nymphaea* for Salisbury's *Castalia*, and giving the new name *Nuphar* to the yellow-flowered species.

In his paper in the Journal of Botany, Mr. Britten has revised the genera *Castalia*, Salisb., and *Nymphaea*, Salisb., and given a Synopsis of the "correct nomenclature" of the Salisbury species, noticing the difficulty in regard to Salisbury's *Castalia mystica*, on account of its including three plants, which Mr. Britten assorted as follows:—

- C. mystica*, Salisb. (the Egyptian and African *N. Lotus*.)
C. sacra, Salisb. in Paradisus, (the Indian, *N. Lotus*.)
C. thermalis, Britten (the Hungarian, *C. mystica*.)

Prof. Greene followed up Mr. Britten's readjustment of the *Castalias* (Torrey Bulletin, March, 1888, XV, p. 84), by renaming several North American species that the latter had not taken up, as follows:—

- Nuphar polysepalum*, Engelm. = *Nymphaea polysepala*, Greene.
N. rubrodiscum, Morong. = *Nym. rubrodisca*, Greene.
Nymphaea tuberosa, Pursh. = *Castalia tuberosa*, Greene.
N. flava, Leitner. = *C. flava*, Greene.
N. elegans, Hooker. = *C. elegans*, Greene.

Not being aware that the proper specific names of *Castalia alba* and *odorata* had been reestablished by Woodville and Wood, Prof. Greene also proposed the reinstating of these specific names under the new generic term, in correction of Salisbury's "wrong-doing" in changing them respectively to *speciosa* and *pubica*.

THE GENUS *Castalia*, Salisbury.

The points at issue having been indicated, and mention made of the work of Prof. Greene and Mr. Britten in reviving Mr. Salisbury's neglected generic names, and revising the specific nomenclature accordingly, it is desirable here to give some history of the genus *Castalia*, and of its species, that have so long stood under the generic name *Nymphaea*.

The following table will show the equivalence of the generic name *Nymphaea* as used successively by leading systematists. The *Nymphaea* of Tournefort, Jussieu, and Willdenow, included the *Castalia* and *Nymphaea* of Salisbury; *Nymphaea* of Linnæus, and Hunberg, included *Castalia*, Salisbury, *Nymphaea*, Salisbury, and *Nelumbo*, Tournefort, which last was called *Cyamus* by Smith and Salisbury; *Nymphaea* of Smith, and of Bentham & Hooker, is equivalent to *Castalia*, Salisbury; *Nymphaea*, Salisbury, Greene, and Britten, is equivalent to *Nuphar*, Smith:—

<i>Nymphaea</i> , Tournefort, 1700	} = {	<i>Castalia</i> , Salisbury, 1805.
<i>Jussieu</i> , 1791		<i>Nymphaea</i> , " "
<i>Willdenow</i> , 1799		

Nymphaea, <i>Linnaeus</i> , 1732 } <i>Thunberg</i> , 1784 }	=	{	Nelumbo, <i>Tournefort</i> , 1700 = (<i>Cyamus</i> , <i>Salisbury</i> .) Castalia, <i>Salisbury</i> , 1805. Nymphaea, " " "
Nymphaea, <i>Smith</i> , 1808-9 } <i>Benth. & Hook.</i> , 1862 }	=		Castalia, <i>Salisbury</i> , 1805.
Nymphaea, <i>Salisbury</i> , 1805 } <i>Britten</i> , 1888 }	=		Nuphar, <i>Smith</i> , 1808 9.

Of plants that come within the genus *Castalia*, Salisbury, only two nominal species were described by Linnaeus, in his genus *Nymphaea*, in the second edition of the "Species Plantarum" (Vol. 1, published in 1762). We have seen that the genus itself, as defined and furnished with species by Linnaeus, was a composite one, including plants that, both before and after his time, were referred to separate genera. In like manner, the two Linnaean species of *Nymphaea* that are now referred to *Castalia* were both composite species, as we glean from the cited references to authors and the indications given of geographical range. The first, *N. alba*, included not only the White Water Lily of Europe—*Nymphaea alba*, Camerarius (1586),—but also, as indicated by the phrase "habitat in Europâ et Americâ," at least one other plant, which we assume to have been the common White Water Lily of the American continent, now known as *odorata*. The second species, *N. Lotus*, included the *Lotus Aegyptia* of Pliny, a name adopted by Alpinus (1672), and also the Jamaica species of Brown and Sloan,—"habitat in calidis Indiæ, Africæ, Americæ." The two original Linnaean species of the genus, then, were:—

- | | | |
|---------------------------|---|------------------------------------|
| 1. <i>Nymphaea alba</i> , | } | Linnaeus, Species Plantarum, 1762. |
| 2. <i>N. Lotus</i> , | | |

In the first edition of Aiton's "Hortus Kewensis" (1789), Dryander described, under name of *N. odorata*, a North American species that had been introduced to England by William Hamilton in 1786, and was identified with the *N. alba flore pleno odorata* of Clayton, in "Gronovii Flora Virginica" (1762):—

3. *N. odorata*, Dryander, Hortus Kewensis, 1789.

J. F. Gmelin, in the third edition of the Systema Naturæ of Linnaeus (Leipzig, 1791), inserted the *N. reniformis* of Walter's Flora Carolina. Willdenow, in his amplified edition of the Species Plantarum, (1799), without recognising Walter's plant (then unknown in Europe except by the description in his work), increased the number of species to five by describing, (1) under name of *N. stellata*, the plant called Citambel in Van Rheedé's Hortus Malabaricus; (2) as *N. pubescens*, another East Indian species, with large toothed leaves, hairy beneath, characterised by Plukenet in the "Almagestum" as "*N. Indica*," etc.:—

- | | | |
|--------------------------|---|---------------------------------|
| 4. <i>N. stellata</i> , | } | Willdenow, Sp. Plantarum, 1799. |
| 5. <i>N. pubescens</i> , | | |

Before this time, however, another well-marked species had been discovered at the Cape of Good Hope by Mr. Francis Masson,¹ and was received in a living state at the Royal Gardens, Kew, having been brought to England in H.M.S. "Gorgon," in the year 1792. This species was described by Kennedy in Andrews' Botanical Repository, as *N. carulea* :—

6. *N. carulea*, Kennedy, Bot. Rep., 1801.

The above mentioned species were all dealt with in Salisbury's original paper, (except (5) *N. pubescens*, which was subsequently added in the *Paradisus Londinensis*), and two others were included for which binomial names had not been published before, viz., an East Indian species named in manuscript, with figure, by Dr. Roxburgh, as *N. Coteka*, and a plant in Brown's History of Jamaica, "*N. foliis amplioribus*," etc., which Linnæus had sheltered under the name of *N. Lotus* (No. 2 of the present list) :—

7. *N. Coteka*, Roxburgh, MS.

8. *N. foliis amplioribus*, etc., Brown, Hist. Jamaica, 1700.

The above list of eight numbers represents the materials upon which Salisbury's new genus *Castalia* was founded. In dividing the old genus *Nymphæa*, of Fournetfort, into two new ones, he might well have retained the original generic name for the group which contained the greater number of species, and sought a new name for the one that included only three. Instead of doing so, he bestowed the well-established name *Nymphæa* upon the genus of few species, and selected a new sentimental one of doubtful taste for the larger genus. Not satisfied with this, he, further, without offering any reason or apology, ignored or changed all the specific names of these plants that had been established, and were in common use by his contemporaries, substituting others, mostly less descriptive, and in no case preferable. He changed the specific term of *Nymphæa alba*, essentially the White Water Lily, so named and known familiarly for centuries, to the (in this genus) meaning-

¹ The memory of Francis Masson, long forgotten as a Canadian botanical collector, may be revived by recounting here a few particulars of his history. He was an able and industrious collector, through whom the Royal Gardens at Kew received many choice productions, especially from South Africa. Born at Aberdeen, in Scotland, August, 1741, he was first engaged in the service of His Majesty George the Third, to collect for Kew, in 1771 or 1772, (in those days Kew was the King's Garden, and not a public or people's institution as now.) He was sent to the Cape of Good Hope, and remained there till 1776. Five years more were spent in exploring the Canaries, Azores, Madeira, and parts of the West Indian Islands. In 1783, he went to Portugal, thence again to Madeira, and, returning to England in 1785, he prepared for a second voyage to the Cape. He laboured there from 1786 to 1795, when he once more returned to England. In 1796 he published, at London, a folio volume of illustrations of new species of *Stapelia*, with forty-one coloured plates. In the following year (1797), having intimated his desire to be further employed on foreign service, Sir Joseph Banks mentioned the same to His Majesty, who was graciously pleased to order him to explore such parts of North America, under the British Government, as appeared most likely to produce new and valuable plants. "On this occasion he perished, in the sixty-fifth year of his age." He died at Montreal, about Christmas, 1805. Francis Masson's name is commemorated in the Cape genus of Liliaceous plants, *Massonia*, Thunberg, Nov. Gen., of which eight species were described in *Hortus Kowensis*, all discovered by Masson himself. In the *Systema Vegetabilium* of Schultes, (1830), the number was raised to seventeen, and by Baker, in Linn. Trans., to twenty-five, but reduced in apparent numbers by separation of species referable to *Polyxena*, Kunth, of the *Scilleæ* tribe, *Massonia* being limited by Baker to species of the *Alliææ*, so that Bentham and Hooker's estimate is twenty. A Carribean Liliaceous plant is named *Sloanea Massoni*, Willd., Sp. Pl., ii, p. 155.

less term *speciosa*. The Sweet Scented Water Lily, *N. odorata*, was to be called *pudica*, which, in view of Salisbury's own expressed reason for choice of the generic term, also became meaningless. The Blue *N. caerulea* is called *scutifolia*. *N. stellata* is changed to *stellaris*, as if for no other reason than to give trouble to proof-readers, (just as he changed Walter's *N. sagittifolia* to *N. sagitticifolia*, spelling the latter name with an initial capital). *N. rubra*, essentially the Red Water Lily is changed to *magnifica*, which, like *speciosu*, means nothing, but, having acquired priority in print, will probably be retained. *N. Lotus* is bereft of its classical name and becomes *mystica* or *sacra*. Under the circumstances, it is not surprising that his contemporaries and successors did not adopt his proposed changes with alacrity, so long as it was the custom to avoid wilful and needless alterations, unless they were supported by some stronger plea than that of so-called priority, namely, that they had been proposed. That Salisbury knew he was acting in direct opposition to the views and feelings of his contemporaries, we have direct proof, for the part of the Annals immediately preceding the one in which his paper appeared, contains an expression of the opinions of its editors, Mr. König and Dr. Sims, in a review of the Flora Boreali-Americana of Michaux, in course of which it is remarked: "We have more serious objections to the frequent innovation this author [Michaux] has taken the liberty of making in botanical nomenclature; this disposition, which unhappily is too prevalent amongst the botanists of the continent cannot be too warmly inveighed against. . . . Some changes of names cannot, of course, be avoided, as the species must take the name of the genus to which it is found to belong; but in such case the trivial name should be sacredly preserved. . . . These strictures are not intended to arraign the new genera that M. Michaux has thought proper to raise from species before known, although this appears to have been sometimes done upon grounds too trivial to warrant such a change, so much as to condemn the unnecessary alteration of the specific name, and even frequently of that of the genus, without any good reason."

The following are the changes contained in Salisbury's paper; the initial capitals of his specific names (another needless change which he seems to have attempted to introduce) are not reproduced here:—

1. <i>Nymphaea alba</i> changed to	<i>Castalia speciosa</i> .
2. <i>N. Lotus</i> "	<i>C. mystica</i> .
3. <i>N. odorata</i> "	<i>C. pudica</i> .
4. <i>N. stellata</i> "	<i>C. stellaris</i> .
5. <i>N. caerulea</i> "	<i>C. scutifolia</i> .
6. <i>N. Coteka</i> "	<i>C. edulis</i> .
7. <i>N. pubescens</i> "	<i>C. sacra</i> .
8. <i>N. foliis amplioribus</i> , etc., named	<i>C. ampia</i> .

An additional species, said to have the odour almost of the tuberose, was introduced from China, in 1805, by the East India Company, in the ship "Winchelsea," Capt. Campbell; it was described by Salisbury in the *Paradisus* as *Castalia pygmæa*, and in Hortus Kewensis (following Salisbury's specific name only) as *Nymphaea pygmæa*. In Ledebur's *Flora Rossica*, (I, p. 84), it is identified with Gmelin's *N. alba minor*, which Willdenow, in *Species Plantarum*, II, p. 1153, had included (ex. syn. Morisoni) in his *N. odorata*. Another eastern species, named by Roxburgh in manuscript *N. rubra*, was

figured in the Botanical Repository and in the Botanical Magazine, and described in Hortus Kewensis, under that name; but changed in the Paradisus to *Castalia magnifica*. Thus the following names have to be added to the list:—

9. *N. pygmæa* = *C. pygmæa*.
10. *N. rubra* = *C. magnifica*.

In Rees's Cyclopædia, which was commenced in the year 1802, and completed in 1819, consisting of forty-five heavy quarto volumes, consequently a larger work than even our present Encyclopædia Britannica, Salisbury's new generic name *Castalia* was adopted in the early part of the work, and formed the title of an article in Vol. VI, in which the several species were fully described. The author or authors of that article (probably either Dr. Woodville or Rev. Mr. Wood, or both, who are credited in the preface as having supplied the botanical articles in the earlier volumes) recognised the propriety of separating the Water Lilies into two genera, but, while adopting the name *Castalia*, disapproved strongly of the principle upon which it had been selected, and the false analogy upon which it was founded, as alike adverse to philosophical precision, truth, and delicacy of sentiment.

The descriptive and technical portions of Salisbury's paper are in Latin. His reason for selecting the name *Castalia* is given in these words:—"Quasi ob pudicitiam, utrum totum petalis occultant species hujus generis; itaque *Castalias* dixi." The authors of the Cyclopædia article evidently thought the comparison a fanciful and offensive one; they say: "We have adopted Mr. Salisbury's generic name, from a confirmed unwillingness to change any name once given, unless urged to it by the most cogent reasons; but, at the same time, we feel ourselves constrained to add that we cannot concur with that excellent botanist in the principle on which he has been induced to choose it, no less adverse to philosophical precision and truth than it assuredly is to moral purity, and to that delicacy of decorum, which is one of the best characters of a rightly cultivated mind."

In this Rees's Cyclopædia article, which has been entirely overlooked by writers on the subject, both in England and America, the unnecessary changes introduced by Salisbury in the specific names are rectified by reinstating the original ones and conjoining them with the new generic term.

In a subsequent volume (XXV) of the same work, these plants are again described in article NYMPHÆA. It is understood that all the botanical articles from letter C, in the Cyclopædia, were written by Sir J. E. Smith; an allusion to his "Prodromus Floræ Græcæ" bears direct evidence that this article was from his pen, and it is so quoted in DeCandolle's Prodromus. In this second article, the generic name *Castalia* is discarded and *Nymphaea* substituted (the Yellow Water Lilies being described in another article in the same volume under the generic name *Nympha*). The following list will show the names under which the several species are respectively described in the two articles referred to; the arrangement and numbering are adjusted, as far as practicable, to correspond with the lists preceding in the present paper:—

¹ See English Cyclopædia, Biography, article: SMITH, JAMES EDWARD.

REES'S CYCLOPÆDIA

Vol. VI. (Woodville and Wood.)	Vol. XXV. (J. E. Smith.)	Vol. VI. (Woodville and Wood)	Vol. XXV. (J. E. Smith.)
1. <i>Castalia alba</i>	= <i>Nymphaea alba</i> .	7. <i>C. pubescens</i>	= <i>N. pubescens</i> .
2. <i>C. Lotus</i>	= <i>N. Lotus</i> .	8. <i>C. ampla</i>	=
3. <i>C. odorata</i>	= <i>N. odorata</i> .	9.	= <i>N. pygmaea</i> .
4. <i>C. stellata</i>	= <i>N. stellata</i> .	10. <i>C. magnifica</i>	= <i>N. rubra</i> .
5. <i>C. cœrulea</i>	= <i>N. cœrulea</i> .	11.	= <i>N. nitida</i> .
6. <i>C. edulis</i>	=	12.	= <i>N. versicolor</i> .

A. P. DeCandolle having elaborated the *Nymphaeaceae* very carefully for his Regni Vegetabilis Systema Naturale (1821), we have his results in the following list, in which the species are arranged in order, and with numbers to correspond to those already given:—

DECANDOLLE, Systema Naturale, 1821.

1. <i>Nymphaea alba</i> .	11. <i>N. rubra</i> .
2. <i>N. Lotus</i> .	12. <i>N. nitida</i> .
3. <i>N. thermalis</i> .	13. <i>N. versicolor</i> .
4. <i>N. odorata</i> .	14. <i>N. cœrulea</i> (<i>stellata</i> , <i>var.</i> Sims.)
5. <i>N. stellata</i> .	15. <i>N. Madagascarensis</i> , (<i>species nova</i>).
6. <i>N. scutifolia</i> .	16. <i>N. pulchella</i> (").
7. <i>N. edulis</i> .	17. <i>N. reniformis</i> .
8. <i>N. pubescens</i> .	18. <i>N. minor</i> (<i>odorata</i> , <i>var.</i> Sims).
9. <i>N. ampla</i> .	19. <i>N. blanda</i> .
10. <i>N. pygmaea</i> .	

DeCandolle's Systema having ceased with the second volume, the Prodromus (1824) took its place. The same nomenclature of the Water Lilies was retained in the latter work, with addition of a somewhat doubtful Chinese species:—

20. *N. acutiloba*.

Not a few new species have been subsequently described by M. Planchon and other botanists, in the Annales des Sciences Naturelles, and other publications. A number of these have been founded on dried specimens in herbaria, and it is probable that a readjustment of them will be required when the living plants or better material become available for examination. Such was obviously the opinion of Bentham and Hooker when working on the Genera Plantarum (1862), for they did not include these novelties in their estimate of the number of species, which is given as twenty, the number described by DeCandolle nearly forty years before. Now that the Water Lilies are more generally cultivated, it may be expected that their specific relations will be more carefully studied. One disturbing influence will be found in the increasing number of artificial, as well as natural, varieties and hybrids, which, however, may prove of value as pointers of relationship in the study of allied forms. The Synopsis, that follows, necessarily imperfect, has been prepared with the special view of assisting in the further study of our Canadian and North American species, and South American and European forms allied to them; consequently the details given in regard to other species are very limited.

PART III.

Synopsis of NYMPHÆACEÆ.

NAT. ORD. *Nymphaeaceæ*, DC., "Prop. Med., ed. 2, p. 119." Syst. Nat. II, p. 39. Bentham & Hooker, Genera Plantarum, I, p. 45. *Nymphaea*, Salisbury, Ann. Bot., (1805), II, p. 69.

GENUS 1.—VICTORIA, *Lindley*.

Lindley, Bot. Register Misc., 1838-9, p. 13. Endlicher, Genera Plantarum, No. 1519. Bentham & Hooker, Gen. Pl., I, p. 74.

VICTORIA REGIA, *Lindley*, l.c. Hooker, Bot. Mag., tt. 4575-4578, and separate Monograph, fol., with coloured plates. R. Brown, Proc. Linn. Soc. Lond., May 7, 1850. Henfrey, Gardeners' Mag. of Bot., May, 1850, p. 225, (coloured plates by Fitch). Lawson, Water Lilies, pp. 24-80, t. 1. Planchon, in Van Houtte's Flore des Serres, March, 1851. Walpers, Annales Botanices Systematicæ, (1857), IV, p. 152. Garden and Forest, pp. 308-309, with fig., (1888). Mr. Gray has argued that *Regina* not *regia* is the proper specific name. See Annals of Natural History, ser. 2, VI, p. 146. The form *regalis* has also been used.

Euryale Amazonica. Froriep's Notizen, 1832. Poeppig, ex Endlicher. Planchon, Revue Horticole, Feb., 15th 1853, (Walpers).

Nymphaea Victoria. Schomburgk, MSS.

Victoria Amazonica. Planchon, Revue Horticole, Feb. 15th, 1853 (Walpers).

V. Cruziana. D'Orbigny. Planchon, Ann. des Sc. Nat., Ser. 3, XIX, p. 27. Flore des Serres, VI, p. 210; VII, p. 35. Walpers l.c.

Bolivia, district Moxos, near River Mamore, 1801.—*Henke*. Rio das Madeiras, 1832.—*D'Orbigny*. Near Ega, 1832.—*Poeppig*. British Guiana, in Rivers Berbice and Roupounoum, 1837-42.—*Schomburgk*. Jacouma, 1846.—*Bridges*. Amazon River, near Santarem, (Para.), April, 1850.—*R. Spruce*. Brazil, prov. Matto-Grosso, in Rio de Barbado.—*Walpers*, l.c. Paraguay (*V. Cruziana*).—*D'Orbigny*, who derives the native name, Yrupé, from *y*, water, and *rupé*, a dish.

The Royal Water Lily of South America, the most magnificent of all the *Nymphaeaceæ*, was first raised at Kew from imported seeds, and has now been in cultivation in some of the principal public and private gardens of Europe and America for about forty years, having first blossomed at Chatsworth in November, 1849. In its native lagoons, it appears to present considerable variation (as is not unusual in aquatic plants), and two of the most striking forms have been described as separate species; one of them is well marked, and pending further observation, is retained here as a variety, viz.:—

Var. CRUZIANA, distinguished by its uniform green leaves (not purple on the under surface) and larger black seeds; it may be distinct, but the description is imperfect. First found by M. A. D'Orbigny in 1827, on the river Parana, 900 miles from its junction with the Rio Plata.

GENUS II.—EURYALE, *Salisbury*.

Salisbury on *Nymphaeae*, Konig and Sims' *Annals Bot.*, II, p. 73, (1805). Benth. & Hook., *Gen. Pl.*, I, p. 47.

EURYALE FEROX, *Salisb.*, l.c. Ait., *Hort. Kew.* ed. 2, III, p. 295. DC., *Syst.*, II, p. 48. *Prod.*, I, p. 114.

Annestea spinosa, Roxb., *Fl. Ind.*, II, p. 573. Andrews' *Bot. Repos.*, t. 618.

Euryale Indica, Planchon, in *Ann. des Sc. Nat.*, ser. 3, XIX, p. 28.

India and China. Introduced into England, 1809, by the Marquis of Blandford.—*Hort. Kew.*

GENUS III.—BARCLAYA, *Wallich*.

Trans. Linn. Soc. Lond., XV, p. 442, t. 18. Walpers, *Ann.*, IV, p. 167. Benth. & Hook., *Gen. Pl.*, I, p. 47.

BARCLAYA LONGIFOLIA, *Wallich*, l.c. Hook. *l.c. Pl.*, t. 809-10, and in *Annales des Sc. Nat.*, ser. 3, XVII, p. 301, t. 21. Walpers. *Ann.* IV, p. 168.

Burma.

GENUS IV.—CASTALIA, *Salisbury*.

Annals of Botany, II, p. 71, (1805). Paradisus *Loud.*, n. 14 and 58. *Nymphaea*. Smith, *Prod. Fl. Græc.*, I, p. 361. Benth. & Hooker, *Genera Plantarum*, I, pp. 46-47.

List of species:—

- | | |
|--------------------------|---------------------------|
| 1. <i>C. alba</i> . | 9. <i>C. cœrulea</i> . |
| 2. <i>C. tetragona</i> . | 10. <i>C. stellata</i> . |
| 3. <i>C. odorata</i> . | 11. <i>C. edulis</i> . |
| 4. <i>C. tuberosa</i> . | 12. <i>C. magnifica</i> . |
| 5. <i>C. elegans</i> . | 13. <i>C. Lotus</i> . |
| 6. <i>C. flava</i> . | 14. <i>C. pubescens</i> . |
| 7. <i>C. ampla</i> . | 15. <i>C. thermalis</i> . |
| 8. <i>C. gigantea</i> . | |

1.—CASTALIA ALBA, *Woodv. & Wood*, *Rees's Cyc.* (art. *Castalia*), VI. *Link, Handbuch*, 1831, II, p. 405. Walpers' *Annales*, IV, p. 163. *Greene, Bulletin Torrey Bot. Club*, XV, p. 85.

Nymphaea alba, *Linn.*, *Sp. Pl.*, ed. 2, p. 729, in part, (exclude the American plant). *Roth, Tent. Fl. Ger.*, I, p. 230, (1788). *Gmelin, Syst. Nat.*, ed. 3, II, p. 811, (excl. syn. *Gmelin, Sibir.*) (1791). *Willd.*, *Sp. Pl.* II, p. 1152. DC., *Syst. Nat.*, II, p. 56, *Prod.* I, p. 115. *Lawson, Water Lilies*, p. 81, t. 2, (1850).

Castalia speciosa, *Salisb.*, *Ann. Bot.* II, p. 72. "Besser, *Enumeratio*, p. 22, No. 639," (*Ledebour*). *Britten, Jour. Bot.*, XXVI, p. 9.

White Water Lily of England. Weisse Scerose of Willdenow, and other German authors.

Extends, in various forms, over nearly the whole of Europe, Algeria, etc.

Var. MINOR. *Nymphaea alba* β *minor*, (Besl., Moris.), Willd., Sp. Pl., II, p. 1153. DC., Syst. Nat.; Prod., l. c. Ledebour, Fl. Rossica, I, p. 84.

Russia. Alsace.

Flowers half the size of the normal form, leaf-lobes spreading, with an open space between.

Var. PAUCIRADIATA. *Nymphaea pauciradiata*. "Bunge in Ledeb., Fl. Altaica, II, p. 272." Ledeb., Fl. Rossica, I, p. 84.

River Bekun, an affluent of the Irtusch, between the Altai and Ural Mountains.

Nymphaea pauciradiata, so far as indicated in Flora Rossica, is certainly very closely related to *alba*, and can hardly be treated as a distinct species, and yet in some of its characters it approaches the Canadian *odorata*; the leaf-lobes are described as less closely approximate than in *alba*, and the lateral veins beneath canaliculate (plane in *alba*), stigma less than nine-rayed, petals obtuse (whilst in *alba* they are acute). There is also, closely related to this form (according to Dr. Caspary's observations) *N. biradiata*, Sommeraner, (Bot. Zeitung), described in Koch's Flora Germanica, I, p. 29, the leaf-lobes spreading, with rounded sinus-margins, stigma 5-10-rayed. The Bohemian *N. candida*, Presl (Rostinar), with an ovate-conical, smooth, naked ovary (only its lower third part hid by the petals and stamens), may also be referred here. "Presl, Deliciae Pragenses, p. 224," (1822). Koch, Fl. Germ., I, p. 29.¹

Several garden varieties are grown:—1. *Var. rosea*. In a paper in The Garden, (London), XXIII, pp. 334-336, (1883), it is stated that this variety, sometimes called *sphaerocarpa* and *Casparyi*, "a native of northern Europe, as far north as Sweden," was figured in that work (XV), having flowered at Kew in 1878. Mr. Frank Miles writes in the Garden of the same variety as *var. rubra*, "obtained ten years ago (he is writing in 1885) through Messrs. Henderson, of Professor Agardh, of Lund University, Sweden, from the University Potanic Garden; . . . two out of three seedlings are red like the parent. . . . The exact locality of this variety is not known, as Professor Agardh did not wish it to be exterminated" (The Garden, XXVIII, p. 653.) 2. *Var. candidissima* is described in the same paper, "a large, pure, white-flowered form, very floriferous, with flowers twelve inches in diameter when well expanded." 3. *Var. Castmeeriaana* is either identical with, or closely resembles, the preceding.

Not without hesitation, I add the following synonym, being doubtful whether it may indicate a mixed nominal species or be referable to *C. alba* or *C. tetragona*:—

N. nitida, "Sims, in Bot., Mag., t. 1359." Smith, Rees's Cyc. XXV. DC., Syst., II, p. 58. Prod., I, p. 116. Ledebour, Fl. Ross., I, p. 84. Said by A. P. DeCandolle to be allied to *odorata* and *alba*,—rhizome perpendicular, branched, leaf-auricles obtuse, sinus narrow, points slightly spreading, veins impressed, lateral nerves plain on both sides, flowers in-odorons, petals obtuse. On the other hand, the plant in cultivation in England, under

¹ For details in regard to the relations of these and other varieties, see Dr. Robert Caspary's Observations in Appendix to Index Hort. Berol., 1855, and Walpers' Annales, iv. 162-166.

this name, is described in The Garden as smaller than *alba*, with very pointed and narrow petals. In the Flora Rossica, Dr. Ledebour quotes the occurrence of *nitida* in Siberia on authority of DeCandolle alone, adding, "mihi ignota."

The Linnaean specific term *alba* is a very old one, as applied to this species, which had several binomial pre-Linnaean names: *Nymphaea alba*, Mathiolus, 1558. *N. candida*, Fuchs, 1542-45. *Neuuphar femina*, Brunfels, 1532-34.¹

2.—C. TETRAGONA. *Nymphaea alba minor*, "Gmelin, Fl. Sibirica, IV, p. 184, t. 71," (1769), but not of Willdenow.

Nymphaea tetragona, "Georgi, Reise im Russischen Reichs, I, p. 220, [1775]. (ex Sims et ex herb. Pall.)" (DC).

N. pygmaea, Ait., Hort. Kew, ed. 2, III, p. 293, (1811). DC., Syst., II, p. 59. Prod., I, p. 116. Ledeb., Fl. Ross., I, p. 84.

Castalia pygmaea, "Salish., Paradisus Londinensis, t. 68." Britten, Jour. Bot., XXVI, p. 9.

Characterised by its acute petals and eight-rayed stigma. The lateral nerves beneath are described by DeCandolle as plane (which they are in *alba* and *nitida*), but by Gmelin, as canaliculate.

3.—C. ODORATA, Woodv. & Wood, Rees's Cyc., VI. Greene, Bulletin Torrey Bot. Club, XV, p. 85, (1888).

Nymphaea alba, Walt., Fl. Carol, p. 155. Michaux, Fl. B.-Am, I, p. 311.

N. odorata, (Dryander) Ait., Hort. Kewensis, ed. 1, II, p. 227 (1789, not 1803, as stated in Journ. Bot). Willd., Sp. Pl., II, p. 1153, (except Gmelin's Eastern Siberian plant, referred to *tetragona*.) (Kennedy) Bot. Repos., t. 297, (1803). Torr. and Gr., Fl. N. Am., I, p. 57. Lawson in Miller's Wild Fl. of America. Provancher, Flor. Canad., p. 28. Macoun, Cat., p. 21. Watson, Bibl. Index, I, p. 38.

Castalia pudica, Salisbury, Ann. Bot., II, p. 72, (1805). Britten, Jour. Bot., XXVI, p. 9.

The Fragrant Water Lily. Wohlriechende Seerose, Willd.

As DeCandolle observes, this species has been much mixed up with the European *C. alba*, which, according to Torrey and Gray, was said by Nuttall to grow near Detroit. Possibly he had seen the then undescribed *tuberosa* there. Sixty years ago, Smith, in the English Flora (III, p. 14, 1825), described the leaves of *alba* as "a span wide, oval-heart-shaped, with nearly parallel or close lobes at the base, their radiating veins underneath not prominent, in which it differs from the American *odorata*." Dr. Caspary, after long

¹ Dr. Caspary classifies the modifications of *alba* into two groups:—1st.—*Melocarpa*, those whose pollen grains are aculeate, filaments more slender than the anthers, rays of the stigma mostly unicuspidate, carpels numerous (8-24), fruit more or less globose. 2nd.—*Oocarpa*, in which the pollen grains are not aculeate, but granular, stamens short with filaments about as broad as the anthers, rays of the stigma mostly unicuspidate, flavous, carpels fewer, 6-14, fruit ovate. He refers to MELOCARPA, *N. venusta*, Hentze; *N. rotundifolia*, Hentze; *N. erythrocarpa*, Hentze; *N. parviflora* Hentze; *N. splendens*, Hentze; *N. wecolata*, Hentze,—all described in Botanische Zeitung, from 1848 to 1852. In the division OOCARPA, he includes *N. candida*, Presl, and of Ortman, Fl. Carlsbad; *N. biradiata*, Sommerauer, and other authors; *N. semiaptera*, Klinggreff and Deutschlands Flora, 1855; *N. neglecta*, Hansleutner, (Bot. Zeit., 1850); *N. Kostletzkyi*, Palliardi, (Index Hamburg. 1852); *N. cubogermen*, Lorinser; *N. intermedia*, Weiker, in Reich. Fl. Sax., 1842; *N. pauciradiata*, Bunge; *N. punctata*, Kar. et Kiril.; *N. Basmianum*, Turekzaninow, Ledebour, Fl. Ross., i. p. 743, who speaks of it as intermediate between *alba* and *pauciradiata*. See also Walpers' Annales, l.c.

and careful observation of the plants in cultivation at Berlin, distinguished *odorata* by the pollen grains being constantly aculeate, stipules subreniform, emarginate, appressed to the rhizome, flowers remaining strongly fragrant as long as open, whereas those of *alba* are only at first slightly fragrant.

The names of this plant have been used as examples, in the recent discussion on botanical nomenclature in the Journal of Botany. Mr. Britten (Kensington) insists upon the adoption of Salisbury's specific term *pubica*. M. Alphonse DeCandolle, who supports the rule of retaining the specific name when a species is transferred to another genus, adheres to the original term *odorata*, which Salisbury had no reason to change; "je n'ai jamais hésité sur ce point," (Journal of Botany, Oct., 1888, p. 289.) Mr. Britton (Columbia College) also argues for this view (*ibid.*, p. 295). His Kensington opponent is inexorable, and will not have the plant called "*Castalia odorata* (Dryand.) Greene," as it is styled in the New York List. There is no necessity, however, for calling it by that phrase, the proper name being *Castalia odorata*, Woodv. & Wood. Woodville and Wood were the botanists who first formally recognised Salisbury's genus, and the first to connect his generic name with the correct specific one.

Var. MINOR. Chiefly distinguished from the usual forms of the species by the small size of the leaves, with widely divergent basal lobes, and much smaller flowers.

Nymph. odorata var. *rosea*. Pursh, Fl. N. A., p. 369.

N. odorata, var. *minor*. Sims, Bot. Mag., t. 1652. Torr. and Gr., Fl. N. A., I, p. 57. Gr., Man., 5 ed., p. 56. Watson, Bibl. Index, p. 38. Macoun, Cat., p. 32.

N. minor. DC., Syst., II, p. 58. Prod., I, p. 116. Hook., Fl. B. A., I, p. 32.

I have examined specimens of this variety, which is very much rarer than the common form, in the Herbarium of the Geological Survey of Canada at Ottawa, as follows:—Near Belleville, Ont., July, 1877.—*Macoun*. Mirnaibi River, Ont., July, 1879.—*Dr. Bell*. Severn River, Kewatin, July 1886.—*Mr. James M. Macoun*.

This species has apparently a very wide range, extending, according to Torrey & Gray, "throughout N. America east of the Rocky Mountains," and possibly some of the described tropical forms are closely related to it. In Walpers' *Annales Botanices Systematicæ*, IV, p. 167, habitats are assigned as follows. "Delaware, Michaux, in Herb., Mus., Paris, (sub nom. *N. alba*). Halifax, in Nova Scotia, Smith in Herb. Delessert. Texas, Drummond, *ibid.*, etc." It is abundant in many of the numerous lakes throughout Nova Scotia, especially in those whose comparatively still waters overlies deposits of the infusorial black mud, brought in by tributary streams, which by maceration slowly passes into diatomite. Abundant about Kingston, Bath, Odessa, etc., in Ontario. Lily Lake, New Brunswick.—*G. U. Hay*, Aug 1st, 1876.

As noted by Dr. Gray, this species, like *alba*, varies with rose-coloured flowers, and there is a variety known as *rubra*, grown at Kew and other gardens in England, "originally found by Mr. Sturtevant" in a "lake near Cape Cod," not in Newfoundland as stated, but in Barnstable, Massachusetts. Mr. Frank Miles remarks in *The Garden*, XXVIII, p. 653, that, in the open air in England it is as red as *Calba* var. *rubra*.

Nymphæa Parkeriana, Lehmann, Index Sem. in Horto Bot. Hamb., *Annales des Sc. Nat.*, ser. 4, I, p. 325, British Guiana, *Parker*, (*Lehm.*), appears to be closely related to *C.*

odorata,—the leaves suborbicular, reddish beneath, the lobes nearly parallel ending in sharp points, stamens appendiculate, the inner ones almost filiform.

4.—*C. TUBEROSA*, *Greene*. Torrey Bulletin, XV, p. 84.

Nymphaea tuberosa, Paine, Catal. Pl. Oneida, (1865). Gray, Manual, ed. 5, p. 56. Watson, Bibl. Index, p. 39.

The *Nymphaea reniformis* of Water's Flora Carolina, p. 155, has not been determined. Dr. Gray speaks of it (in Manual, ed. 5) as very obscure. Mr. Watson doubtfully refers it, and De Candolle's plant of that name (described from a Carolina specimen of Fraser), to *tuberosa*. Chapman, in the Southern Flora gives it, without comment, as a synonym of *odorata*. *Nelumbium reniforme*, Willd., Sp. Pl., II, p. 1,260. *Nymph. odorata*, var. *reniformis*, Tor. and Gr., Fl. N. A., I, p. 57. *Cygnus reniformis*, Pursh, Fl., p. 398. There appears to be little doubt, from DeCandolle's description (Syst. Nat. II, p. 55.) that Fraser's Carolina plant, from which it was taken, Presque Ile, was of this species. Mr. Watson quotes as synonyms, with a mark of doubt, *N. maculata* and *N. spiralis*, Raf. Med. Fl. II, p. 45.

Paine's Water Lily was first distinctly recognised in Oneida Lake, New York State but has been found also by Prof. Macoun in the Bay of Quinté, and along the margin of Lake Ontario, from Presque Ile eastward; its distribution has not yet been fully traced either in Canada or the United States, and, although it is said to be more southern in its range than *C. odorata*, we should remember that the latter species probably extends, in some of its forms, into South America.

This species of the American lakes had been long overlooked, or taken for a form of *odorata*, from which it differs in the shape of the rootstock, and in having small lateral tubers on the side of the larger ones. In cultivation, "the habit of pushing up its central leaves above the water, and almost perpendicular to the surface, is a distinguishing characteristic;" but the flowers hardly differ from those of *alba*. (Miles, in The Garden, in which the species is figured.) In specimens collected on the Bay of Quinté, Aug. 15th, 1888, by Prof. Macoun, the leaves resemble those of *alba*, being thick and green on both sides; they are about as broad as long, but the petiole is inserted below the middle of the lamina, which is strongly veined.

5.—*C. ELEGANS*, *Greene*, Bulletin Torrey Bot. Club, March, 1888.

Nymphaea elegans, Hook. in Bot. Mag., t. 4604, (1851). Lemaire, Jard. Fleur., II, t. 180. Walpers' Ann., IV, p. 159. E. E. Sterns, Bulletin Torrey Bot. Club, XV, p. 13, (1888).

Mr. Sterns states that, in June, 1849, specimens were collected by Dr. Charles Wright "in a pond near the head of the Leona River," in south-western Texas, which Dr. Gray referred doubtfully to *N. Mexicana*. Zucc.; one of the specimens sent to Sir William Hooker, and a seedling plant, enabled him to describe it as a new species. After an interval of forty years, specimens were received from Waco, in east-central Texas (collected by Miss Trimble and Miss Wright), which Mr. Sterns took at first for a small form of *odorata*, but, on careful examination and enquiry, determined to be identical with the long-lost *elegans*. The seeds he describes as globular (not oblong as in its ally), the sepals purple-lined, and the petals with purple-blue tips.

Mr. Thomas Morong describes, in the Botanical Gazette, May, 1888, XIII, p. 124, a supposed new Water Lily, under the name of *C. Leibergi*, (with a footnote name, *Nymphaea*

Leibergii.) It is a diminutive plant, said to resemble *pygmaea* (*tetragona*), but with obtuse petals, which are described as faintly striped with purple lines (as in *elegans*), but the figure shows the leaf to be more elongated than in either of these species. The rhizome and seeds have not been seen. Its true relations remain to be ascertained.

6.—*C. FLAVA*, *Greene*, Bulletin, Torrey Bot. Club, XV, p. 85, (1888). "*Nymphaea flava*, *Leitner* in Audubon's Birds, p. 411, (1838)." The Garden XXIII, p. 334, with coloured plate; also XXVII, (1885, pp. 439 and 599). I cannot verify the reference to *Leitner*. There is no allusion to a Water Lily in the original edition of Audubon's Ornithological Biography, published at Edinburgh in 1831, nor any reference either to *Leitner* or *Nymphaea flava* in Pritzel's works, the Thesaurus Lit. Botanicæ or the Iconum Botanicarum Index.

"*N. lutea*, *Treat*, in Harp. Mag., LV, p. 365, (1877)," (*Greene*.) The Lemon-Yellow Water Lily of Florida.

This species is described as having flowered in the Harvard Botanic Garden in the spring of 1878, and in England in 1881. The drawings in "The Garden, prepared from plants that flowered at Kew, in August 1882," show the erect rootstock, covered with scale-like nodules, the young sagittate submerged leaves, and mature floating ones; also the lateral annual runners or stolons, which are thrown out, each ending in a permanent bud bearing leaves and flowers and forming a new plant. The flowers are lemon-yellow, an exceptional colour in this genus. Although described and named in botanical works only a few years ago, this plant is figured in Audubon's Birds of America. Mr. Frank Miles, writing in The Garden, (XXVIII, p. 653, Dec. 26, 1885), finds it hardy at Bristol, and says it has flowered in a pond in Kent. He speaks of it (from a cultivator's point of view, I presume) as the same, "or nearly so," as *Amazonica*.

7.—*CASTALIA AMPLA*, *Salisb.* Ann. Bot., II, p. 73. *Britten*, Jour. Bot., XXVI, p. 9. *Nymphaea ampla*. DC., Syst., II, p. 54. Prod., I, p. 115. *Grisebach*, Fl. West Ind. Islands, p. 11.

Jamaica. St. Domingo. (Large-leaved, white-flowered.)

8.—*C. GIGANTEA*, *Britten*, Jour. Bot. (Lond.), XXVI, 9, (1888.)

Nymphaea gigantea, *Hook*, Bot. Mag., t. 4647, (one flower filling double plate). The Garden, XXIII, p. 334, with plate.

Castalia stellaris, *Salisb.*, Parad. Lond., "quoad pl. Austral."—*Britten*.

Victoria Fitzroyana, *Hort*.

Native of Australia. Flowered in Van Houtte's nurseries, Paris, in 1855, and at Kew, where materials for the illustration in The Garden were obtained. The tubers are described as long and thick, with eyes scattered over their surface like those of potatoes. "There are three forms at Kew,—one [with flowers] a clear blue, another paler, and a third almost white." Flowers usually blue, but varying with white, rose and purple colours.

9.—*C. CÆRULEA*, *W. & W.*, Rees's Cyc., l.c. *Nymphaea caerulea*, " (*Kennedy*) *Andr.* Bot. Repos., t. 197, (Dec., 1801). (*Dryander*) Bot. Mag., t. 552, (Feb. 1802.)"

Castalia scutifolia, *Salisb.*, Ann. Bot., II, p. 72. *Britten*, Jour. Bot., XXVI, p. 9.

N. scutifolia, DC., Syst., II, p. 50., Prod., I, p. 114.
Cape of Good Hope, (Masson, Thunberg).

10.—C. STELLATA, W. & W., Rees's Cyc., VI.

Nymphaea stellata, Willd., Species Plantarum, II, p. 1153. DC., Syst., II, p. 51., Prod. I, p. 115.

Castalia stellaris, Salisb., Ann. Bot., II, p. 72, exclude the Australian plant, which is *gigantea*. Britten, Jour. Bot., XXVI, p. 9. *N. Madagascarensis*, DC., Syst., II, p. 50. Prod., I, p. 114, is also referred to this species, together with forms in cultivation known as *caerulea*, *Cupensis*, *parviflora*, *versicolor*, *cyanea*, *scutifolia*, *micrantha*, and *Daubeneyana*,—the last a reputed garden hybrid.

Nymphaea Zanzibarensis, Caspary, which first flowered at Kew in 1883, is referred, in The Garden, as a variety of *stellata*. It is figured and described in that work (1883) as having flowers nine inches in width. The flowers are described as blue or violet-purple in tint, and as having a delicate primrose scent. The descriptions given are not very assuring as to its place:—"Possibly this noble plant is an unusually fine form of the Cape species, *N. stellata*." "Only a form of the common African species, *N. stellata*." "Doubtful if it differs at all from the plant known as *N. scutifolia*." (The Garden, XXIII, p. 128.) *N. Zanzibarensis*, var. *fl. rubro*, "Siber., Gartenflora, jahr. XXXVI, heft 3, Gräbener, ibid., jahr. XXXVI, heft 9."—Balfour, Vines and Farlow's Annals of Bot., I, p. lxxx.

A writer in the London Gardeners' Chronicle notices, under date June 9th, 1888, the flowering at Kew of a Water Lily obtained through seeds, under name of *N. Ortigiesiana* var. *Adele*, from M. Todaro of Palermo, but which proved to be not related to *Ortigiesiana*, which is a supposed hybrid of continental origin, so near *N. Lotus* var. *rubra* as to be scarcely distinguishable from it. *N. "Adele"* is regarded as a form of the African *stellata*: leaves irregularly notched and mottled, flowers three inches across, sweet scented, with narrow pointed petals. The same writer (presumably) in a subsequent number of the same periodical says:—"Under these three names [*Nymphaea Zanzibarensis flore-rubro*, *N. Ortigiesiana* var. *Adele*, and *N. scutifolia rosea*] there are three plants in the collection at Kew, which are in flower and which are not distinguishable from each other. The first-named came from Karlsruhe, reputedly as a cross between *N. Zanzibarensis* and *N. dentata*; the second came through seeds from Palermo; and the third was obtained from Glasgow. Whatever the origin of the plant which has somehow been named three times, it is certainly a variety of the well-known African species, *N. stellata*, and, so far as I can make it out, it is the form which has been named *N. stellata* var. *purpurea*. The flowers are five inches across, with purple filaments and yellow anthers; open before noon and remain expanded till evening."—W.W., Gardeners' Chronicle, June 30, 1888, ser. 3, III, p. 800.

11.—C. EDULIS, *Salisbury*, l.c. Rees's Cyc., VI. Britten, Jour. Bot., XXVI, p. 9. *Nymphaea Coteka*, Roxb. MSS. *N. edulis*, DC., Syst., II, p. 52; Prod., I, p. 52.
India.

12.—C. MAGNIFICA, *Salisbury*, *Paradisus Londinensis*, t. 14. Britten, Jour. Bot., XXVI, p. 9.

Nymphæa rubra, Roxb. MSS. (Salisbury), and Florn Indica, II, p. 576. Andrews' Bot. Repos., t. 503. Sims' Bot. Mag., t. 1280 (DC.) DC., Syst., II, p. 52. Prod., I, p. 115. Paxton's Flower Garden, p. 63, t. 50, where it is observed: "This brilliant aquatic, though an old inhabitant of our gardens, is still a rarity, appearing only in first class collections. Nor has it been fortunate in the artists who have attempted to fix its likeness on paper; the early figure in the Botanist's Repository is particularly unsatisfactory. . . It is probable that more species than one may be included in this name. . . The leaves are closely covered on the underside with a soft felt of delicate hairs, which are quite perceptible to the touch, . . . simple attenuated and smooth cones."

India, flowering in the rainy season.

13.—C. LOTUS. *C. mystica*, Britten, Jour. Bot., l.c. Salisb., Ann. Bot., II, p. 73 and Paradisus Lond., (in part).

Nymphæa Lotus, Linn., l.c. Delile, Fl. Ægypt. III. DC., Syst., II, p. 53. Prodr., I, p. 115. *N. casulea*, Savigny, Decad. Ægypt.

Nile regions and N. Africa.

Varieties in cultivation, referred more or less correctly to this species, are: *rubra* (not *C. magnifica*); *dentata*, a white flowered variety which lacks the purple colouring of leaf; *Devoniensis*, with dark-red flowers, said to have been "raised at Chatsworth from *rubra*, and the type," by another writer to have been "produced from the white-flowered *dentata*"; also *sagittata*; *pubescens*; *Boucheana*, raised from same plants as *Devoniensis*; *Sturtevantii* ×, A. Gr., flower paler than in *Devoniensis*, from which it was raised by Mr. E. Sturtevant, "differs from the other red flowered Nymphæas viz., *rubra*, *Devoniensis*, and *Ortigiana*, in the form and color of its flowers, and the tint of its leaves," (The Garden, XXIII, p. 184. *Kewensis*, a hybrid of *C. Lotus fl. albis* by *Devoniensis*, is figured in the Botanical Magazine, t. 6988, (April, 1888).

14.—C. PUBESCENS, *Woody & Wood*, Rees's Cyclop., VI.

Nymphæa pubescens, Willd., l.c.

N. Lotus, Roxb. "Rep. 391."

Castalia mystica, Salisb., Ann. Bot. (in part).

C. sacra, Britten, Jour. Bot., XXVI, p. 10.

India.

15.—C. THERMALIS, Britten, Jour. Bot., XXVI, p. 10.

Nymphæa Lotus, Waldst. et Kit., Pl. Par. Hung., I, p. 13, t. 15.

Cast. mystica, Salisb., Ann. Bot., II, p. 73, and Paradisus, (in part). *Nymphæa thermalis*, DC., Syst., II, p. 54. Prod., p. 115.

Hungary.

This and the two preceding species, *pubescens* and *Lotus*, have been much confused, and there is uncertainty in the references to authorities. This is said to have always large white sweet-scented flowers, and to be distinguished from the large forms of *Lotus*, (under which name it is figured in Bot. Mag. and Bot. Rep.) by absence of pubescence on the lower surface of the leaves, and the "large depression in the crown of the germen."

16.—C. BLANDA. *Nymphæa blanda*, Meyer, Prim. Fl. Essequeib., p. 201, (DC.) DC., Syst., II, p. 59. Hook., Bot. Mag., t. 4823, (*Amazonum*).

N. Amazonum, Mart. & Zucc. Planchon, Ann. des Sc. Nat., ser. 3, XIX, p. 48.
N. Rudgeana, Meyer. Grisebach, Fl. Brit. West Indian Islands, p. 11.
 Plants in cultivation under names of *Nymphæa Rudgeana* and *N. Amazonica* are apparently referable to this species.
 Brazil. Guiana.

The following species having been mostly described from dried specimens in Herbaria, or being still imperfectly known, it is not desirable to rename them under the genus *Castalia* without further investigation:—

- Nymphæa Berneriana*, Planchon. Annales des Sciences Naturelles, ser. 3, XIX, p. 39. Madagascar.
- N. Emirnensis*, Planch., Ibid. Madagascar.
- N. Guinensis*, Thom. et Schum. Walpers' Rep., I, p. 107. Guinea.
- N. Hudehotii*, Planch., Ibid. *N. pseudopygmaea*, Lehmann, Ann. Sc. Nat., ser. 4, I, p. 327. Sepegambia.
- N. abbreviata*, Planch., Ann. Sc. Nat., ser. 3, XIX, p. 42. Senegambia.
- N. Gardneriana*, Planch., Ibid. Brazil.
- N. oxypetala*, Planch., Ann. Sc. Nat., l.c., p. 51. *N. Raja*, Lehmann, Ann. Sc. Nat., ser. 4, I, p. 327. Guayaquil.
- N. Jamesoniana*, Planch., Ann. Sc. Nat., ser. 3, XIX, p. 51. *N. sagittariifolia*, Lehm., Ann. Sc. Nat. ser. 4, I, p. 327. Guayaquil.
- N. gracilis*, Zuccarini. Walp. Rep. I, p. 107.
- N. Mexicana*, Zucc. Walp. Rep., I, p. 108.
- N. Fenzliana*, Lehm. Ann. Sc. Nat., ser. 4, I, p. 327. Guiana.
- N. Gondotiana*, Planch., l.c., p. 49.
- N. lasiophylla*, Mert. & Zucc. Planch., Ann. Sc. Nat., l.c., p. 50.
- N. tussilagifolia*, Lehm., l.c., p. 326. Walpers Annales, IV, 162. Mexico and the Amazon.
- N. pulchella*, DC., Syst., II, p. 51; Prod. I, p. 115. Peru.
- Two fossil forms have been referred to this genus, and may also be left without Castalian names:—
- Nymphæa Dumasii*, Saporta, Comptes Rendus, tom. CIV, No. 22.
- N. polyrhiza*, Sap., found in the tertiary strata of the south-east of France, by Gaston de Saporta. Annales des Sc. Nat., ser. 4, XIX.

GENUS V.—NYMPHÆA, *Salisbury*, (*Limn.* in part.)

Salisbury, Ann. Bot., II, p. 71. *Nymphæa*, Smith, Fl. Græc., I, p. 361, etc. Benth. & Hook., Gen. Pl., l.c.

List of Species:—

- | | |
|--------------------------|----------------------------|
| 1. <i>N. lutea.</i> | 5. <i>N. microphylla.</i> |
| 2. <i>N. advena.</i> | 6. <i>N. polysepala.</i> |
| 3. <i>N. Fletcheri</i> × | 7. <i>N. sagittifolia.</i> |
| 4. <i>N. pumila.</i> | 8. <i>N. Japonica.</i> |

1.—*NYMPHÆA LUTEA*, *Linu.*, Species Plantarum, ed. 2, p. 729, in part, (exclude the Canada plant of Kalm.) Willd., Sp. Pl., II, p. 1151, and European botanists. Britten, Jour. Bot., XXVI, p. 8.

Nuphar luteum, Smith, Prod. Fl. Gr., I, p. 361.¹ Rees's Cyc., XXV., Koch, Synopsis Floræ Germanicæ et Helvicæ (1848), and of other European botanists. Lawson, Water Lilies, p. 97.

Nymphaea umbilicalis, Salisb., Ann. Bot., II, p. 71.
The Common Yellow Water Lily of Europe.

2.—*N. ADVENA*, *Solander*, Aiton's Hortus Kewensis, ed. 1, II, p. 226, (1789). Michaux, Flora Boreali-Americana, I, p. 311. Britten, Jour. Bot., XXVI, p. 9.

Nuphar advena, R. Brown, in Ait. Hort. Kew., ed. 2, III, p. 295, (1811.) DC., Syst., II, p. 63, with full synonymy (the numbers referring to Rees's Cyclopædia, as given in DeCandolle's Systema are the numbers of the consecutive species of *Nuphar* described in the work, and do not indicate either pages or volumes; the Cyclopædia is not paged.) Watson, Bibl. Index, p. 37. Macoun, Cat. Can. Pls., pp. 32 and 484. *Nuphar Americanum*, Provancher, Fl. Can., p. 28.

Nymphaea arifolia, Salisbury, Ann. Bot., II, p. 71.

The Common Yellow Water Lily of America. Introduced to English gardens in 1772 by Mr. William Young.

Nuphar variegatum, Engelmann, is referred by Gray as a variety of this species.

DeCandolle and Salisbury both quote, as belonging to this species, the *Nymphaea floribus flavis* of Clayton, in the Flora Virginica of Gronovius, "ed. 1, p. 164." I have not been able to refer to that edition, but find neither the name, nor any corresponding plant, in the second edition of 1762.

3.—*N. FLETCHERI* ×. *Nuphar advena* × *Kalmianum*, Caspary, MS. Macoun, Cat. Can. Pl., p. 32, (1883). Fletcher, Flora Ottawaensis, p. 62 (exc. syn. *N. rubradiscum*). Mr. Fletcher describes this hybrid, which he found in the Ottawa River, as intermediate in size and appearance between *Nuphar advena* and *Kalmianum*, the floating leaves purple beneath, with slender petioles, the submerged ones freely produced and like those of the latter species; expanse of flowers 1½ inches, sepals 6, stigmatic disc 10–15-rayed, the perfect fruit, which is seldom produced, bearing a closer resemblance to that of *Kalmianum* than of the other parent. Prof. Caspary, to whom living plants were sent, found the

¹ The generic name *Nuphar*, a neuter noun, was long treated by Smith, DeCandolle, and European botanists generally, as feminine. In quoting references, I have not thought it necessary or desirable to keep up the feminine terminations given by the authors quoted to the adjective terms. The change to the neuter gender appears in Walpers' Annals, tom. IV, fasc. 2, published in 1857, after which corrections of names come slowly into botanical works; the earliest instance of correct use that I can find is in Koch's Synopsis Floræ Germanicæ et Helvicæ, 2nd ed., published in 1843. His first edition, I have not been able to refer to.

pollen to be bad, as usual in hybrids, 95 per cent. of the grains being empty sacs without fovilla.

The denoting of hybrids by pedigrees of descent instead of names, as was Caspary's custom, is rather disturbing to a binomial system. I have, therefore, suggested a needed name. Mr. Thomas Morong has described, as *Nuphar rubrodiscum*, a Lake Champlain form which has sound pollen grains and fruits freely; he regards it as "a new and perfect species," developed from the hybrid, and synonymous with the *Nuphar luteum* of Gray's Manual, (Botanical Gazette, XI, p. 167. July, 1886.) This is *Nymphaea rubrodisea*, Greene, Bulletin Torrey Bot. Club, March, 1888, p. 84.

4.—*N. PUMILA*, Hoffm., Deutschlands Flora, (1800), p. 241. (Smith). *N. lutea* β *minima*, Will., Sp. Pl., II, p. 1151. *Nuphar minimum*, Smith, E. Bot., t. 2252, (1811.) Rees's Cyc., XXV. *Nuphar pumilum*, Sm., Eng. Fl., III, p. 16. Lawson, Water Lilies, p. 101.

Mountain Lakes of Scotland and other parts of Northern Europe, rare.

5.—*N. MICROPHYLLA*, Persoon, Synops. Plantarum, II, p. 63, (1807). Britten, Jour. Bot., XXVI, p. 9.

N. lutea β . *Kalmiana*, Michaux, Fl. B. A., I, p. 311, (1803).

N. Kalmiana, Sims, Bot. Mag., t. 1243, (1809).

Nuphar Kalmianum, R. Br., Ait. Hort. Kew., ed. 2., III, p. 295, (1811). Smith, Rees's Cyc., XXV. DC., Syst., V, p. 61, (ex. syn. Walt. Fl. Car.) Pursh. Barton. Hooker. Gray. Wood.

Nuph. luteum var. *Kalmianum*, Torr. and Gray, Fl. I, p. 58.

Nuph. luteum var. *pumilum*, Gray, Manual, ed. 5, p. 57. Macoun, Cat. Can. Pl.

Nymphaea lutea, Linn., Sp. Pl., ed. 2, p. 729, in part, (the Canadian plant from Kal.) Canada and other parts of North America, not common.

6.—*N. POLYSEPALA*, Greene, Bulletin Torrey Bot. Club, March, 1888, p. 84.

Nuphar polysepalum, Engelm. in Trans. Acad. St. Louis, II, p. 282, (1865.) A. Gr., Proc. Am. Acad., VIII, p. 376. Macoun, Cat. Can. Pl., pp. 32 and 484. Porter, Fl. Colorado, p. 5.

This Western American plant is obviously nearly related to *Nuph. advena*, and when more carefully studied may come to be regarded as a variety of that species.

7.—*N. SAGITTIFOLIA*, Walter, Flora Carolina, p. 154, (1788).

N. longifolia, Michaux, Fl. B. A., I, p. 312, (1803).

N. sagittifolia, Salisbury, Ann. Bot. II, p. 71, (1805).

N. sagittata, Pers., Synop., (1807.)

Nuphar sagittifolium, Pursh., Fl. Am. Sep., II, p. 370 (1814.) Morong, Bot. Gaz., XI, p. 169.

Nuphar longifolium, Smith, Rees's Cyc., XXV.

This may probably be a southern form of *Nuph. advena*.

8.—*N. JAPONICA*.

Nymphaea lutea, Thunb., Fl. Jap., (ex. syn.)

Nuphar Japonicum, DC., Syst., II, p. 62, Prod., I, p. 116.

Japan.

GENUS VI.—NELUMBO, *Tournefort*.

Tournefort, *Inst. Rei. Herb.*, p. 261. Adanson, *Familles des Plantes*, II, p. 76. Gært. Poir. Lamarek. Persoon, *Synops. Pl.*, II, p. 92. Greene, l.c. *Nymphaea*, Linn., in part. *Nelumbium*, Jussieu, *Gen. Pl.*, p. 76, (1790). Benth. & Hook., I, p. 47. *Cyamus*, Smith, *Exotic Botany*, (1804). Salisb. *Ann. Bot.*, l.c., (1805.) Bentham & Hooker recognised two species.

List of Species:—

1. *N. speciosa*.2. *N. lutea*.1.—*N. SPECIOSA*.

Nelumbium speciosum, Willd., *Sp. Pl.*, II, p. 1258. *Bot. Mag.*, t. 303.

Nymphaea Nelumbo, Linn., *Sp. Pl.*

Cyamus Nelumbo, Smith, *Exot. Bot.*, I, p. 59, t. 31, 32.

C. mysticus, Salisbury, *Ann. Bot.*, II, p. 75.

Nelumbo Indica, Persoon, l.c.

India, Ceylon, Java, China, Egypt, &c.

2.—*N. LUTEA*, Persoon, l.c., (1807) "Baillon, *Hist. Pl.* III, p. 79, (1872)." Greene, *Torrey Balletiu*, Oct., 1887, p. 215.

Nelumbium luteum, Michaux, *Fl. B.-A.*, I, p. 317. Willd., *Sp. Pl.*, l.c. Grisebach, *Fl. W. I.*, p. 12.

Cyamus flavicomus, Salisbury, *Ann. Bot.*, l.c.

Nymphaea Nelumbo var. β ., Linn., *Sp. Pl.*, l.c.

Jamaica, Carolina, Florida etc., extending north to the southern side of Cape Cod, its most easterly point, and to Lake Ontario in the west.

Smith remarks, in Rees's *Cyclopædia*, in reference to the name *Nelumbo*; "The name given by the natives of Ceylon to the sacred bean of India. Adanson, who first, with unquestionable propriety, separated this plant from *Nymphaea*, having no objection to barbarous names, retained *Nelumbo* for a generic appellation, and he is followed by Gærtner. It is not easy to say why they preferred a very confined and local appellation, for a plant known throughout India by the name of *Tamara*, by which it is distinguished in the *Hortus Malabariensis*, and celebrated in Hindoo poetry and mythology. Jussieu intended as an improvement the alteration into *Nelumbium*. We wish to adhere, as much as possible, to the Linnæan rejection of barbarous generic names, and have no desire to establish either *Nelumbo* or *Tamarâ*, greatly preferring *Cyamus*. It is much to be wished that botanists not totally illiterate and tasteless, would advert a little to the propriety of keeping their nomenclature under some regulations of sense and uniformity, which those who read the writings of Linnæus, will find already established, and abundantly supported by reason and convenience." Smith and Salisbury adopted the generic term *Cyamus*, which was also used by Pursh and Nuttall; but in Persoon's *Synopsis*, pars secunda, published two years later than Salisbury's paper, (1807), the original name of Tournefort was reverted to, and in its original form, *Nelumbo*; it had been so retained earlier in Lamarek's *Dictionary*, Vol. IV, published six years after Jussieu's proposed modification

in Genera Plantarum. In the Systema (1821), A. P. DeCandolle set aside *Cyanus*, because Latreille had occupied that name for a genus of Crustaceans, and adopted Jussieu's *Nelumbium*, which has been in general use since then, until Baillon again revived *Nelumbo*, (1872), which was enforced by Greene, and acquiesced in by Asa Gray.

GENUS VII.—BRASENIA, *Schreber*.

"Schreb. Gen. Pl., 372." (1789.) Benth. & Hook., Gen. Pl., p. 46.

BRASENIA PELTATA, *Pursh*, Fl. Am. Sept., p. 389. Wats., Bibl., Index, p. 36.

1784. *Menguanthes nymphoides*, Thunb., Fl. Jap., p. 82.

M. peltata, Thunb., "Act. Upsalensis, VII, p. 142, t. 14. f. 2."

1803. *Hydropeltis purpurea*, Michaux, Fl. B.-A., p. 323, t. 29.

1805. *H. pulla*, Salisb., Ann. Bot., II, p. 74.

1813. *Brasenia Hydropeltis*, Muhlenberg, Cat., 55.

1814. *B. peltata*, Pursh, Fl. Am. Sept., p. 389.

1819. *Villarsia peltata*, Röm. et. Schultes, Syst., IV, p. 178.

1821. *Hydropeltis purpurea*, DC., Syst., II, p. 37.

1845. *Limnanthemum peltatum*, Griesb., DC. Prod., IX, p. 141.

Brasenia nymphoides, "Baillon, Hist. Pl., III, p. 82."

This exceptionally curious plant, was first found in "Upper Canada" by F. Masson at the beginning of the century, but is now known to be widely distributed in our Canadian waters, and throughout those of North America generally, as well as in Eastern Asia and Australia. It has had a chequered literary career. The first term applied to it was not an inappropriate beginning: *Anonyma* of Plukenet's *Almagestum*, (DC., Syst.) In *Flora Japonica*, Thunberg named it by mistake *Menguanthes nymphoides*, supposing it to be the plant so named in the *Species Plantarum*, which, is now known as *Limnanthemum peltatum*, S. P. Gmelin, belongs to the *Gentianaceae*, and is not an American plant. In *Nova Acta Upsalensis*, Thunberg gave it another specific name, *peltata*, but still kept it in the same genus. Michaux (1803) described and figured it as *Hydropeltis purpurea*. Salisbury (1805) retained the generic name of Michaux, but, as was his wont, changed the specific term, calling the plant *H. pulla*. Muhlenberg (1813) adopted the generic name of Schreber, and used Michaux's generic as a specific term. The plant thus became *Brasenia Hydropeltis*. Pursh (1814) followed Schreber and Muhlenberg in the generic term, and brought back one of Thunberg's specific names, calling it *C. peltata*. Röm. & Schultes (1819) returned it, probably in course of literary editing, and not from examination of the plant, to the Gentianaceous genus, naming it *Villarsia peltata*, (the plant with which Thunberg first confounded it having meantime become *Villarsia nymphoides*). DeCandolle (1821) restored the name of Michaux, *Hydropeltis purpurea*. Grisebach (1845), in DeCandolle's *Prodromus*, inserts, among his "species minus notæ," *Limnanthemum peltatum*,—"in Japoniâ," giving as synonyms *Meng. peltata et nymphoides*, Thunb. Finally, Baillon (*Hist. Pl.*, III, p. 82), adopts the first mistaken

name, calling the plant *Brasenia nymphoides*. This is certainly the "priority" name, as is confirmed by Planchon, "lide specim. ex herb. Lugd. Batav. in herb. Mus. Paris., --non Linn." But *nymphoides* as a specific term surely belongs to the *Villarsia*, and, as an old generic name of Tournefort (although not now usually spelt with a capital *N*), and even for no other reason than to avoid further confusion, may well be restricted to its own genus, which has also had at least four other names in addition to *Villarsia*. The first correctly applied specific term for our plant is *pellata*. The generic name *Brasenia* goes back to 1789. In Rees's Cyclopædia, Sir James Smith remarks that Dr. Solander had made a genus of the plant, *Ixodia*, but the name of Michaux, *Hydropeltis*, having been printed, was properly retained by Dr. Sims. The generic name *Ixodia* was afterwards given by R. Brown to a New Holland composite plant.

Mr. Joseph Schrenk has published, in the Torrey Bulletin, (XV, pp. 29-47, Pls. 57 and 58) the results of a very careful and elaborate study of the vegetative organs of this plant, with precise and clear descriptions and drawings, to which I would invite the attention of students as a model that may be imitated with advantage in like investigations.

GENUS VIII.--CABOMBA, *Aublet*.

Cabomba. "Aubl. Pl. Guian." Benth. & Hook., Genera Plantarum, I, p. 46.

C. CAROLINIANA, Gray. Wats., Bibl. Index, p. 36, (with synonymy). *C. aquatica*, DC., Syst. Nat., I, p. 36.
Southern States of North America and Central America.

REFERENCE LIST

OF

SPECIES INCLUDED IN THE SYNOPSIS OF NYMPHÆACEÆ.

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