

VI. On *Sycopsis*. By DANIEL OLIVER, Esq., F.L.S.

Read March 15, 1860.

SYCOPSIS. Genus novum *Hamamelidearum*.

CHAR. ESS. Flores abortu uni-sexuales [an etiam nonnunquam polygami?].

Fl. ♂. Calyx brevissimus, irregulariter v. obliquè dentatus lobatusve. Corolla 0. Stamina 8, calycis tubo inserta; filamenta brevia, in connectivum continua; antheræ basifixæ, biloculares, oblongæ, apice breviter productæ. Gynœcium rudimentum bifidum.

Fl. ♀. Calyx semisuperus, tubo ovarium arcè cingente, limbo deciduo. Corolla 0. Ovarium biloculare; styli duo, distincti, subulati, intus canaliculati, minutè papilloso-stigmatosi; ovula in loculis solitaria, pendula.

S. GRIFFITHIANA, *species unica*.*Frutex* verisimiliter (v. arbor parva), ramosissimus.

Ramuli cortice cinerascete, vix lævi, glabro v. ultimorum minutè puberulo. *Folia* numerosa, alterna, minutè stipulata, petiolata, integra, ovali-lanceolata, lanceolata v. obovato-lanceolata, acutè acuminata, coriacea (perennia?), discolora, glabra v. primùm pilis stellatis conspersa; costâ (in spp. exsicc.) supra depressâ, subtèr valde prominente, venularum reti inconspicuo. *Stipulae* lanceolatae, minutæ, citò caducæ. *Inflorescentia* axillaris, e glomerulis paucifloris vel racemis abbreviatis petiolum subæquantibus composita. *Flores* ♂ et ♀ intermixti (an semper?), primùm sessiles v. subsessiles, ante florescentiam in axillis bractearum nidulantes, omnes plus minusve pubescentiâ minutâ stellatâ obsiti. *Calyx*, ♂ brevissimus, triangulari-dentatus v. obliquè lobatus, in ♀ ad faucem, stylosum basin arcè cingentem, squamis minutis pilosis instructus; limbi lobi denique curvi v. revoluti, citò decidui. *Stamina* nonnunquam partim imperfecta; *fertilia* (cum sterilibus minoribusque non alternantia) filamentis brevibus, glabris, crassiusculis, calycem excedentibus, antheris (bilocularibus, dehiscentiâ —?) pro ratione magnis, ovato-oblongis, apice breviter et vix acutè apiculatis; *stamina sterilia* parva. *Ovarium* semi-inferum, stellato-pilosum, usque ad basin stylosum calycis tubo crasso arcè cinctum. *Styli* a basi distincti, divergentes, infra stellatim pilosi.

Folia laminâ $1\frac{1}{2}$ ad $3\frac{1}{2}$ poll. (sæpius circa $2\frac{1}{2}$ poll.), petiolo 2–5 lin. longis.

Further information is needed as to (1) whether the flowers are ever really hermaphrodite, (2) if both ♂ and ♀ are alike protected singly in the axils of the early caducous bracts or scales of the inflorescence (these bracts are mostly ovate or rotundate, the outer one sometimes produced above), (3) the mode of dehiscence of the anthers, (4) the ripe fruit. It is doubtful how far the lobation and degree of obliquity of the calyx-limb may be constant; I have therefore omitted, in the foregoing diagnosis, to describe the forms observed in the comparatively few good flowers which I have had an opportunity of examining*. The young subobovate fruits, narrowed and (from drying?) more or less sulcate below, together with the general appearance of the plant, recall some of the narrower-leaved

* It is probable that the limb of the calyx, both in ♂ and ♀ flowers, may be 4-toothed or -lobate (? sometimes 5-lobate),—one or more lobes in the ♀, being linear-lanceolate, subtriangular at the base.

species of East Indian *Fici*. Until the calyx-tube be laid open by dissection, the ovarium of the young fruit appears quite inferior.

The foregoing description of *Sycopsis* rests upon specimens met with in the course of arrangement of the late William Griffith's herbarium. These, although very numerous, appear to be all of one gathering, and, unfortunately, are almost all a little too far advanced to enable me to furnish, from a sufficient number of female flowers, complete details of their earlier condition. It was indeed not without a close examination of the specimens, that a few glomerules bearing staminate flowers were obtained for analysis. The examples being unaccompanied by any MS. of Mr. Griffith's, it is not improbable they may have been obtained by some of the collectors despatched by that most zealous botanist to the Khasia Hills, and that he had not had an opportunity of examining better ones himself.

In his roughly published posthumous 'Itinerary Notes,' I do not find any description referable to them. From the available material (which offers several peculiar points of structure), assisted by a drawing of Mr. Fitch's, I believe, however, that I am warranted in seeking permission to bring it before the notice of the Linnean Society, especially as a further interest attaches to what may be termed the constitution, as well as to the geographical distribution, of the natural order to which it manifestly belongs, as I shall endeavour in the course of this memorandum further to indicate.

In northern India we are already acquainted with six species, belonging to as many genera, of *Hamamelideæ*. In the consideration, therefore, of the new form, I have tried to ascertain whether, after a fresh comparison of specimens, it might not be possible, by the modification of generic diagnoses already published, to assign to some one of these the Khasian plant. I feel satisfied, however, that such cannot be accomplished with a proper regard either to the community of appreciable affinities which constitute and characterize natural genera, or to the practice of those botanists (some the most conservative of comprehensive genera) who have been engaged in the study of this group. I consider *Sycopsis* to be most nearly allied to *Distylium* (Sieb. and Zucc.), a second species of which (*D. indicum*) has been recently remarked by Mr. Bentham from Khasia.

To this genus it approximates in the ♂ ♀ tendency of the flowers, the absence of petals, the structure of the stamens and their insertion in the ♂ flower, and the axillary shortly racemose inflorescence,—differing from it most conspicuously in the adhesion of the ovary, the closely surrounding calyx-tube of the ♀ flower reaching to the base of the styles, and the number of stamens. The calyx of *Distylium racemosum* is irregularly divided almost quite to the base, the ovary superior, and the stamens five in number. The remaining uni-ovulate apetalous Asiatic genera, *Parrottia*, *Eustigma*, and *Tetrathyria*, are hermaphrodite, and in several respects abundantly diverse—*Parrottia* in its capitate precocious flowers, *Eustigma* in the extraordinarily developed stigmata and the presence of alternating didymous squamæ replacing the petals* as in *Tetrathyria*, which latter genus is also further removed by its remarkable anthers, which closely resemble those of *Hamamelis chinensis*† in the produced connectivum and double-valved loculaments. The

* Or perhaps, with a greater probability, these may be regarded as abortive stamens.

† In reference to this species, Robert Brown observed, in his account of Abel's Plants (Appendix to Abel's Narra-

anthers of *Sycopsis* I have not been fortunate enough to find subsequent to dehiscence; they are very similar before bursting to those of *Distylium* and the African genus *Trichocladus*.

In connexion with this notice it is scarcely within my province to inquire at length into the general relations of the *Hamamelideæ*. Excepting a somewhat anomalous mode of dehiscence in the anthers of a few species (at least of *Eustigma*, *Tetrathyria*, and *Hamamelis chinensis*), and the singular stipules of *Bucklandia*, the order does not offer any very salient peculiarity, neither does it afford any well-marked type of structure pervading its members. Mr. Griffith, in his 'Observations on Cantor's Plants *,' and Tulasne in "Fragmenta Floræ Madagascariensis †," remark the rather complex character of the affinities of the order, and the variety in the structure and disposition of some of the floral whorls presented by its various genera. The more characteristic features of the *Hamamelideæ* may be said to reside in their arborescent or frutescent growth; the prosenchyma bearing discoid markings from the presence of minute intercellular lenticular cavities; leaves nearly invariably alternate and stipulate; perigynous or epigynous and definite stamens in nearly all of the hermaphrodite species; the more or less inferior bicarpellary and bilocular ovary (in *Distylium* quite superior) with distinct styles; the ovules solitary and pendulous, or in the pluriovulate genera, with the exception of one or two in each loculament, mostly abortive. The order presents in these characters much in common with *Cornaceæ* (including *Alangieæ* and *Nyssa*), near which Dr. Lindley disposes it. Of this order it may not improbably be regarded as a section, especially as a *Trichocladus* of South Africa and a *Dicoryphe* described by Tulasne, from Madagascar, have opposite leaves; and as, further, in some genera we find the flowers closely aggregated into a dense capitulum (as in *Benthamia* or in *Nyssa* ‡), and sometimes also provided with conspicuous involucre bracts analogous to those of some species of *Cornus* (as in *Rhodoleia* and *Parrottia*): the frequently tetramerous symmetry of the flower and the tendency to a valvate æstivation of the petals favour this view of their affinity. With *Cunoniaceæ* and the *Saxifragal* alliance (as observed by Drs. Hooker and Thomson §) an affinity is indicated by the curious stipules of *Bucklandia*, as well as by other of the characters above enumerated. To *Bruniaceæ* the order is allied in some important particulars, as noted by Robert Brown and Prof. Lindley.

tive, p. 375), that it might not improbably be considered generically distinct from *H. virginica*, on the ground chiefly of the different structure of the anthers; and Asa Gray remarks ('Botanical Memoirs' [from Mem. Am. Acad. of Arts and Sciences, new ser. vol. vi.], p. 390), that *H. japonica* (a species which I have not myself examined) is close to *H. virginica*, "its only other strict congener"—implying, consequently, his sense of the importance of this distinction. *H. chinensis* ought, perhaps, to be separated from the American species, under the name of *Loropetalum*, suggested by R. Brown (*l. c.* p. 375).

The question may be open whether *Tetrathyria*, with the same stamens, but having the petals represented by didymous scales, ought to be reduced to the same genus with this plant. As *Hamamelis* stands at present, including both the American and Chinese species, this feature in *Tetrathyria* must be held of less than generic value, estimated by the range permitted in the yet more important particular of the structure of the anthers.

* P. 24.

† Annales des Sciences Naturelles, 4^{me} sér. vol. viii. p. 142.

‡ The elongate revolute laterally-stigmatose style of *Nyssa* recalls that of some *Hamamelideæ*.

§ Proc. Linn. Soc. vol. ii. p. 54.

With respect to orders, on the other hand, presenting a less degree of complexity in the structure of the flower, a resemblance (to say the least of it) is presented to us between *Liquidambar*, the catkin-flowered though hermaphrodite *Corylopsis*, *Distylium*, and *Sycopsis*, and the *Platanæ*, *Ulmaceæ*, and *Betulineæ* *.

The number of species at present known which may be referred to the *Hamamelideæ* I reckon at from 26 to 30 (28). These are grouped under 13 genera, hence in the strikingly small relative proportion of about 2 or 2·3 species to a genus. Upon the value of those characters which have been considered to possess a generic importance in this order, I may observe that, from the important bearing which it appeared to have in connexion with the distribution of its members, I have endeavoured, by the comparison and dissection of various species, to form an opinion, although with a view chiefly to determine the position and affinities, &c. of *Sycopsis*. Having in the preceding observations alluded to some of these, it is not needful here to enter upon this point, further than to observe that nearly each genus is characterized by marks of considerable importance estimated by the value ordinarily attached to them in other Dicotyledonous orders, and might only from special considerations which I think we are not yet in a position to decide upon be deemed of less than generic import.

Coupled with a regard to these peculiar intergeneric relations and one or two other concomitants, which I shall briefly touch upon, a consideration of the geographical distribution of the *Hamamelideæ* acquires considerable interest. The order is tolerably widely dispersed; at least, there occur outlying individuals or small groups far removed from what may be regarded as being at the present period their focus. None of the species, however, and, with one or two exceptions, none of the genera, present in themselves a great extension of area; on the other hand, not a few of the genera are, so far as our knowledge extends, very unusually restricted in this respect, although from our very imperfect acquaintance with the botany of the interior of Eastern Asia, probably not so remarkably as from our present data it would appear. Dr. Royle, in his valuable 'Illustrations of the Botany of the Himalaya †,' calls attention to the wide extension of the genus *Hamamelis*, of which he states one species to grow in China, a second in Peru, and a third in North America. Some singular mistake, however, must have here occurred, no species of this genus, nor, to my knowledge, of the order, having been as yet discovered in South America, and, indeed, the question as to the propriety of retaining in *Hamamelis* the Chinese species now assigned to it being quite open to doubt, as noted by Robert Brown in his paper on the plants of Abel's Journey ‡.

Dr. Royle would appear to have based his statement upon the localities given in the 4th vol. of the 'Prodromus,' in which work are enumerated three species of *Hamamelis*—*H. virginica*, *H. persica* (now *Parrottia*), and *H. chinensis*. I have little doubt that, through some *lapsus*, Peru has been substituted for Persia. The distribution of the *Hamamelideæ* is pretty nearly as follows:—

* Agardh, in 'Theoria Syst. Plant.' p. 155, says, "*Altingiaceæ* sunt *Fothergilleis* fere collaterales formam aliquantulum perfectiorem *Platanacearum* constituentes," and "*Hamamelideæ* sunt evolutione florum *Corneis*, *Bruniaceis*, *Araliaceis*, *Rhizophoreis* &c. analogæ."

† P. 234.

‡ *l. c.* p. 375.

In Japan, China, and the Chinese Islands, there are 9 species belonging to 7 genera—*Liquidambar*, *Distylium*, *Corylopsis*, *Hamamelis*, *Eustigma*, *Tetrathyria*, *Rhodoleia*. (1·3 : 1). Himalaya, Khasia, and the eastern peninsula, 8 species of 7 genera—*Liquidambar*, *Distylium*, *Corylopsis*, *Hamamelis*, *Parrottia*, *Bucklandia*, *Sycopsis* (1·1 : 1). [I include here an undescribed *Bucklandia* (?), of which I find specimens destitute of flower or fruit, from Malacca, in Griffith's herbarium; Griffith, from his MS. attached to these, considered them as belonging probably to this genus; the woody tissue presents the characteristic disks of the order. An imperfect fruiting specimen of probably a new *Distylium* is in the same collection, but without a locality; this I pass by.] In western Asia, Persia 1 species (*Parrottia persica*), and Asia Minor 1 (*Liquidambar orientale*), both growing socially, the latter over a very limited area. In the Indian Archipelago, according to Prof. Miquel's 'Flora Indiæ Batavæ*' are 2 species of 1 genus (*Liquidambar*); in Madagascar 1 genus (*Dicoryphe*), containing, according to Tulasne †, from 5 to 6 species; South Africa 1 genus (*Trichocladus*), of, say, 2 species; North America (U.S.) 3 species, referred to 3 genera (*Liquidambar*, *Fothergilla*, *Hamamelis*).

From the preponderating number of genera occurring in the belt extending from Japan through China to the Himalaya, this may be regarded as the centre of the order,—a circumstance presenting a possible significance when we note that it is in the same area there remains what, with some considerable show of reason, may be accepted as perhaps the oldest type of Gymnospermous structure extant in the isolated genus *Salisburia* ‡. This significance is enhanced by the fact that the *Hamamelideæ*, with at least the Coniferous Gymnosperms, are alike entirely absent from the Western Indian peninsula, although, from the presence of species in the Khasia Hills, the Malay peninsula, and Madagascar, there is no reason to suppose climatic conditions at present obtaining necessarily prevent their extension thither. Viewed in connexion with the important hypotheses advanced by Messrs. Darwin and Wallace, and, in reference to plant-distribution, by Dr. Hooker, recollecting the peculiar structure of the prosenchyma of the wood, which closely resembles that of the *Coniferæ* in some respects, and also the remarkable relative proportion of species to genera, the circumstances above noted appear of interest, and with other parallel cases, which may no doubt be correlated §, are calculated to assist us towards a solution of some of the most important problems engaging the attention of botanists. It may be noted that the *Hamamelideæ* are absent from Australia, the Polynesian Islands, and South America; nor do they occur in North America, except on the eastern side of the Mississippi, the botany of which part, as has been observed by Dr. Asa Gray, presents a notable relationship with that of Japan.

Mr. Griffith first called attention to the peculiar histological character of the wood of *Bucklandia populifolia*, which attracted his attention while on a stay in the Khasia Hills

* Vol. i. pp. 836, 1097.

† *l. c.* p. 142.

‡ Consult an important paper on *Trigonocarpon*, &c. in Phil. Trans. 1855, by Dr. J. D. Hooker and Mr. Binney.

§ For example, that of the anomalous group of *Calycanthææ*, like *Hamamelis*, Japanese and North American, and exhibiting, as noted by Prof. Lindley (Veg. Kingd. p. 541), discoid markings on its tissue. These markings I have seen only in *Calycanthus occidentalis* and *Chimonanthus fragrans*; I have not minutely examined their character.

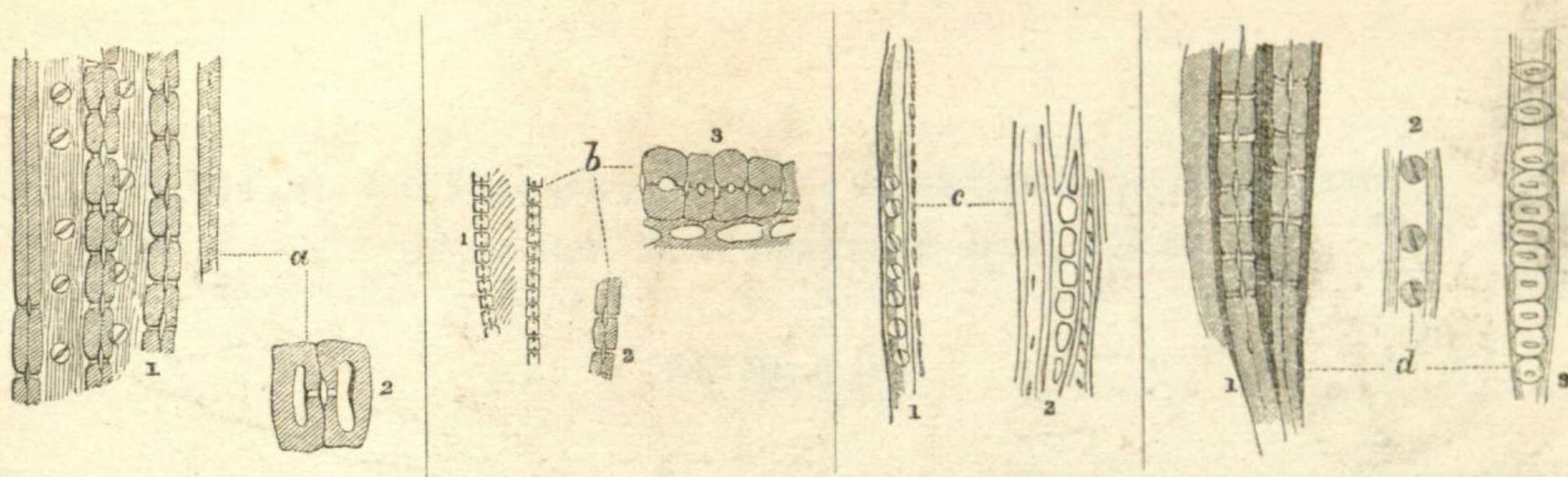
in 1835*. From an examination of the wood of this species, and of a second undescribed Malayan *Bucklandia* (?), of *Rhodoleia*, *Trichocladus*, *Hamamelis*, *Sycopsis*, *Eustigma*, *Distylium*, *Corylopsis*, and *Liquidambar*, I find a close uniformity throughout in respect to its minute structure. The more or less circular and faintly defined disks of the often much elongated and tolerably thick-walled prosenchyma of the wood are, as in the *Coniferæ*, due to the presence of minute lenticular cavities between the adjoining wood-cells: the canals traversing the secondary layers of these cells are opposed on each side to these intercellular spaces, and are almost invariably elongated laterally in a direction transverse or oblique to the axis of the cell, although sometimes nearly circular and very minute, and then in all respects quite similar to those of the so-called "glandular markings" of coniferous wood†. In all the *Hamamelideæ* examined I have found a proportion of vessels in the wood fully equal to that obtaining in the more familiar Dicotyledonous structures; in some (*Corylopsis* for example) the vessels in a cross section of the wood, occupy an area about equal to that of the other tissues. Generally the vessels are transversely barred. The medullary rays are numerous and narrow, consisting of plates of but one cell (though often of two or three) in thickness. In the present state of knowledge, it would be useless to speculate on the purport of the intercellular spaces which constitute the peculiarity of the wood of these plants; nor can we indicate how far an identity of structure in this particular alone with that of Gymnosperms affords a ground for the notion that, possibly, through a long-continued series of widely receding divergences in respect to all the reproductive apparatus, the histological character of the elementary tissue of the vegetative organs might afford a contrasting constancy.

If, however, connecting links between these remarkably different groups ever existed, assuredly none now remain. If the tissue characteristic of Gymnosperms has been rightly designated by a distinguished naturalist "the highest specialized tissue known‡" (I presume, on the ground of its discoid markings), it does become of some interest to trace a close approach to it throughout a group presenting in hardly any other respect a single feature in common. In the absence, however, of vessels from the dense bundles of prosenchyma of the cone-bearing Gymnosperms (in which the markings are especially well developed), although their rôle is almost as obscure to us as that of the interspaces of the wood-cells, I should scarcely regard this tissue as offering, in its structure, a higher measure of specialization than obtains in the little order under consideration.

* Private Journals, p. 4.

† In some Gymnosperms, however, the canals are often thus elongated, and become slit-like, as occurs in *Callitris* and *Araucaria Bidwellii*. In *Salisburia* the disks are irregularly scattered and small.

‡ Dr. Hooker in 'Essay on the Flora of Australia,' p. xxii.



EXPLANATION OF WOODCUTS.

- a. *Liquidambar Altingia*. 1. vertical, 2. transverse sections, showing the lenticular intercellular cavities, with their canals.
- b. *Trichocladus*. 1 & 2. vertical, 3. transverse sections.
- c. *Corylopsis Himalayana*. Vertical sections, in fig. 2 traversing a medullary plate.
- d. *Sycopsis Griffithiana*. Vertical sections of wood-cells.

DESCRIPTION OF THE PLATE.

TAB. VIII.

Sycopsis Griffithiana.—Natural size.

Fig. 1. Young δ flower, nestled in a slightly hollowed recess exterior to the base of a bract of the yet unexpanded inflorescence.

Fig. 2. δ flower, with subtending bract; but three stamens developed.

Fig. 3. The same, showing obliquity of the calyx.

Fig. 4. The same, laid open.

Fig. 5. Rudimentary stamen.

Fig. 6. Bifid rudiment of pistil from δ flower.

Fig. 7. Glomerule of η flowers.

Fig. 8. Single η , with lobes of the calyx, tolerably perfect, still remaining.

Fig. 9. Vertical section of η flower.



W.H. Fish, del.

Sycopsis Griffithiana.

G. Jarman, sc.