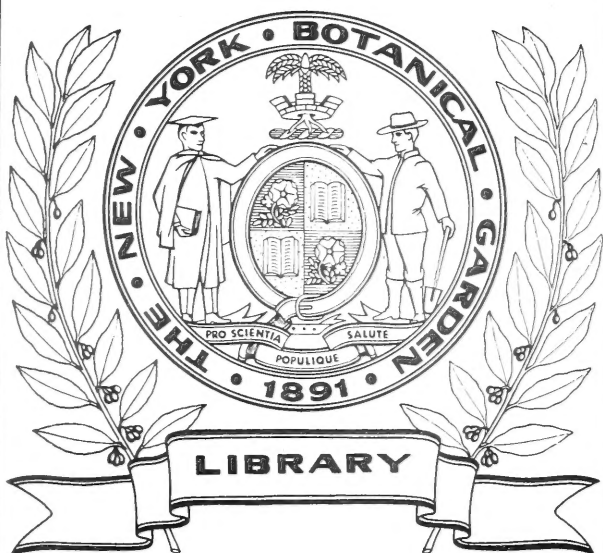




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Vol. 1
1901



TORREYA

A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS



JOHN TORREY, 1796-1873



EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

Volume I.

NEW YORK

1901

Vol. 1
1901

THE TORREY BOTANICAL CLUB

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PUBLICATIONS. **Bulletin.** Monthly, established 1870. Price \$3.00 per year. Of former volumes, only 1-6 and 19-27 can be supplied entire, but the completion of sets will be undertaken. All correspondence relating to the **Bulletin** and **Memoirs** should be addressed to Professor L. M. Underwood, Columbia University, New York City.

Memoirs. A series of technical papers published at irregular intervals, established 1889. Price \$3.00 per volume.

Torreyia. Monthly, established 1901. Price \$1.00 per year. Address the Editor of Torreyia, New York Botanical Garden, Bronx Park, New York City.





Vol. 1

No. 1

TORREYA

January, 1901

NOTES ON *RUDBECKIA HIRTA* L.

BY N. L. BRITTON

In *Pittonia*, 4: 174-180, recently published, Mr. Thomas V. Moore, a student of the Catholic University at Washington, working under the direction of Professor Greene, presents a valuable contribution to the arrangement and description of some of the species of *Rudbeckia* of the *hirta* group. In discussing *R. hirta* he takes exception, apparently with good reason, to the statement in *Illustrated Flora*, 3: 416, that this plant is native only on the western prairies, and is widely distributed in the East as a weed.

There can be no doubt, however, that the latter portion of this statement is quite true; at the time of publication of Dr. Torrey's *Flora of the State of New York*, in 1843, the only station for this species known in that State was near Buffalo, where it was collected by Dr. Sartwell; it is now one of the most abundant weeds in grass fields throughout, I think, nearly all portions of the State and is a pest to farmers in many counties, being exceedingly abundant everywhere within one hundred miles of New York City. No indication of its occurrence further east in the northern states is given in the first edition of Dr. Gray's *Manual* of 1848, where its range is cited from western New York to Wisconsin and southward. In the second edition of Dr. Gray's *Manual*, 1856, this is supplemented by the statement "also in southern New York (White Plains), and various parts of New England, but probably of recent introduction." In the sixth edition of Dr. Gray's *Manual*, 1890, the statement of the first edition is repeated, supplemented by "now common as a weed in eastern meadows, introduced with clover-seed from the West."

[The exact date of publication of each issue of *TORREYA* is given in the succeeding number]

It was the acceptance of the ranges cited by Gray which caused the limitation by me of the native habitat of the plant to the western prairies. I find, however, on reference to Dr. Darlington's *Florula Cestrica*, that the plant is recorded from Chester County, Pa., in 1826, though it is there said to be not common. In the third edition of the *Flora Cestrica*, 1853, it is recorded by Darlington as growing in "fence-rows and thickets, not common."

In 1857, Dr. Knieskern records it in his *Catalogue of Plants of Monmouth and Ocean County, New Jersey*, as occurring in dry fields, not common. In the *Catalogue of Plants of New Castle County, Delaware*, published in 1844, the species is admitted without question. In Dr. Aikin's *Catalogue of Plants of the vicinity of Baltimore, Md.*, 1837, the plant is said to grow in bushy meadows. According to Dr. Curtis' *Catalogue of Plants of North Carolina*, 1867, it is said to grow in all the districts of that State. In Dr. Elliott's *Botany of South Carolina and Georgia*, 1824, it is recorded as growing in dry sandy soil.

It seems to me from the above citations that the point made by Mr. Moore is well taken, and that there is no evidence that the species is not native on the Atlantic sea-board from Maryland or, perhaps, Pennsylvania, southward; that it has, however, been introduced, as Dr. Gray suggested, presumably from the West, into New York and New England, seems from its recorded history, equally certain.

SEEDLINGS OF ARISAEMA

BY D. T. MACDOUGAL

The writer has had the seedlings of *Arisaema triphyllum* and *A. Dracontium* under observation for some time in etiolation experiments and some facts of independent interest have been gathered and are presented here.

The general facts concerning the germination of *A. triphyllum* are familiar and need be recounted only briefly. The cylindrical cotyledon pushes out of the seed coats in about six

weeks after being placed in moist soil, carrying the hypocotyl and plumule. It becomes progeotropic almost immediately upon its emergence from the seed coats and pushes its way down into the soil to a depth of 8 to 10 mm. The basal or outer end of the hypocotyl next becomes slightly enlarged giving rise to one to three roots which penetrate the soil to a depth of 2 or 3 centimeters. These roots are well provided with root hairs in the earlier stages of their existence and later contract to some extent as indicated by the wrinkled epidermis, losing the root hairs previous to this process. This results, of course, in the pulling of the corm downward into the soil, and the repetition of the process in succeeding stages finally buries the adult corm to a depth of 10 cm. or more.

Shortly after root-formation has begun, the first leaf begins to grow, emerging from the cylindrical cotyledon through a rupture near the seed. By the activity of the leaf, carbohydrates are formed, and the third stage of the seedling is marked by the enlargement of the corm until it reaches a size about equal or greater than the seed, and is conical, or globose in form. Almost all of the original store in the seed is expended in the construction of the seedling in the two first stages of development.

During the course of the etiolation experiments, numbers of seeds and plants were divided into two lots, one being placed in the dark chamber and a second in the experimental laboratory. The seeds from an entire fruit of *A. Dracontium* were thus placed in two pots in January. No seedlings being visible in the first week of May the soil was explored to determine the fate of the seeds. To the great surprise of the writer numbers of seedlings were found which had undergone the development underneath the surface, and those in the dark room were indistinguishable from those grown in the light. In fact, this plant was found to offer a second example of a germination of the seed without development of the plumule, a type of procedure which is followed also by *Arum maculatum* as discovered by Scott and Sargent.*

* Scott and Sargent. On the Development of *Arum maculatum* from the Seed. *Annals of Botany*, 12: 399-414. 1898.

The cylindrical cotyledon of *A. Dracontium* frees itself from the seed coats and attains a length which varies from 3 mm. to 6 to 7 mm. and pushes down into the soil. Before this extension has ceased, the base of the hypocotyl begins to enlarge and in the case of the shorter cotyledons may bring the resulting corm actually in contact with the seed. Coincidentally with the swelling of the hypocotyl the appearance of two or three roots is to be noted. These are furnished with hairs and are highly contractile. In the matter of the development of the plumule the widest variation is shown. In the greater number of instances the plumule is absolutely quiescent during this germination and the formation of the corm goes forward until the seed is exhausted, when the roots go into the contractile state and pull it down into the soil with no showing of a leaf during the first stage of its development. This agrees in the main with the behavior of *Arum maculatum*. In a small number of seedlings of *A. Dracontium*, however, the first leaf may be dissected out as a small body about 3 mm. long, of which half is petiole and the other half a rolled green lamina which reaches no greater development, and never emerges from the cylindrical cotyledon in which it is enclosed. In 9 of the 70 seedlings which came under observation, the first leaf became active before the hypocotyl had doubled its thickness and before more than one root was formed, and extended, forming a petiole 3-4 cm. long and a broad lamina. The seed remains attached to the corm by the cotyledon for an unusually long period and may be seen adhering to the corms formed by leafless seedlings in their first resting period.

The seedlings of *Arum maculatum* and *Arisaema Dracontium* are thus seen to be entirely saprophytic during the first season of their development.

Ignorance of this habit of *A. Dracontium* led the writer to sacrifice a fine lot of seedlings of a hybrid between *A. Dracontium* and *A. triphyllum*. During the first season of the development of these plants only seven plumules were counted and when the second season began thirty plants were found, which led to the belief that the culture had been vitiated and the entire lot was

discarded. Fortunately some drawings had been made which preserved characters easy of interpretation in the light of subsequent discoveries.

NOTES ON THE GENUS LYCOPODIUM

BY FRANCIS E. LLOYD

Lycopodium Chamaecyparissus.—Through the courtesy of Mr. D. K. Gilbert, the writer has received specimens of this plant collected at Alder Creek, Oneida Co., N. Y., at which place it grows "plentifully in woods." This establishes the fact of the plant's distribution in this State, from which it was not hitherto reported. "The specimens were gathered in early October, and you will see that the strobiles are old and brown. Those of *L. complanatum* gathered at the same time and place were still yellowish green and show that their time of ripening is much later than that of *L. Chamaecyparissus*," writes Mr. Gilbert. This discrepancy in the time of ripening, first noted by Austin in New Jersey, is an important physiological character distinguishing the two species. Another observed difference is in the position of the rhizome, which in *L. Chamaecyparissus* is underground and in *L. complanatum* prostrate on the surface. Notes by field workers on this point should be made during the coming season.

L. pinnatum.—In August of the past year Professor S. M. Tracy and the writer were collecting in the vicinity of Biloxi, Miss., and a locality was found where this plant grows in abundance, and in perfect form. The horizontal stems are quite prostrate and thin and the leaves are confined to one plane very closely. The habitat is a very wet white or yellowish clay bank with full insolation. In the same spot *L. Carolinianum* was found growing to a good size (18 cm.). There can be no doubt of the distinct specific value of this plant. When it grows in sphagnum bogs, as was found to be the case near Auburn, Ala., a little later in the same season, the plant becomes so spindling and distorted as the result of its struggles in growing through the moss, that it becomes very difficult to recognize it.

L. alopecuroides.—This species also was found in savannahs near Biloxi. In the South the variation of the plant is quite small in amount. The arching of the stem, its thickness (4–5 mm.) and the leaf positions separate it very readily from *L. pinnatum*. Recently we advanced the notion that the presence or absence of reflexion of the sporophylls when ripe would serve to distinguish the two plants, but our observations in the South do not strengthen that view. The plants were, however, not ripe, and further observation is necessary.

L. adpressum.—The validity of this species is still open to some doubt. We found during July last, in bogs near Toms River, N. J., many plants which show the same perplexing variation recently referred to by Clute in the Fern Bulletin (9 : 8. 1901). No plant of the species was found in the South. As the plants of Toms River were by no means mature we hesitate to submit an opinion on them further than to say that forms from New Jersey, hitherto regarded as *L. alopecuroides* and *L. adpressum* are apparently the ends of a series of many intergradations. One point we think settled, namely, that the denticulations of the leaves are of no constant specific value in distinguishing species of this segregate. It is, however, worth while to point out that the plants of the *inundatum* group, from that species to *L. alopecuroides*, including the so-called *adpressum*, are to be regarded as a series of forms in a plastic condition. They seem also to be very susceptible to small changes or differences in the environment. It becomes necessary, therefore, to study them very carefully in the field, and full series of specimens should be collected with differences in habitat carefully noted. One way in which some useful work might be done by those who are in favorable conditions would be to exchange growing plants, say of *L. inundatum* and *L. alopecuroides* and to determine by cultivation in different environmental conditions whether they vary toward each other. It is also of great interest to note that the segregate has in the Old World, so far as known, only one representative, *L. inundatum*.

THE SUMMIT FLORA OF KING'S MOUNTAIN AND CROWDER'S MOUNTAIN, NORTH CAROLINA

BY JOHN K. SMALL

A few miles north of the southern boundary of North Carolina and many miles east of the Appalachian Mountain system, is an irregular ridge with a northeasterly and southwesterly trend. From most adjacent points this ridge is not conspicuous ; in fact, it might be passed unobserved were it not for the two peaks which rise abruptly near its northeastern extremity. These peaks are known as King's Mountain and Crowder's Mountain.

The geology of the region in question is quite similar to that of the nearest portion of the Blue Ridge, while neither peak reaches an altitude of quite 1,800 feet. The top of King's Mountain is a little higher above the level of the sea than that of Crowder's Mountain.

I have visited this locality several times and have found interesting, rare and undescribed species ; but it is the character of the vegetation inhabiting the summits that especially impresses one.

The summits of both mountains are small and very rugged ; that of Crowder's is somewhat larger and less rugged than that of King's Mountain. On ascending the slopes of either mountain two striking features arrest the eye. They are the prevalence of a very local species which has taken the name of one of the mountains, namely *Lacinaria Regimontis*, and of the relatively rare fern, *Asplenium Bradleyi*. The main peculiarity in connection with this fern there, is that it does not confine itself to its favorite habitat, namely, overhanging cliffs ; but it is, or it was up to the time I last visited the locality, very common and grew nearly everywhere, on cliffs, on ledges, on and about boulders and in loose soil.

The vegetation of the summits is almost exclusively of woody plants, and shrubby. The shrubby condition of normally large forest trees presents an extraordinary and interesting aspect. The chestnut tree, *Castanea dentata*, ranges from three to six

feet in height, nevertheless these plants produce an abundance of fruit. *Sassafras*, *Pinus Virginiana*, *Quercus Prinus*, *Diospyros* and *Oxydendrum*, all appear in the same form and stature. The common sour gum, *Nyssa sylvatica*, in like condition, exists on King's Mountain, and a single shrub of *Ilex opaca* was found on the uppermost cliffs of Crowder's Mountain.

The normally shrubby plants appear more natural. *Polycodium stamineum*, *Vaccinium vacillans* and *Quercus nana* are common to both peaks, while *Kalmia latifolia*, *Rhododendron Catawbiense*, *Gaylussacia frondosa*, *Gaylussacia resinosa* and *Batodendron arboreum* are species apparently confined to the top of King's Mountain. Only two perennial or shrubby herbs, namely *Galax aphylla* and *Paronychia argyrocoma*, exist on the summit of King's Mountain, while the summit of Crowder's Mountain is destitute of herbaceous vegetation with the exception of a fern and a few sterile plants of some sedge.

A SIMPLE DYNAMOMETER

By H. M. RICHARDS

It is instructive to demonstrate that force is exerted by the swelling of seeds previous to germination, or, for that matter, in the imbibition of water by any substance capable of taking it up. A very simple machine for registering approximately the amount of energy involved, which perhaps may be dignified by the name of a dynamometer, is found in one of the ordinary self-registering letter scales which work by compression. A dish containing the seeds is placed on the pan of the scale, and on top of them is laid a cork, or better a glass plate, which just fits into the glass vessel without binding. The whole is placed on a retort stand and a stick, held firmly by a clamp, is placed against the glass plate. Water is now poured on, and as it runs down among the seeds they swell, and the glass cover being rigid the scale itself is depressed as a result of the pressure. It is needless to say that the weight of the dish, seeds, etc., must first be recorded. In this way an idea of the amount of force exerted by a given weight of

seeds can be obtained. It is not of course very accurate or strictly quantitative, but it is at least approximate, and suitable for comparisons, say between living and dead seeds.

The dials of these scales, as obtained in this country, are graduated in ounces, but it is not difficult to substitute a paste-board dial and regraduate it in grammes by means of weights placed on the scale pans. This is of course preferable. The construction of these scales is so simple that there is no reason why a home-made and weaker spring could not be substituted for the one provided, and in such a manner an apparatus capable of more delicate adjustment could be obtained. With a more sensitive balance the force exerted by the downward growth of the root tip of *Vicia Faba* could be recorded.

THE RARE MOSSES OF BASHBISH FALLS

BY ELIZABETH G. BRITTON

Bashbish Falls may be reached from the Copake station of the Harlem Railroad, by a short walk, and are about one hundred miles from New York City. They are situated in a picturesque ravine with steep walls of rock and wooded slopes surrounding them. Many interesting mosses have been collected in the two expeditions which I have made to this locality, the rarest of which is *Anomobryum concinatum*, this being the third station recorded for this species in the State. *Didymodon riparius* was collected by Mr. Williams in the stream above the Falls and on the wet cliffs were found *Didymodon rubellus*, associated with *Gymnostomum rupestre*, *Amphoridium Lapponicum*, and *Myurella Careyana*, all rare species for this region, but finding congenial moisture and shade in this sheltered ravine. *Homalia Jamesii*, *Porotrichum Allegheniense*, *Pogonatum alpinum* and *Forsströmia trichomitria* growing on wet rocks, were also collected above the Falls, and the slopes on the south side yielded *Hylocomium brevirostre* and *Dicranella heteromalla* with curved pedicels. Fine fruiting specimens of *Bryum proliferum* were also found in the region.

ECONOMY IN NATURE

BY P. A. RYDBERG

Rising "on stepping stones
Of their dead selves to higher things."

On Faitoute Avenue in New Orange, New Jersey, used to stand an old cherry tree, seven or eight feet in circumference. About seven feet from the ground it divided into two trunks. Just at the junction of the two there was a big hole, indicating that the tree was decayed and hollow. Nothing of peculiar interest about this tree was revealed, however, until the severe storm came in the spring of 1899, when one of the two trunks was torn down. The hollow trunk contained several bushels of cherry-pits and mulch, produced by decayed cherries and leaves. An adventitious root had sprung from the margin of the hole, ramified in this mass of decayed matter, and grown to the size of the thickness of one's wrist. Not satisfied, however, to feed only on old cherries and leaves, it had sent numerous branches into the decayed portion of the trunk, and the tree was actually feeding on itself, like the old wolf which, according to the fable, was eating its own frozen legs.

REVIEW

A "Flora of Vermont,* a list of the fern and seed-plants growing without cultivation," prepared by President Ezra Brainerd, Professor L. R. Jones and Mr. W. W. Eggleston, a committee of the Vermont Botanical Club, was issued in December, 1900. This list represents much careful and painstaking work on the part of the authors and their associates, involving a thorough-going revision of previously published lists of Vermont plants. The spirit in which the work has been conceived is revealed in the following words from the preface: "In every case where a name is admitted to the main list, there is an authenticated specimen deposited in one or more of the permanent herbaria of the state, or

* Brainerd, Jones and Eggleston. *Flora of Vermont, a list of fern- and seed-plants growing without cultivation.* 8vo. Pp. i-xii; 1-113. Burlington, 15 D. 1900. [Extracted from Twentieth Vermont Agricultural Report.]

in such other herbarium as is indicated in the accompanying note. The invariable rule has been to admit no name which has not an extant specimen back of it. This has necessarily led to the exclusion of a number of names of plants reported by earlier botanists. In many of these cases the evidence is such as to leave little doubt that the plants actually occurred as reported, and probably many of them will be rediscovered. The names of such plants are included in a supplementary list at the end of the main catalogue, and each name so appearing should be considered as a challenge to the sagacity of present botanists until the plant is again found." The main list includes a total of 1,563 species and varieties of Phanerogams and Pteridophytes. The Engler and Prantl sequence is adopted, but the nomenclature is essentially that of Gray's Manual and of the Kew Herbarium. Whatever may be our differences of opinion as to the claims of usage and expediency in nomenclatural matters (any appeal to ethical grounds being logically denied to us who accept an initial date for nomenclature), it certainly seems a violent perversion of botanical history to retain longer for one of our common ferns the generic name *Dicksonia*, a name, which, so far as the Pteridophytes are concerned, was first applied to two species of ferns so different from ours that now, by common consent, they are placed in an entirely different family. Even Sir William Jackson Hooker,* a prince of "conservatives," once wrote, "The name of *Dicksonia* surely, however, ought to be preserved to the original *D. arborescens* (*Balantium* Kaulf. * *)," and this position is maintained by Diels in the Engler and Prantl Pflanzenfamilien and by other modern writers. From an international standpoint, the attempts to preserve two *Dicksonias* in two different families of ferns are likely to prove a little confusing.

Those who have seen *Lycopodium Chamaecyparissus* growing side by side with *Lycopodium complanatum* and so distinct as to be readily distinguished at a distance of several feet and showing not the least tendency to intergrade will be very sceptical as to the propriety of considering it a variety of *L. complanatum*.

At the close of the work are shorter lists, representing the more important regional floras, in which we see an expression of the

* Hooker, W. J. Genera Filicum, pl. 61 A [text].

commendable and increasingly popular modern tendency to study plants particularly in relation to their surroundings. The pamphlet is attractively printed and is most fittingly dedicated to the well-known botanical collector, Mr. Cyrus G. Pringle. The Vermont Botanical Club is to be congratulated upon the enthusiasm and enterprise which have resulted in the publication at this time of such an important addition to the list of American local floras. [M. A. H.]

NEWS ITEMS

Professor Francis E. Lloyd, of the Teachers College, Columbia University, is soon to take a half year's leave of absence. He will spend the time in the laboratory of Professor Strasburger at Bonn.

The *Asa Gray Bulletin* and the *Plant World* have effected a consolidation, retaining the name of the latter. The place upon the editorial board which was to have been filled by the late Thomas A. Williams of the *Asa Gray Bulletin*, will be taken by Mr. Cornelius L. Shear.

Dr. William A. Murrill, whose valuable paper on "The Development of the Archegonium and Fertilization in the Hemlock Spruce (*Tsuga Canadensis* Carr.)," has recently appeared in the *Annals of Botany*, is now Instructor in Biology in the Boys' High School, New York City. Dr. Murrill received his degree from Cornell University.

The last annual meeting of the Society for Plant Morphology and Physiology was held at Baltimore, December 27th and 28th. The presidential address, entitled "A Decade of North American Palaeobotany," was given by Professor D. P. Penhallow, of McGill University. Among the papers presented were three by Dr. D. T. MacDougal, with the following titles: "Critical Points in the Relation of Light to Plants," "Propagation of *Lysimachia*," and "Germination of *Arisaema*." An account of "The Insular Flora of Mississippi and Louisiana," illustrated by lantern views, was given by Professor F. E. Lloyd. Dr. Erwin F. Smith was elected president for the ensuing year, and Professor W. F. Ganong, secretary-treasurer.



Vol. 1

No. 2

TORREYA

February, 1901

THE VALUE OF FORESTRY IN A COURSE OF NATURE STUDY

BY ELIZABETH CARSS

Until very recently, little or no attention was paid to the care of our forest trees or to the relation of our forests to water supply and soil preservation. Forests were cut only for immediate gain with no regard to future productiveness. Tracts of land were also carelessly burned and no means taken to prevent such occurrences. The consequence is that many districts once covered by forests are now barren wastes of stumps. Farms are often seen where a good wood patch has been so reduced as scarcely to provide the household fuel. I recall one farm in northern New York where the only plot of woodland that the farmer possessed has been almost entirely cut away within the last five or ten years. At first, as the wood was abundant and the farmer felt no particular need for economy, the cutting was done in a most wanton manner. Tall stumps forty and fifty inches in height have been left, and great tree trunks have been felled and left to decay, often crushing small trees in their fall. In the same region there are two striking examples of hillsides that have been cut and burned to the ground to form "pasture." The result is scarcely satisfactory even for sheep. The soil at best was very scant and the hard rock ledges formed uneven masses to which soil could not cling without the aid of vegetation.

It is not difficult to find many illustrations of such destruction as has been described, which is the result of ignorance and con-

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 1, comprising pages 1-12, was issued January 29, 1901.]

sequent short-sightedness. Attempts are now being made to awaken the private owner to the necessity of care and proper management of forest areas, both for his own sake and for the interests of the country. The Division of Forestry of the Agricultural Department at Washington is making efforts to instruct owners of forest lands and to aid them in the care and preservation of such areas. To this end the Division has undertaken to provide a series of practical examples of improved treatment of private forest lands. The object of the undertaking is to show, by assisting a few owners to make a trial of new methods, that improved ways of handling timber lands are best for the owner and forest. The results of these experiments with private lands are to be published for the benefit of all.

In order that a reform may become vital in a country like this, it is necessary that the means of reform should reach not only those who are directly interested, but the many who influence the legislation of the country. The majority of people know nothing of the valuable government publications on the subject, nor appreciate the expenditure necessary for experimentation and publication of results.

How can the school aid in establishing among the people a proper estimate of the importance of the forests? We often hear that the aim of the school should be to promote social efficiency. To this end children are given calculations and illustrations from the life of trade and commerce, and are taught the ins and outs of a complex political life. While the value of this may not be disputed, there is here presented a very vital question in which both city and country children should be interested.

Elementary work in forestry may be approached through two parts of the school curriculum: geography and nature study. The subject may be introduced by simple study of trees. With very little children, only the recognition of some of the common trees by means of form, leaves, fruit and blossom, is possible. Later, the work may be expanded somewhat as suggested in the following outline originally prepared by the writer for the Teachers College Record:

I. Special tree study.

General form : branching, height and breadth of the tree.

Bark : Characteristic appearance. Does the tree shed the bark ?

Compare bark of the tree studied with other common trees.

Compare the bark of the needle-leaved trees with that of some of the broad-leaved trees.

Leaf : Compare the form with other leaves that have been studied. How is the leaf fastened to the stem ? Where are the leaf buds for next year ? Make a careful study of buds with their wrappings. When do the leaves fall and what changes take place in the leaf before its fall ?

Fruit : How fastened to the stem ? Where most abundant on the tree ? Kind of seeds produced by the tree ?

Germination of seeds : Recognition of seeds of the common trees. Allow the seeds to sprout and examine stages of growth. Brief account of nourishment and growth of trees.

Twigs : Prominence of certain buds and smallness of others. Development of buds on different parts of the twigs ; size, shape, color of buds ; shape and character of bud scales. Scars on the twigs. Leaf scars ; bud scars. Annual growth as shown by external markings ; compare growth of different years. Growth and development of branches.

II. Field work. Recognition of individual trees at different seasons. General outline for field work : difference in height of trees ; difference in foliage masses ; advantage of different types growing together ; trees that have the greatest number of branches ; results of crowding ; method of making a tree grow with a tall, straight trunk ; the effect upon the wood if numerous branches are allowed to develop ; method of cutting and pruning.

III. Care of trees and forests. Some ways in which destruction of forest areas has come about ; fires, careless cutting, etc., insect pests, fungus growths. Ways of preventing destruction.

Let some pupil write for pamphlets. Discuss the efforts that are being made to save the trees and forests. Compare our forest tracts with forest areas in Europe.

IV. Wild life in the woods. Make a list of some of the wild animals seen in the woods in which we have been, and speak of their interesting characteristics, enemies, means of protection, etc. Life in winter, snow tracks. Hunting centers of the United States.

V. Lumbering.

I. Lumbering regions and forest reserves : Where situated in

the United States? Characteristic trees of different regions. Relation of water supply and forests. Control of erosion by forests. The effect of extensive cutting upon distribution of soil. Examples of excessive erosion and excessive deposition of soil.

2. Lumber camps: Sites chosen—reasons. Why winter is a good time for cutting and hauling. Transportation from lumber camp.
 3. Saw mills: Situation; power used for operation; ways of preparing wood.
- VI. Woods. Examine woodwork in the school room. Notice the different grain found. What is the grain of wood? Why do pieces of wood differ so much in grain? Examine small logs of different woods cut in cross, longitudinal and radial sections. Growth of wood—meaning of rings in the wood; green layer under the bark; injury caused by girdling trees.

It is not supposed that this outline can be carried out in all schools, but it is believed that many valuable lessons can be given along such lines of thought as are here suggested. The work as it stands is very comprehensive and is intended to be distributed throughout a course of nature study and geography.

A large part of this has been in use in the Horace Mann School in New York and has been found of great interest to the boys and girls, and it is hoped that such study in the schools will lay the foundation for an intelligent interest in the problems of forestry in the United States, and thus aid in checking the destruction which has already attained alarming proportions.

A NEW HYGROMETER SUITABLE FOR TESTING ACTION OF STOMATA

BY D. T. MACDOUGAL

Light, temperature, electricity, mechanical shock, moisture of the soil, salts in the soil, humidity of the air, winds, and prolonged darkness, exercise an influence upon the guard-cells of stomata in such manner that the pore is closed or opened when

any one of these forces acts with increased or decreased intensity upon the plant. The behavior of stomata to these factors is exceedingly various however. Thus some stomata open when the leaf is placed in water, while others close ; some stomata open in light, while others close under the effect of the sun's rays. Again, weak electric shock gives rise to one result, while a strong shock exercises the reverse action.

Any study of stomata by which their action is observed by means of a microscope will be vitiated with many errors, because in taking the epidermis from a leaf and mounting it for examination, stimuli are set up, which may cause the stoma to open or close before its original condition can be observed.

Practically all of the water given off by a leaf in transpiration passes through the stomata in the form of vapor, and the best method of ascertaining whether the stomata are opened or closed is to use some means of detection of watery vapor. This may be done in two ways, viz., by the cobalt method, in which paper saturated with cobalt nitrate placed on the leaf changes from a bluish to a reddish color in the presence of watery vapor ; the second method consists in the use of a hygrometer. Several types of these instruments are in use in physiological laboratories. In one the variations in length of a strand of human hair with the changing humidity moves a lever carrying a pen which gives a constant record of the proportion of watery vapor in the air. This form has not been made suitable for testing the action of leaves. Another hygrometer consists essentially of an awn of some grass, like *Stipa*, which twists or untwists with the variations in humidity of the atmosphere. This type has been found very useful in some forms of investigation. A third form contains a thin strip of some material which curves and straightens with the varying humidity, and the best example of this type is the horn hygrometer of F. Darwin, in which the sensitive material is made of a thin strip of pressed horn. The simpler forms of hygrometer sold in the market for general use have a sensitive strip composed of two layers of material of different hygroscopicity, and the writer has devised one for testing the action of stomata which is based upon this principle. It may be made as follows :

Secure a straight piece of iron or copper wire 2 mm. in diameter and 25 cm. long, and bend a section 8 cm. long at right angles. Thrust this short arm through the axis of a cylindrical cork 15 mm. long and 8 mm. in diameter and bend the terminal 5 cm. at right angles and parallel with the long arm. Cut a strip from a developed film plate, such as are supplied by photographers, 8 cm. long and 5 mm. wide. Cut a slit in the cork parallel to the axis and thrust one end of the film in the slit. Now fasten a bristle 5 or 6 cm. long to the free end of the strip of film, which should have its convex surface uppermost. Bend the free end of the long arm of the wire upwards and at right angles, affixing a cork to the tip to which a suitable scale may be attached with glue (Fig. 1, *D*). Turn the cork on its axis until the strip would lie within 2 mm. of any surface on which the apparatus might be placed; note the position of the pointer, and place on the under surface of leaf which has been laid on a table upside down. If the stomata

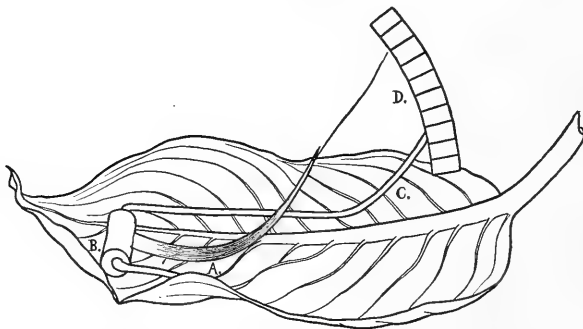


FIG. 1. Differential hygrometer. *A*, strip of film. *B*, cork. *C*, portion of wire bent upward to hold scale. *D*, scale over which the indicator has moved two divisions showing open stomata in the leaf on which the instrument rests. (Illustration from "A Practical Text-Book of Plant Physiology," by MacDougal, now in press. By permission of Longmans, Green & Co.)

are open the gelatine of the film will absorb watery vapor instantly and the strip will begin to straighten so that a movement of the indicator may be noticed inside of ten seconds. Set the hygrometer aside for a few minutes and place on the opposite side of the leaf. If it is free from open stomata no movement will be seen.

The instrument is extremely delicate and care must be taken not to blow the breath upon it while making a test, and the transpiration of the hand will give a decided reaction. Leaves attached to the plant may be tested both indoors and outdoors. It is believed that this instrument is free from most of the faults ascribed by F. Darwin to the horn hygrometer devised by him, and is quite as accurate and sensitive.

THE LYGODIUM AT HOME

BY FREDERICK H. BLODGETT

In Middlesex County, New Jersey, the climbing fern [*Lygodium palmatum* (Bernh.) Swz.] occurs in considerable abundance. The several localities are quite similar in general conditions, and a description of one will serve for an average of all.

The most accessible spot where it is found abundantly is a few miles south of New Brunswick, in the edge of the sandy area known as "the burnt woods." This is a tract of low hills and shallow hollows covered to a large extent with various scrub oaks and laurel. Many of the hollows contain water, either as nearly stagnant ponds, or as bogs of sphagnum and other aquatic plants. It is in one of these sphagnum bogs that the *Lygodium* grows.

Swamp maples and other water-loving trees surround the bog, giving place to the lower forms as the edge of the peat is reached, so that the surface of the sphagnum is nearly free from shade during the greater part of the day. Near the west end of the bog there are three colonies of *Lygodium*, a small one at the southwest, another at the northwest, and the third at the apex of a triangle, nearly equilateral, formed by the three. The fern grows among and entwines the low shrubbery and stout herbaceous plants forming the border of the sphagnum area of the swamp.

The largest colony is that in the northwest corner of the swamp. Here, on the 22nd of last December, the stems of golden-

rod and similar plants were closely entwined by the coils of the fern for nearly four feet from the ground. The fruiting pinnules were very abundant and formed nearly half the length of the fronds. Six or more fronds were often twined about the same stem, forming a loosely coiled rope. The pinnules of such masses would make the diameter of the whole reach three or four inches—a dense cluster of fine brownish lobes, contrasting with the brighter green of the less dissected and fewer sterile pinnules lower on the stem. Following the slender fronds downward, the dark brown rootstocks are found covered with about an inch of moss and leaf-mould, among the roots of the plants which support the fronds. The rootstocks, which usually bear only a few, from one to three, fronds, are often branched, throwing off one branch at a time, and they persist for a number of years, so that a length of a foot or more is not rare.

While the plants appear to require abundant moisture, they are not common in the sphagnum of the swamp, but are confined quite strictly to the growth of stout herbaceous plants and low shrubs along the bog margin, or on islands of similar growth in the midst of the sphagnum.

The large colony just described covers about a square rod at the edge of the bog, but extends through the undergrowth for a considerable distance from the open swamp. Along the sides of a drainage ditch it is quite luxuriant but does not equal the more exposed plants. Here the soil has only a thin layer of moss and leaf-mould upon it, the rootstocks being more directly in contact with the wet sand below. In some portions of the swamp area there are clay beds, but the *Lygodium* has not been observed in their immediate vicinity.

The sterile pinnules of the climbing fern were almost grass-green on December 22nd, but the fertile ones were turning brown. Nearly all other foliage had been killed and browned by the severe frosts, so that the color of the fern was in striking contrast to its surroundings. But conspicuous as its color was, it was not easily seen until close at hand, owing to the mass of dead sedge stalks, of golden-rods and briers in the midst of which the plants are located.

A NEW *SENECIO* FROM PENNSYLVANIA

BY N. L. BRITTON

In the course of a field excursion of the Torrey Club and the Philadelphia Botanical Club on May 29, 1899, at Penn Valley and Tullytown, Bucks Co., Pa., my attention was called by Mr. Joseph Crawford to a *Senecio* growing in abundance in a marshy meadow at Tullytown, which seemed different from any described species. The plant was in full flower at the time and its bright yellow rays were a conspicuous feature in the landscape. Ripe fruiting specimens were secured from the same place by Mr. Crawford on June 6, 1900.

The locality had already been considerably explored by the Philadelphia botanists and is interesting from the large number of pine-barren plants which inhabit it, the soil being very sandy.

The new species resembles both *Senecio Balsamitae* Muhl., of dry soil, and *S. Robbinsii* Oakes, of northern meadows, but is, I think, distinct from either. I append a description.

Senecio Crawfordii.—Perennial, with slender thread-like roots, glabrous, or with sparse woolly pubescence below. Stem slender, about 4 dm. high: leaves thick, firm, the basal ones erect, the larger 2–2.5 dm. long, the blades oval, oblong, or some of them narrowly obovate, mostly not more than one-half as long as the slender petioles, sharply and nearly equally serrate from the acute or obtuse apex to the entire cuneate base, or the lower teeth somewhat larger than the upper; stem leaves lanceolate or narrower, mostly acuminate, incised-serrate, clasping, the upper sessile, the lower petioled, the uppermost very small: heads 3–7; peduncles 1.5–10 cm. long, slender, bracted, rarely forked; involucre 7–9 mm. high, its bracts linear-lanceolate, acuminate, 1–1.5 mm. wide, shorter than the white barbellate pappus; rays 8–10 mm. long; achenes linear, striate, 2.5 mm. long, 0.5 mm. thick.

Type specimens in herbarium of the New York Botanical Garden.

ROSELLINIA OVALIS (ELL.) SACC.

BY WILLIAM A. RILEY

Mr. Ellis has described* under the name *Sphaeria ovalis*, a pyrenomycete occurring on *Artemisia* in Utah. Specimens were issued as No. 896 of N. A. F. A careful comparison of these with specimens of *Rosellinia pulveracea* (Ehr.) shows no essential differences and has led me to question the validity of the species.

In North American Pyrenomycetes, Mr. Ellis says regarding the new species: "Closely allied to *R. pulveracea*, differing principally in its perithecia." A careful study of the two species reveals individual perithecia of each which correspond perfectly. Those of *R. pulveracea* are in some cases subovate, while, on the other hand, those of *R. ovalis* are sometimes subglobose. Even in the descriptions there is not brought out any marked distinction. As an aid to comparison, I tabulate Ellis's descriptions of the two species:

<i>Rosellinia ovalis</i> (Ell.) Sacc.	<i>Rosellinia pulveracea</i> (Ehr.) Fckl.
1. Perithecia gregarious or sub-caespitose.	1. Perithecia densely gregarious, often forming continuous crustaceous layer and <i>sometimes scattered</i> .
2. Ovate.	2. Ovate-globose.
3. Rough.	3. Minutely tubercular-roughened.
4. 250-300 μ in diameter.	4. One-third mm. in diameter.
5. Ostium obtusely papilliform.	5. Ostium papilliform.
6. Asci cylindrical, 60-65 $\mu \times 6 \mu$.	6. Asci cylindrical 60-70 $\mu \times 10-12 \mu$.
7. Stipe 15-20 μ .	7. Stipe 20-30 μ .
8. Spores short-elliptical to oblong, 8-12 $\mu \times 5-7 \mu$.	8. Spores elliptical, 8-15 $\mu \times 6-9 \mu$.

The above table shows some little distinction in size of asci

* Bull. Torr. Club, 8: 125. 1881.

and spores. The unimportance of these characters, unless very marked, is quite generally recognized by workers on this group and has been frequently emphasized. An instance is afforded by a series of measurements of asci and spores of *R. pulveracea* from the various exsiccati. In these Mr. Ellis found a variation from $60-70 \mu \times 8-10 \mu$ in asci and from $6-8 \mu \times 5-6 \mu$ to $10-12 \mu \times 7-9 \mu$ in spores. My measurements of the same species show a variation from $70 \times 7 \mu$ to $90 \times 13 \mu$ in asci; from $10 \times 7 \mu$ to $15 \times 10 \mu$ in spores. For *R. ovalis*, Ellis's measurements, as seen above, are $60-65 \mu \times 6 \mu$ for asci; $8-12 \mu \times 5-7 \mu$ for spores. I find asci as large as $85 \times 7 \mu$, spores $10-12 \mu \times 6-7 \mu$. From a comparison of these figures it may be seen that on the basis of asci and spores we cannot even approximate a separation of the two species. It is my belief that *Rosellinia ovalis* (Ell.) is, at most, but a variety of *R. pulveracea* (Ehr.).

It should be noted that Saccardo attributes this species to New Jersey, whereas, it has so far been reported only from Utah. Misled by the statement "on sage-brush" he doubtfully refers to the host as *Salvia*.

BOTANICAL DEPARTMENT, CORNELL UNIVERSITY.

NEWS ITEMS

The sixth annual winter meeting of the Vermont Botanical Club was held in Burlington, on January 25th and 26th. Fourteen papers were presented.

"*The Gamophyllous*, a monthly magazine devoted to plant life in field, forest and garden," is the title of a recently established periodical. It is edited and published by Mr. Harry A. Bird of Plainfield, New Jersey.

An interesting paper entitled "An Ecological Study of the New Jersey Strand Flora," by Dr. John W. Harshberger was issued on December 31, 1900. It is extracted from the Proceedings of the Academy of Natural Sciences of Philadelphia.

Dr. David Griffiths, who received his advanced degree from

Columbia University last June, is now botanist of the Agricultural Experiment Station at Tucson, Arizona. His doctorate thesis, an important paper on the North American Sordariaceae is in press.

The appearance of "A Practical Text-Book of Plant Physiology," by Dr. D. T. MacDougal is announced for May 1st. The book will be suitable for use in the laboratory, will comprise about 350 pages with 150 illustrations, and will be published by Longmans, Green and Company.

Dr. Timothy Field Allen has donated his collection of Characeae to the New York Botanical Garden. The collection represents the accumulations of many years of active interest in this group of plants. It is rich in types and co-types and is doubtless one of the largest collections of Characeae in existence.

"Mosses with a Hand Lens," an introduction to the study of mosses, by A. J. Grout, Ph.D., of the Boys' High School, Brooklyn, is an attractive booklet of 73 pages, issued in December last. It contains descriptions of one hundred of the commoner and more conspicuous mosses in but slightly technical terms, with numerous illustrations.

"The Outline of the Course in Biology" in the Horace Mann School, by Professor F. E. Lloyd and Mr. Maurice A. Bigelow, has recently appeared as Vol. II., No. 1 of the Teachers College Record. The pamphlet contains the detailed outline of the course in botany and zoölogy and will be of interest to teachers of those subjects in high schools.

Mr. J. E. Kirkwood has accepted a position in Syracuse University, where he will take charge of the Department of Botany. Mr. Kirkwood is a graduate of Pacific University, Forest Grove, Oregon. He received the appointment of special Fellow in Biology, Princeton University, for the year 1898-99, on the completion of which he continued his studies at the New York Botanical Garden and Columbia University. His special work has been on the embryology of the Cucurbitaceae and on the food content and digestion in the coconut during germination.

TORREYA

March, 1901

A NEW HORSE GENTIAN (TRIOSTEUM) COMMON
IN THE EASTERN STATES

BY EUGENE P. BICKNELL

Notwithstanding that Rafinesque, in 1836, proposed six species of *Triosteum* in addition to the two which had come down from the time of Linnaeus, these two alone continue to represent the genus in our manuals of to-day. There is, nevertheless, a third species, quite a common one, which seems to have escaped recognition as effectually as if it did not exist. Its discovery, now some years ago, was quite a matter of accident, and affords a good illustration of the utility of botanical gardens in the study of our flora.

In the early days of the New York Botanical Garden, while passing through the grounds one Saturday afternoon in company with Dr. Britton, I rather surprised my companion by asking the name of a *Triosteum* cultivated in the herbaceous beds. My own surprise was in turn excited upon learning that the plant was merely the common *T. perfoliatum* L. and I insisted that it was, nevertheless, a species different from the plant with which I was familiar as *T. perfoliatum* and which actually grew in its native state on the grounds of my own home. The cultivated specimen had been brought from Staten Island, near Dr. Britton's home, and the following day an opportunity was found of visiting, under Dr. Britton's guidance, the very piece of woodland from which the plant had been removed. There, in its natural surroundings, we found more of it, and the interesting fact at once developed that it was distinctly later-flowering than the species of my own region twenty miles

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 2, comprising pages 13-24, was issued February 23, 1901.]

farther north along the Hudson River. The latter had come into bloom some two weeks before, whereas the flower-buds of this Staten Island plant were still very immature. I had never collected the species familiar to me, taking for granted—a cardinal sin in systematic botany—that it was our supposedly well-known *T. perfoliatum*, the only red-flowered species allowed by the books. Now, however, upon the first occasion, the two plants were carefully compared and it needed no profound study to find out that they were distinct species.

The essential or rather the most obvious difference between the two is seen in the main leaves which, broadly perfoliate in true *perfoliatum*, are in the new species conspicuously narrowed into a merely sessile base. This, however, holds true only of the principal sets of leaves. In the upper leaves a curious reversal of these characters is frequent. In *perfoliatum* the upper leaves are often, or usually, narrowly sessile; in the contrasted plant they are sometimes distinctly connate.

Just here is encountered a difficulty which I have found insuperable in attempting the correlation of any of Rafinesque's descriptions with the present new plant. Parts of most of these descriptions seem to point toward it; other parts seem to have a different bearing. It would appear that Rafinesque must have had the species but there is no certainty in regard to this nor as to the positive application of any of his names. Those which do not refer unmistakably to *Triosteum perfoliatum* or to *T. angustifolium* may refer, for anything which appears to the contrary, either to forms or fragments of *T. perfoliatum*, or to species as yet unknown. In going over the matter with Dr. Britton, we have been able to reach no other conclusion than this. The case seems analogous to that of the genus *Lechea*, about which Rafinesque knew a great deal in a careless and incoherent way or, at least, so set down what he knew, making his descriptions veritable enigmas to us at the present day.

Triosteum aurantiacum sp. nov.—Stem 5–12 dm. tall, glandular-puberulent to weakly hirsute, simple and erect or late in the season sometimes declined: leaves thin, entire or rarely subsinuate, becoming 1.5–2.5 dm. long and 8–10 cm. wide, ovate-oblong to oblong-lanceolate, acute, attenuate at both ends,

or acuminate at the apex and contracted below the middle into a narrow basal portion, sometimes, especially in the upper leaves, the extreme base again slightly dilated and connate, but never broadly perfoliate, green and thinly appressed-hirsutulous above, scarcely paler beneath, except in age, and minutely soft-pubescent: corolla dull purplish-red, 14–20 mm. long, the outer surface glandular-puberulent, strongly gibbous-saccate at base, more distinctly two-lipped and dilated above and with larger more spreading lobes than in *T. perfoliatum*, the stamens relatively much shorter and the style less exerted; calyx-lobes linear, obtuse, the largest becoming 18 mm. long and much surpassing the corolla; fruit 2–6 in each pair of axils, larger and more obovoid-oblong than in *T. perfoliatum*, pubescent, becoming orange to bright orange-red.

From Quebec to Minnesota, Massachusetts, North Carolina, Kentucky and Iowa, growing in rich soil in hilly or rocky woods. Comes into flower about New York from May 9 to 20, two or three weeks earlier than *T. perfoliatum*. The fruit ripens in late summer and sometimes persists well into November.

The type from Van Cortlandt Park, New York City, is deposited in the herbarium of the New York Botanical Garden.

This plant, although greatly resembling *T. perfoliatum*, has many points of difference. Perhaps the most obvious of these results from the shorter internodes of *T. perfoliatum* and its broadly perfoliate leaves which sometimes measure as much as 5–7 cm. across their united bases. *T. perfoliatum* is also mostly stouter and more leafy, the leaves thicker, and more rugose-veiny and paler beneath and more densely soft-pubescent. A closer comparison reveals interesting differences between the flowers of the two species. Not only is the corolla of *T. perfoliatum* often duller in color and decidedly greenish about its lower half, but it is markedly different in shape and in relatively longer stamens and more exerted style; the corolla-tube is nearly cylindrical and scarcely at all two-lipped with very short erect lobes scarcely, if at all, surpassing the anthers, in definite contrast with that of *T. aurantiacum*, which is decidedly two-lipped and upwardly dilated with much larger more or less spreading lobes much surpassing the included stamens. Furthermore, the calyx segments of *Triosteum perfoliatum* are ordinarily much shorter and less foli-

aceous than in *T. aurantiacum* and usually narrower and more acute. The fruit of *T. perfoliatum* is commonly more numerous and crowded than in *T. aurantiacum*, mostly 6-8 in each pair of axils, more globose and of a duller yellowish-orange color; at least, I have never seen it of as deep a flame color as that of *T. aurantiacum* sometimes becomes. Apparently also the species prefers a more sandy soil in lower, more level woods and thickets.

I have been unable to make out much difference in the distribution of the two species, although *T. perfoliatum* is perhaps rather more southern in its range. Specimens seen show a range from New York to Minnesota, Alabama, Kentucky and Kansas.

A MODIFIED FORM OF RESPIRATION APPARATUS

BY H. M. RICHARDS

There are many methods of all degrees of complication by which the amount of carbon dioxide evolved by plants may be measured. Many are simply out of the question for a laboratory which is not extensively stocked, requiring as they do a great array of glassware, many air-tight joints, siphons, aspirators or what not, while others are very crude. The writer has found the following simple and easily constructed piece of apparatus very useful for demonstrating in a fairly accurate way and on a somewhat large scale the respiration of plants. It is indeed a modification in form but not in principle of a method long used and often figured in many of the text-books. The apparatus referred to consists, as far as the glassware is concerned, of an exceedingly long-necked flask. Such flasks, however, must be specially blown and are consequently hard to obtain and also somewhat expensive. Instead of such a flask, an ordinary Bohemian one of 150 to 200 cc. capacity, with the neck of usual length, is selected. A test-tube, the closed and slightly tapering end of which was just a little too large to slip into the flask's neck, is next taken. By means of a little carborundum or emery-powder it is ground into the flask neck so as to get an air-tight closure like that of the glass stopper in a bottle.

It may be noted here that carborundum is a very handy grinding material. It is harder than emery and cuts more quickly and may be obtained in any grade of powder from the manufacturers at the electrical works at Niagara Falls. The writer has prepared ground-glass plates of considerable size and has ground covers to dishes, joints in tubes, etc., with a minimum amount of trouble by means of this carborundum.

But to return to the respiration apparatus. The test-tube having been ground into the neck in a satisfactory manner, its end is next blown out, by heating and blowing while in a Bunsen flame. The hole thus produced may be easily enlarged to any size by moulding with a piece of cold metal.

The tube should now be graduated, which may be done by corking up the end of the tube and running in water from a burette, marking on a paper scale glued to the side any graduation—1 or 5 cc.—that is desired. For use, the flask is filled with seedlings, flowers, leaves, or whatever is to be investigated, and a plug of cotton, loosely poked in, to prevent their falling out when the flask is inverted.

The extension of the neck is now put with its end (what as a test-tube was its mouth) over mercury. Some strong potash—say 50 per cent.—is run in at the top; the weight of the mercury will be enough to prevent as much, at least, as 5 cc. from running out. The ground joint of the test-tube is now painted liberally with vaseline, or better vaseline and wax, and the correspondingly ground flask joined to it. The whole apparatus is supported by a clamp on a retort-stand over the dish of mercury.

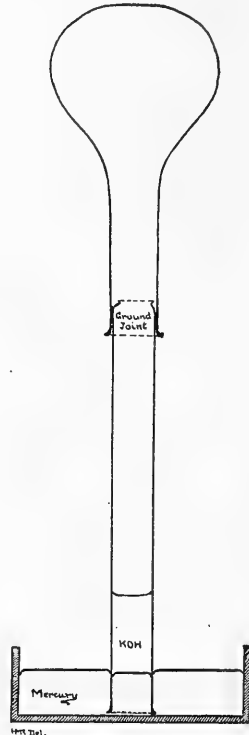


Diagram of Section. The apparatus is supported by a clamp to a retort-stand. The flask is the receiver for flowers, seeds, etc. The tube may be graduated or the results may be read simply by comparison.

You now have such a flask with an elongated neck as is figured in the text-books, but with the advantage that, the neck being in two pieces, the potash can be introduced in the manner described with the greatest ease. As the carbon dioxide is evolved, it, of course, sinks and is absorbed by the alkali, the diminution in volume of the air within the flask being shown by the corresponding rise of the mercury in the neck. The tube being graduated, this absorption can be readily observed and noted.

The apparatus is so simple and so quickly and cheaply put together, that several may be set up side by side for comparison of the respiration of different plant organs under different conditions. There are certain errors to be guarded against. The rise of the column within the neck should be read from the mercury surface and not from that of the potash above it, since the latter absorbs water as well as carbon dioxide. Great change of temperature should also be guarded against, since it alters the volume of gas within the flask, and to this the apparatus is very sensitive. If the volume of the flask and neck, less the contents, be taken, the proper correction for temperature variation may be applied. There is also an error introduced by the variation of vapor tension due to the possible change of the moisture in the enclosed air, but this is not considerable. Such a union by a ground joint is vastly to be preferred to cutting off the flaring mouth of the flask and uniting it to a tube by a rubber joint. The manipulation of a rubber tube of such size and under such conditions is annoying in the extreme. The ground joint prepared as above and well sealed with vaseline has proved itself to be entirely air-tight.

THRIVING UNDER DIFFICULTIES

BY DAVID GRIFFITHS

A sewer pipe three feet underground is not only uninviting but rather an unusual object of botanical study. Yet associated with such a structure on the campus of the University of Arizona, the workmen uncovered one of the most interesting struggles for ex-

istence the writer has seen for some time. The sewer system, which was put in eight or ten years ago, is of a most primitive character, being simply a drain pipe leading from the laboratories into a small ravine which finally finds its way into the Santa Cruz. The pipe consists of short sections of tiling, with no shoulders, placed end to end as closely as circumstances would permit, no cement at all being used on the joints. This pipe was laid about three feet under the surface through a hard calcareous subsoil commonly designated by the Spanish name, *caliche*. After the pipe was placed in position the trench was filled with the white hard chunks of *caliche* together with pieces of brick and scraps of iron and tin, refuse from the construction of the building.

This pipe recently became clogged, necessitating the removal of a large portion of the tiling. While the laborers were excavating, they discovered, just above the pipe and running parallel with it, an unusually large contorted root which excited their curiosity. This proved upon examination to be the root of a Virginia creeper situated at a distance of nine feet from one end of the trench. It had followed the wall of the building as far as the tiling, turned an obtuse angle and then proceeded to follow the pipe across the campus. The débris and hard masses of *caliche* caused it to become exceedingly twisted and contorted, but strange as it seemed to me the contortions were mainly in one plane approximately parallel to the surface. In no instance was the root in actual contact with the pipe, but it followed directly above it at a distance of one to two inches. Laterals, however, were freely given off toward the pipe and in two instances small roots were found actually entering between the joints of the tiling and projecting into the lumen.

The clogging of the pipe was due in a very large measure to the entrance of the roots of plants which penetrated mainly from the top and sides, forming dense mats around all the crevices. All roots, whether isolated or in clusters, were imbedded in a black slimy deposit characteristic of such locations.

There is nothing surprising in the fact that roots in this arid region should penetrate into such a structure as that described

above in search of moisture ; but when we remember that this small pipe, four inches in diameter, drains two chemical laboratories running at their full capacity during the entire school year, a different aspect is placed on the phenomenon. No less than 150 pounds of sulphuric acid alone pass through the pipe during the year. Of course there are solutions of other acids and salts in corresponding quantities. At certain times in the year and indeed at different hours of the day, solutions of poisonous chemicals of considerable density must pass down this pipe and bathe the roots which project into it.

There are probably two reasons why the large root of the Virginia creeper should follow the pipe. It found along this path considerable moisture and but slight resistance compared with the hard undisturbed *caliche* on the outside of the trench. But since we are naturally led to suppose that its main object was a search for water, we may inquire why it did not follow the pipe closely instead of remaining at a distance of one to two inches. The probable explanation for this is that it kept a safe distance from the poisonous chemicals which flow down the pipe and that the small quantities which ooze through the loose joints are reacted upon to some extent by the soil which renders them less harmful. Possibly the laterals which entered the pipe did so at a time when the quantity of chemicals in solution was at a minimum, as is the case during the summer months. One of the rootlets which entered the pipe a distance of half an inch was in apparently a perfectly healthy condition but the other which entered a distance of fully an inch had its end blackened and dead.

The roots which formed a mat around the joints and were the chief agents in clogging the pipe proved to be those of Bermuda grass (*Capriola Dactylon*) a plant which does not appear at all choice with reference to what it drinks, for it is known to thrive in the Southwest in localities where alkali is very abundant. Among other plants growing in the vicinity and which doubtless contributed to some extent to the clogging may be mentioned burr clover, alfalfa and rescue grass.

SYNONYMY OF BURMANNIA AND GYROTHECA

BY ROLAND M. HARPER

A few weeks ago I had occasion to look up the synonymy of *Burmannia capitata*, one of the plants I collected in Georgia last summer, and found the following facts of interest in connection with it.

In Heller's Catalogue of North American Plants, both editions, the name of this species is cited as *B. capitata* Chapm. But Dr. Chapman was not the original author of the species, for in his Flora of the Southern States, all editions, he gives as a synonym *Tripterella capitata* Mx. Michaux based his species on *Vogelia capitata* Gmel., and Gmelin refers to "Walt. flor. carol. p. 69," where our plant seems to have been first described, under the name of "*Anonymos capitat.*"

Having traced the origin of the name back to Walter, it then occurred to me that Dr. Morong a few years ago had published the combination *Gyrotheca capitata*,* based on this same *Anonymos capitat.* of Walter. On examining Walter's description, I noticed that it applied undoubtedly to our *Burmannia*, and had nothing whatever to do with *Gyrotheca*. But on the opposite page (68) I noticed an *Anonymos tinctori.*, the description of which clearly applies to our *Gyrotheca*, and the cause of the trouble at once became evident.

It appears that Dr. Morong in some way got the two names confused, for he says: "It is a little singular that Walter's specific name has been changed into 'tinctoria' by all the writers who have quoted him, from Pursh to Kuntze. The plant is placed by Walter among his 'Anonymo' genera, the term he uses when he is doubtful about the genus, but his description is so full that no one can doubt what is meant." He then cites the correct page, 68, but gives the wrong specific name, *capitata*.

This error seems to have passed unnoticed ever since, having been taken up in the "List of Pteridophyta and Spermatophyta growing without cultivation in Northeastern North America"

* Bull. Torr. Club, 20: 472. D. 1893.

(Mem. Torr. Club, 5), Britton and Brown's Illustrated Flora, Rhodora (1: 68), Heller's Catalogue, and other publications.

In the Kew Index, Walter's *Anonymos capitata* is correctly referred to *Burmannia*, and the authorship of the combination *Burmannia capitata* is credited to Martius.

The correct synonymy of these two species is then as follows:

BURMANNIA CAPITATA (Walt.) Mart. Nov. Gen. et Sp. Pl. Bras. 1: 12. 1824.

Anonymos capitata. Walt. Fl. Car. 69. 1788.

Vogelia capitata Gmel. Syst. 2: 107. 1791.

Tripterella capitata Mx. Fl. Bor. Am. 1: 19. pl. 3. 1803.

GYROTHECA TINCTORIA (Walt.) Sal. Trans. Hort. Soc. 1: 327. 1812.

Anonymos tinctori. Walt. Fl. Car. 68. 1788.

Dilatris tinctoria Pursh, Fl. Am. Sept. 30. 1814.

Lachnanthes tinctoria Ell. Bot. S. C. & Ga. 1: 47. 1816.

Gyrotheca capitata Morong, Bull. Torr. Club, 20: 472. 1893.

Several other synonyms for the latter are given in Dr. Morong's paper.

COLUMBIA UNIVERSITY.

TRANSPIRATION OF RUST-INFESTED RUBUS

BY FREDERICK H. BLODGETT

On May 23d last, two branches of *Rubus* sp. were cut from adjacent plants. The branches were as nearly alike in size and number of leaves as possible, but one was healthy, the other badly rusted (with *Gymnoconia interstitialis*). Fifteen minutes after cutting they were placed in water. Each had wilted somewhat, especially in the new growth of which there were several inches on each branch. The rusted branch was wilted considerably more than the healthy one. The healthy specimen revived when placed in water, the rusted one continued to wilt, the basal leaves only showing any tendency to recover.

On the 24th the test was repeated in a more careful manner. The two branches bore the same relation to one another as before, but they were placed in water immediately upon cutting.

The leaf surface was slightly greater in the healthy specimen, as the normal leaves were larger than the rusted, but the number was nearly equal in the two specimens. Large test-tubes were used, in which the branches were left tightly corked over night. When examined on the morning of the 25th the healthy branch was not wilted, the rusted one was considerably so. The rusted specimen evaporated 42 cc. while the healthy specimen evaporated 23 cc. of water under parallel conditions.

Thus the branch with the rusted leaves absorbed nearly twice as much water as the healthy branch, and yet failed to remain unwilted. The rust covered the lower surface of nearly all of the leaflets almost completely, and the extra demand for water thus imposed upon the plant was equivalent to doubling the leaf surface, as indicated by the volume of water transpired.

NEWS ITEMS

Professor A. S. Hitchcock, of the Kansas Agricultural College, has been appointed Assistant Agrostologist of the Department of Agriculture in the place of Thomas A. Williams, deceased.

A revision of the Crotons of the United States by A. M. Ferguson has recently been issued as a separate from the Twelfth Annual Report of the Missouri Botanical Garden. Twenty-six species and several varieties are described, most of which are also illustrated.

The Yale Summer School of Forestry will hold its sessions this year at Grey Towers, the estate of Mr. James W. Pinchot, near the village of Milford, Pike Co., Pennsylvania. The instruction will be under the charge of Professor Henry S. Graves and Professor James W. Toumey.

Mr. Percy Wilson, Museum Aid at the New York Botanical Garden, has been sent with the Solar Eclipse Expedition, under the direction of Professor David P. Todd, of Amherst College, to the Dutch East Indies, for the purpose of securing museum specimens, living plants and seeds. He sailed on March 2, by way of the Suez Canal, for Singapore.

One of the latest results of the remarkable activity of American mycologists and mycophagists is "The Mushroom Book" by Miss Nina L. Marshall. It is expected that a review of this will appear in an early number of *Torreya*.

Mr. George V. Nash, Head Gardener of the New York Botanical Garden, has gone to the Royal Gardens, at Kew, England, on the invitation of the Director, Sir W. T. Thiselton-Dyer, for the purpose of selecting duplicate living plants from the Kew collections and shipping them to New York. Mr. Nash will also carry out some studies on grasses in the Kew herbarium.

Five of the papers presented at the meeting of the fern students held in New York City on June 27, 1900, under the auspices of the Linnaean Fern Chapter, have been published by the Chapter in pamphlet form under the collective title of "Fernwort Papers." They are: "The Genus *Isoetes* in New England," by A. A. Eaton; "The system of Ferns proposed in 'Die natürlichen Pflanzenfamilien,'" by Lucien M. Underwood; "Experiments in hybridizing Ferns," by Margaret Slosson; "Athyrium as a Genus," by B. D. Gilbert; and "On the Occurrence of the Hart's-tongue in America," by William R. Maxon.

The announcement for the fourteenth season of the Marine Biological Laboratory at Woods Holl, Massachusetts, has recently been issued. The season extends from Wednesday, July 3, to Wednesday, August 14, 1901. The botanical staff consists of Dr. Bradley Moore Davis, Instructor in Botany, University of Chicago; Dr. George T. Moore, Instructor in Botany, Dartmouth College; Dr. Rodney H. True, Lecturer in Harvard University; Dr. Charles H. Shaw, Professor of Botany, The Temple College; Mr. Anstruther A. Lawson, Fellow in Botany, University of Chicago; and Miss Lillian G. MacRae, Curator and Collector in Botany. Copies of the announcement may be obtained of Dr. Bradley M. Davis, University of Chicago.

TORREYA

April, 1901

NOTES ON THE BOLETI OF WEST VIRGINIA

BY HENRY C. BEARDSLEE

Brookside, West Virginia, is situated in the heart of a mountainous region at an altitude of 3,100 feet. Its surface is much varied and presents all the conditions for an abundant fungus flora, which it was the writer's good fortune to study during the past summer.

Many of the species observed were of great interest to a northern botanist; the Boleti, especially, presenting many forms which are either rare or unknown to our own State of Ohio. In all, nearly forty species were observed. Many of these were common and well known to all students of the group. Some, however, were comparatively rare, and the following notes in regard to them have been collated, as of possible interest to students in other regions.

Boletus auriflammeus B. & C. was one of the first species of interest to be observed. Like all the Pulverulenti, it is very rare, but as all three of our species were originally discovered in the Carolinas, it was with more of pleasure than surprise that it was observed in West Virginia. It grew by preference in dry gravel high on the mountain-sides, and was remarkably arid, being less perishable than any other species observed. • It is a small plant, bright golden yellow in color, and thickly covered with a yellow powder, which disappears with age. This powder in the younger plant colors the mouths of the tubes, giving them a distinct orange tint, which contrasts plainly with the remainder of the tubes.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 3, comprising pages 25-36, was issued March 25, 1901.]

This would seem to explain the reference, in the original description, to the scarlet mouths of the angular tubes, which certainly does not otherwise apply to our plant.

Boletus Ravenelii B. & C., another member of the *Pulverulenti*, was rather more common than the preceding species and almost as striking. It was frequently found with its large fluffy veil intact, and thickly covered with its sepia-brown spores. Its slender flexuous stipe was a marked characteristic of the form at Brookside.

Boletus cyanescens Bull. has been considered a northern species, but it was not rare along the mountain roads. The first specimen observed was just emerging from the bare soil on the roadside. Its yellow tomentum was so characteristic and its appearance so distinct that it was visited daily as it slowly developed, though with no suspicion of its identity. It was afterward found fairly abundant, but always in the clay-banks, along the roads, with which its grayish yellow color harmonized perfectly.

Among the rosy spored species *Boletus alutarius* Fr. and *Boletus nigrellus* Pk. were the most interesting, and *Boletus gracilis* Pk. the most abundant.

Boletus nigrellus Pk. was observed in all its stages and differed so widely from the original description, that it seemed at first distinct. It was at first "blackish" in color, but soon changed to a sordid gray. Its flesh, however, was decidedly not "white and unchangeable," as the entire plant, when handled or bruised, blackened rapidly, the dried specimens being inky black. Professor Peck, who has examined my specimens, pronounces them identical with his species, so that it is evident that the original description must be modified.

Boletus alutarius Fr. grew all summer in turf beneath the same chestnut tree, where it was kept under observation. It is an attractive plant, unlike any of its relatives. In its earlier stages it has a distinct pubescence, but it becomes quite smooth with age.

Peck's two fine species, *Boletus separans* and *Boletus eximius*, were generally distributed on the hillsides, but neither was common. *Boletus eximius* Pk. fell far below the huge dimensions of this species as we have found it in Maine.

Boletus edulis Bull., to our great surprise, was scarcely seen all summer. *Boletus affinis* Pk. was abundant everywhere.

The two species which were most abundant were *Boletus chromapes* Frost and *Boletus bicolor* Pk. The latter species was particularly common along the sandy roads, where its dark red pilei might be seen often in large clumps attracting the eye of every passer-by.

CLEVELAND, OHIO.

REMARKS ON THE USE OF FUNARIA HYGRO- METRICA IN BOTANICAL TEACHING

BY MARSHALL A. HOWE

The common cord-moss (*Funaria hygrometrica*) figures so prominently in well-known botanical text-books that little or nothing needs to be said as to the characters by which it may be recognized. It may be remarked, however, that this moss grows by preference on moist sandy soil in either open or lightly shaded places and that it thrives with special luxuriance where such soil has been recently burned over. Though the leaves of the living *Funaria* have long been famed for the beauty and clearness with which their chloroplasts are exhibited, the gametophyte, on account of the shortness of the stem, is perhaps not so well adapted for general study in the laboratory as is that of some of the larger mosses like the Mniums. Yet, for spring classes, *Funaria* may be relied upon to furnish material for the demonstration of living spermatozoids. The clusters of antheridia may be recognized in the living plants with the naked eye or with the aid of a hand lens. They are of a yellowish or brownish color owing to changes in the chloroplasts of the cells composing the walls of the maturing antheridia, and each cluster is surrounded by leaves in such a way that the whole is rosette-like in form. In the region of New York, the antheridia are mature late in April or early in May. As in dealing with fern prothalli, the spermatozoids are set free with greater certainty if the plants are kept rather dry for a day or two before the antheridia are brought into a drop of water for examination.

But certain characters of the sporophyte, notably the beauty of the peristome and the ease with which it may be made to illustrate the hygroscopic nature of moss peristomes in general, are what especially commend *Funaria* for use in botanical instruction. It is, I believe, a sound principle in the pedagogics of natural history to select illustrative material now and then which is bound to excite the interest and admiration of the most indifferent pupil. It can be readily understood that in its abuse this motive might lead to a selection which would interfere with a proper perspective of the subject as a whole, but, in the present case, the features in which the peristome of *Funaria* differs from the type most common in the mosses are of little importance to the general student.

For the best demonstration of the workings of the peristome, the plants should be collected and dried when the capsules are mature and brown and a little before the opercula are ready to fall, which, in the neighborhood of New York, is mostly in June and July. In this dried condition, they may be preserved indefinitely. When the study of the matured sporophytes is begun, some of them, still attached to the gametophytes, may be placed in a glass of water and the student's attention directed to the untwisting of the seta as it absorbs the water. Then, on holding one of them in the air a few moments, the seta is seen to twist again. These movements of the seta under changing conditions of moisture were, with little doubt, what suggested the specific name *hygrometrica* to Linnaeus. Finally, the probable relation of these movements to the dispersal of the spores may be suggested to the student if he fails to think of it himself. The amount of soaking required to remove the operculum depends largely on the degree of maturity of the capsule at the time of gathering. The act of throwing off the operculum and the relation of the annulus to the process can best be observed if a few capsules are placed in a large drop of water on a glass slide or in a shallow watch-glass. After the removal of the operculum and annulus, the capsule may be allowed to dry and if it can then be balanced on its back with the mouth directed upward, the peristome as a whole may be examined to advantage by reflected light under the ordinary lower powers of the compound microscope.

If the peristome is in a normal condition, it will be found to be extremely sensitive to changes in moisture, responding perhaps to the ordinary breathing of the observer or at least to a gentle blowing. As in mosses in general, the teeth draw inward and close together on absorbing moisture and execute the reverse movements on drying. The equilibrium of a capsule balanced in the manner described is unstable at best, but it can be easily rendered stable and permanent by the use of various adhesives. Professor Francis E. Lloyd suggested to the writer the use of paraffin for this purpose and this has proved a convenient medium. A very small quantity of paraffin is melted on a glass slide and the capsule is placed in contact with it and held in position, mouth upward, until the paraffin hardens. Preparations made in this way may be laid aside for future use. The matured capsule, peristome, annulus, etc., may of course be subjected to further study in the usual manner, not neglecting the important fact of the presence of stomata, which may be found near the base of the capsule.

Formalin-preserved material of *Funaria* with young sporophytes is valuable, among other things, for demonstrating the structural independence of gametophyte and sporophyte. With the right kind of a pull, the young sporophyte may often be separated from the gametophyte in such a way that a microscopical examination of its foot will show that the act was accompanied by no rupture of cells. But for this special purpose *Funaria* is perhaps no better than many other mosses.

SHORTER NOTES

A NEW HAWKWEED FROM FLORIDA.—Contained in an interesting collection of plants made in the vicinity of Tallahassee, Florida, by Mr. N. K. Berg, and received from him several years ago by Dr. Small, is a single well-preserved specimen of a hawkweed which differs widely from any species known to me, and I can find no plant described which answers to its peculiar characters. In a genus of so many species, and these so very widely distributed there is chance that this plant may have been recorded

by some previous author, but this chance is not very great, for the North American species have been considerably studied, and doubtless most of the forms deserving recognition as species are fairly well understood. The plant may be characterized as follows:

Hieracium Floridanum. — Stem tall, stout, villous-hirsute below the middle, over 1 m. high, paniculately branched above the middle, the branches slender, erect-ascending; no basal leaves at flowering time: stem leaves broadly oval to elliptic or ovate-oval, firm, the lower 9 cm. long, 4-5 cm. wide, rounded at the apex, subcordate-clasping at the base, loosely villous-hirsute on both sides, entire, with numerous minute glands on the margins, the upper leaves gradually smaller, the uppermost acute: panicle 6 dm. long or more, naked, ample, its branchlets glandular; heads very numerous, 20-25-flowered; involucre 8 mm. high, its principal bracts in one series, linear, acutish, glandular, the much shorter outer ones triangular-lanceolate, acuminate or acute: achenes columnar, 4 mm. long, truncate, slightly narrowed above, a little shorter than the brown pappus.

The sessile half-clasping leaves extend down the stem to the fourth node above the mass of fibrous roots. They are very numerous and the internodes not over 2 cm. long. From the character of the achenes the species is apparently more nearly related to *H. Marianum* than to any other North American plant.

—N. L. BRITTON.

A NEW ARNICA FROM OREGON.—**Arnica aurantiaca.** Sub-alpine, low, forming dense patches, the simple monocephalous stems 2-6 inches high from horizontal rootstocks: leaves in about 3 pairs, the lowest broadly oblong, obtuse, the others broadly lanceolate, attenuate-acute, all entire, glabrous or nearly so, except the woolly-ciliate margin: slender peduncle sparingly woolly-hairy and minutely glandular: involucre broadly turbinate, its thin lanceolate bracts about 10, scarcely biserial, narrowly lanceolate, woolly at base, the margins obscurely glandular-ciliolate: flowers both of ray and disk orange-color: achenes silky-villous: pappus white, barbellulate.

At the head of Keystone Creek, Wallowa Mountains, Oregon, at about 7,000 feet, Aug., 1900, W. C. Cusick. A small sub-alpine species, uncommonly well marked by its deeply colored flowers, and silky achenes.

ARNICA CROCINA is a name to be assigned the *A. crocea* of Pittonia, 4: 159, in view of the fact that the Linnaean name of

what has since been transferred to *Gerbera* was *Arnica crocea*.—

EDWARD L. GREENE.

A NEW PANICULARIA.—**Panicularia Holmii.** A pale perennial 25–50 cm. high, spreading by rootstocks: leaves 4–6, scabrous; the upper ligule 5–7 mm. long; blades flat, acuminate, 4–12 cm. long, 4–7 mm. wide: panicle open, lax, 5–8 cm. long, rays in pairs, the longest 4–5 cm. long, bearing about 20 spikelets on the outer half: spikelets 2–3-flowered, joint of rachilla 0.5 mm. long; first empty glume hyaline, ovate, 1 mm. long with one obscure nerve; second, hyaline, oval, 1.3 mm. long with three obscure nerves: floret scabrid, oblong, 2–2.2 mm. long, floral glume broadly oval when spread, 5-nerved, apex subtruncate, irregularly toothed; paler while attached, extending to the apex of its glume: grain elliptical, 1 mm. long, base acute, apex truncate.

Near to *Panicularia pallida*; the blades wider, spikelets mostly 2-flowered, empty glumes shorter, floret shorter, floral glumes 5-nerved instead of 7-nerved.

Growing in a creek at a beaver-dam in dense thickets of *Salix*, near Lamb's Ranch at Long's Peak, Colorado; altitude, 8,600 feet.

No. 249. Collected by Theo. Holm, July 8, 1899, for whom it is named.—W. J. BEAL.

NATURALIZED OR ADVENTIVE NARCISSI.—Mr. C. L. Gruber writes as follows from Kutztown, Pa. "I have repeatedly found two species of *Narcissus* running wild, escaped from cultivation: *Narcissus Pseudo-Narcissus* (daffodil) and *Narcissus poeticus*. *Pseudo-Narcissus* I have found at a number of places, usually on warm slopes of meadows, in the vicinity of gardens; and *N. poeticus* I have found in meadows, unused portions of cemeteries and on one occasion in an orchard adjoining a garden."

REVIEWS

MYCOPHAGY AND ITS LITERATURE

Some five years ago an extensive interest began to be displayed in this country toward the subject of edible fungi. It is probable that a part at least of this interest was stimulated

through the influence of William Hamilton Gibson's popular articles and illustrated work,* and the interest was increased by the publication of the special edition of the report of the State Botanist of New York for 1894 † with numerous colored plates of edible and poisonous fungi. It was thought that the fad would soon die out, but, instead, the mycological clubs seem to be growing larger and the interest in their gatherings does not appear to show any signs of abating. It was further hoped that this widespread interest in this neglected group of plants would stimulate some to take up a scientific study of the fleshy fungi, but while a very few have made slight contributions, the many desiring entertainment rather than severe study, have contented themselves to remain mere mycophagists instead of taking mycology too seriously. To appeal to this latter class of readers, four works have recently appeared. That they all appeal to eye and stomach as well as brain is evidenced by their profuse illustration, their chapters on how to cook the delectable mushroom, as well as by their assumption of scientific or pseudo-scientific diagnoses.

Of these books, two may be quickly dismissed. The modest little work of Misses Dallas and Burgin ‡ purports mainly to give the beginner in the study of the larger fungi the results of the recent field experiences of its authors. The ponderous volume by McIlvaine §, while it will doubtless prove the most useful of the entire series because of its covering a much wider range of descriptions of species than any of the others and freely quotes descriptive matter from original sources, is more or less uncertain and unreliable because one is often left in doubt where the quota-

* GIBSON. Our edible Toadstools and Mushrooms and how to distinguish them. 8vo. New York, 1895.

† PECK. Annual Report of the State Botanist for 1894. 4to. Albany, 1897.

‡ DALLAS & BURGIN. Among the Mushrooms. $7.5 \times 5 \times 0.875$ in. Pp. xi + 175. With 11 full-page plates, two colored, the others half-tones. Weight 15 oz. Drexel Biddle, Philadelphia. 1900. Price, \$1.50.

§ MCILVAINE. One thousand American Fungi. How to select and cook the Edible; how to distinguish and avoid the Poisonous. $11.25 \times 8.25 \times 3.5$ in. Pp. xxxvii + 704. Illustrated with 193 "plates" of which 128 are simple text figures, thirty are full-page diagrams or half tones and thirty five are colored. Weight, 122.5 oz.—about that of a Winchester repeating rifle. Bowen-Merrill Co., Indianapolis. 1900. Price, \$10.00.

tions end and the less reliable remarks of the author commence. As a work intended for practical use it is a clumsy product of the bookmaker's art* as wretchedly adapted to its purposes as any botanical work that the past century produced.

The other two works however are the ones between which the mycophagic public will be more likely to choose, for at this public it is evident that their respective authors have clearly aimed. Of the two, Professor Atkinson's work † is more technical, for it is not easy for the professional botanist to lay aside the technicalities of his office in appealing to a popular audience. Yet a mixture of too technical science and recipes for cooking jars one's sensibilities of congruity, seeming to bring the kitchen in too close proximity to the laboratory. The work is admirably illustrated with photographs in half-tone and seven colored plates. The cover ill accords with the contents and the paper used is of the glossy clay-covered form so common in our time, which serves to bring out the half tones well, but ill comports with fine bookmaking and lessens the prospect of durability. The descriptions are very complete and accurate, giving details that were evidently drawn from long and close acquaintance with the specimens in their native haunts.

The work by Miss Marshall ‡ is a practical well-written text shorn, as far as possible, of technicalities, prepared to accompany reproductions of what are without question the finest series of fungus photographs that have been produced. These were made by Mr. J. A. Anderson, of Lambertville, New Jersey, and colored

* In quoting titles of books hitherto it has usually been sufficient to mention the superficial area of the cover. As these works ought to be such that they can be used afield, it is thought desirable to add the third dimension so that bulk may be computed, as well as the important consideration of weight.

† ATKINSON. *Studies of American Fungi*. Mushrooms, edible, poisonous, etc. 10 × 6.5 × 1 in. Pp. vi + 275. Illustrated with 223 figures, 76 of them full-page plates, seven colored. Weight, 38.5 oz. Andrus & Church, Ithaca. 1900. Price, \$3.00. Reviews of this book by its own author appear in *Science*, 23 N. 1900, and in *Popular Science Monthly*, F. 1901.

‡ MARSHALL. *The Mushroom Book*. A popular Guide to the Identification and Study of our commoner Fungi with special Emphasis on the edible Varieties. 11 × 8 × 1.25 in. Pp. xxvi + 167. Illustrated with forty eight full-page plates, twenty four of them in colors, and numerous text illustrations. Weight, 42 oz. Doubleday, Page & Co., New York. 1901. Price, \$3.00.

by his daughter, Miss H. C. Anderson. Twenty four of these have been reproduced in color, none of which equal the superb originals, though a few, like those of *Amanita muscaria*, *Pholiota adiposa*, *Boletinus pictus*, and *Phallus*, approach them. Others like *Tricholoma personatum* and *Clavaria formosa* are too highly colored and the defective reproduction of backgrounds in some cases detracts from the good illustration of the fungus itself. The work makes no claim to be coldly scientific but depends for its technical descriptions on those who have originally made them. As a piece of artistic bookmaking the Mushroom Book shows superior workmanship. Fine quality of paper, excellent printing, and plain but effective cover make the work attractive externally and internally, while its clear and simple text is not aimed above the heads of the audience to which it primarily appeals.

In both works are occasional slips of the pen and verbal inaccuracies which future editions will doubtless correct. Through both it becomes clearly evident that the camera is the scientific instrument by which we must attack the problem of bringing to the laboratory the characters of the perishable fleshy fungi.

But after all that is said, for the practical purpose for which these books are intended, namely the enlightening of unscientific people as to what are edible and what are poisonous fungi, none of the American books yet touch the standard* set by the Germans at half the price, where in place of attempts to force science on unscientific minds, in place of heavy books adapted best for library tables, we have fifty-six colored plates (nearly all of which are of species as common in America as in Europe) put up in a form adapted for the pocket and for work afield, with plain descriptions of the fungi one is sure to meet with in the field and forest, and with no entanglements of rare or new species or elaborate keys and array of technicalities; for after all the mycophagist must learn edible fungi as he learns garden vegetables—by sight—and then eat them by faith!—LUCIEN M. UNDERWOOD.

* MICHAEL. Führer für Pilzfreunde. 8.25 × 5.5 × 0.5 in. Pp. xi+31. With 56 colored plates with descriptive text opposite each for ready reference. Weight, 11 oz. Zwickau, 1897. Price, 6 marks (\$1.50).

CORRESPONDENCE

"A SIMPLE DYNAMOMETER"

In the first number of *TORREYA*, Dr. H. M. Richards describes briefly "a very simple machine for registering approximately the amount of energy involved" in imbibition.* Passing over the terms here used (to which the physicist would take serious exception), it is obvious that the force of imbibition cannot be measured by the arrangement described. Dr. Richards has apparently confused the *force* of imbibition with the *extent* of swelling. The attraction in virtue of which water is imbibed, being probably molecular or analogous thereto, is not dependent on the number of organized structures (such as cell-walls) involved, but the extent of the swelling is. The scale in the arrangement suggested registers not force but *distance in terms of weight*. To illustrate: If the bottle contained only one layer of peas the scale might register a quarter of an ounce, since the distance through which the pan would be depressed might equal the depression which that weight would cause in the particular spring used (a weak one). If the bottle were nearly filled, however, and the peas did not jam but moved freely upward as they swelled, the scale might register half a pound. Yet the actual force of imbibition in the two cases would be exactly the same, and vastly greater than either registration. Evidently also the result would be wholly different with a very strong spring, an equal depression corresponding perhaps to 100 lbs.

The same objection would lie against the use of the scale for measuring the force exerted in growth.

It may be worth while, further, to call attention to the fact that a like error inheres in all methods of measuring the force of root-pressure in decapitated plants when a large open tube is used as a manometer.† To a less extent this objection applies also to open mercury manometers.—C. R. BARNES, *University of Chicago*.

* Richards, H. M. A simple Dynamometer. *Torreyia*, 1: 8. Ja. 1901.

† Atkinson. *Elem. Bot.* 32, and *Lessons in Botany*, 51. Here, regarding a device recommended by Detmer merely to demonstrate the outflow of sap, it is said, "The height of this column of water is a measure of the force exerted by the roots."

“A SIMPLE DYNAMOMETER”

In reply to the above criticism by Professor Barnes the undersigned would say that it was not his intention that anyone should interpret the method described as a way to estimate the total imbibition force in all directions: but it is hardly possible, of course, to make an experiment absolutely safe against misunderstanding. The apparatus described by MacDougal* is about the only one which will adequately represent this force. In this method enough seeds are used so that the total thrust of expansion is delivered within the range of the manometer. With proper precautions however the apparatus described as “a simple dynamometer” may be made use of for a comparative study of the force of imbibition in one—the vertical direction. The precaution is a simple one, namely that the scale be not overloaded, or in other words that the amount of material used be coördinated with strength of the spring. In common with other apparatus of this type the critical point at which overloading begins can only be determined by empirical experimentation.

The same objections as those brought forward by Professor Barnes could also be made to Pfeffer’s spring dynamometer† or indeed to the common lever dynamometer if the same precaution is neglected. The apparatus described by Detmer‡ is in effect much the same, and the results obtained by it could also be rendered of small import if a two gram instead of a two hundred gram weight were used on the platform.

It should indeed have been stated that it was a “2 lb.” letter scale which was used. The weaker scales might serve for indicating force exerted by the downward growth of certain roots; ones in other words which were adapted to the strength of the spring within the scale.—HERBERT M. RICHARDS, *Barnard College*.

* Journ. N. Y. Bot. Gard. 2: 39. Mr. 1901.

† Druck und Arbeitsleistung durch wachsende Pflanzen p. 18 et seq. Leipzig. 1893

‡ Practical Plant Physiology (translation), 142.

TORREYA

May, 1901

A NOTE ON THE BLADDER KELP, NEREOCYSTIS
LÜTKEANA

BY W. A. CANNON

One of the most interesting forms of the West Coast marine algae is the bladder kelp (*Nereocystis Lütkeana* Post. & Rupr.). This is closely related to the giant kelp (*Macrocystis*), to the sea palm (*Postelsia*), to the devil's apron (*Laminaria*), and to other forms which are familiar to all frequenters of the coast of middle California.

In these algae there is an interesting correlation between the environment and the structure and certain other peculiarities of the plants. They not only vary in the length of the daily exposure to the air, but, in addition, they occupy a varying position with regard to the impact of the waves. The bladder kelp is normally never out of the water, while the sea palm is regularly exposed to the drying influence of the atmosphere, and the other kelps vary between these extremes. The different relation of these forms to the waves, which will be spoken of later in this sketch, is presumably the basal cause of a certain and unexpected weakness of the stem of *Nereocystis*, as well as accounting for the great mechanical strength of the stem of *Postelsia*. The examination of other kelps would undoubtedly disclose quite as remarkable a connection between the plants and their individual surroundings.

The bladder kelp is light brown in color and somewhat translucent. It is said to reach a length of 300 feet and is therefore to be reckoned as one of the largest marine plants. The blad-

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 4, comprising pages 37-48, was issued April 19, 1901.]

der kelp grows near shore attached to the sea bottom and reaches to the surface of the water, upon which the larger part of it floats. The plant may be divided into three main regions: a holdfast, a stem, and a crown. The holdfast is made up of root-like processes which attach themselves to the rock, or to a fragment of rock, and they form a body that may reach a diameter of two feet or so. The holdfast is so securely attached to its foundation that, if it is a boulder, the rock in a storm may be dragged by the kelp from its bed to a place high on the beach.

The stem of this kelp is for the most part hollow and of variable diameter. Where the stem leaves the holdfast, it is less than an inch in diameter, and it gradually increases the diameter until, at a place just below the free end, it may be three or more inches in transverse section. The stem ends in an enlargement, beneath which it is somewhat constricted, and to the oblong enlargement the name of bladder or cyst is given. The bladder is hollow and its cavity is continuous with that of the stem. The cyst may attain a length of eight inches, although commonly it is considerably less. The wall of the stem, where it is hollow, and of the cyst is about half an inch in thickness.

The crown is composed of two groups of leaves or sporophylls attached to the free end of the bladder. They are entire and leathery, and like the rest of the plant, are smooth. The leaves vary much in length but seldom exceed three feet, and in the plants examined they are on the average one inch wide, tapering somewhat toward the end. They bear, in certain areas called sori, masses of asexual reproductive bodies. It need hardly be said that all of the measurements vary with the age of the plant. Those which I have given may probably be regarded as the maximum in the species as I have seen it. Much larger figures are given by observers farther to the northward.

The relation of the bladder kelp to the impact of the waves is such that it is subjected to stresses almost exclusively of one kind, namely, to pulls in a direction parallel to the long axis. The pounding to which some kelps, as for instance the sea palm, are subjected by the waves seems to be entirely wanting in the present case. The endeavor of the plant to keep to the surface of

the water, the level of which is perpetually changing, and the pulling action of the ebb and flow of the tide cause the free end to tug at the holdfast like a ship at anchor.

A few summers ago I wished to put up material of the "fruit" of *Nereocystis* for microscopical examination and for the purpose it was necessary to obtain fresh sporophylls. I found a place near the Hopkins Seaside Laboratory where the plants grew in abundance. They were out of reach from the shore by hand but I found that they could be reached with a long-handled gaff-hook. The attempt was made at first to pull from the water the smallest by placing the hook back of the bladder, but I was unable to get any plants in this manner. Next the hook was used as a hatchet in the hope that some of the leaves might be torn away, but they were so tough and smooth that this also failed. Finally, I tried to tear the cyst in two by striking the sharp hooks into it; much to my surprise the large bladders cracked across like the most fragile substance. I tried repeatedly blows of varying force and found that even a slight one was sufficient to break either the cyst or the stem. Through this unexpected weakness of the plant I had no difficulty in obtaining all of the sporophylls that were desired. It should be said that the plant loses this brittle character when it is exposed to the air.

In seeking for a cause of this mechanical weakness of the stem of the bladder kelp, *i. e.*, to its inability to withstand the stresses to which I subjected it, it occurred to me to compare the habitat of another form, as for instance the sea palm, with that of the bladder kelp and also the mechanical strength of the former with that of the latter. The sea palm was chosen because its habitat and habit are well marked and quite different from that of the bladder kelp. These will be considered very briefly.

The sea palm is usually about two feet high. Like the bladder kelp, it has a holdfast, a stem, and a crown of leaves or sporophylls. The stem is upright and quite independent of support from the water. The plant grows on sloping rocks between tide marks. The position of the sea palm is such that it is pounded with inconceivable force by the waves in the times of high seas, and always when the tide is in, it is subject to the

direct impact of the waves. There are several sorts of forces thus brought to bear upon the sea palm. The waves may strike the plant at right angles to the long axis, they may tend to crush the plant to the surface of the rock by their great weight, or they may exert a pulling force. And the plant has become a sort of living resultant of these forces.

To compare the two kelps with regard to the mechanical strength, I applied to the sea palm the same sort of blow that had been previously given to the bladder kelp. The result was what one would expect; it did not have the slightest effect. In addition, I found it quite impossible to wrench the kelps from their station, however hard I might try.

Briefly, it would appear then that the differences of the sea palm and the bladder kelp in habitat, more especially the difference in their exposure to the waves, go far to explain the differences which the plants themselves exhibit as regards mechanical strength, and, further, these plants appear to be able to withstand those stresses best which also occur among the conditions of their environment.

COLUMBIA UNIVERSITY.

THE NORTH AMERICAN TWINFLOWERS

BY P. A. RYDBERG

In all our manuals of botany, *Linnaea* is given as a monotypic genus, consisting of only *L. borealis* L. One variety has, however, been recognized by some botanists, viz., *L. borealis* var. *longiflora* Torr., described from the collection made on the Wilkes Expedition. This is found in the extreme eastern portion of Asia as well as on the American Pacific Coast from Alaska to California, and extends also into the Rocky Mountain region in British Columbia and Idaho. In connection with my work on the flora of the Rockies, I happened some time ago to look up the record of this plant. As a rule, it is easily distinguished from the common twinflower of the East and of the Rockies by its much longer leaves, especially on the flowering branches. In depau-

perate specimens this character is, however, not sufficient. I therefore looked for some differences in the flower.

In the original description and also in Gray's Synoptical Flora, the variety *longiflora* is said to have a longer corolla attenuate below into a distinct tube. I made a comparison with the eastern form and found that the flower of the Pacific Coast plant had a slightly longer corolla, but that our common twinflower had just as much a distinct tube as the other, but I found another character, viz., that the var. *longiflora* had about twice as long calyx-lobes. This character held in all American specimens. How in the European and west Asiatic? In them, the calyx-lobes were just between the two in length. But now I happened to make the most interesting discovery of all, viz., that all the latter specimens had a campanulate corolla without any indication of a narrow tube at the base. I then looked up illustrations of the European twinflower and found that the corolla there is figured as more campanulate, or short-funnelform without a distinct tube, while our American plant has rather a funnelform corolla with a short narrowed tube-like portion at the base, in fully developed flowers usually exceeding the short calyx-lobes. When the var. *longiflora* was described, it was evidently compared with the European species in which case the character of the corolla given above is the most prominent.

Being satisfied that our American twinflower really is distinct from the European, I tried to find if it had ever received a distinct name. I found that it had been named, in 1833, by Forbes in *Hortus Woburnensis*, page 135. His description is scarcely a description at all, for it does not distinguish the plant from *L. borealis*, the only character being orbicular shining leaves in contrast to oval. Undoubtedly his cultivated specimens had unusually broad leaves. There is, however, no doubt regarding the identity of Forbes's plant and our North American twinflower, which, therefore, should be known as *Linnaea Americana* Forbes.

The genus *Linnaea* contains consequently at least three species, viz :

Linnaea borealis L., of Europe and west Asia.

Linnæa Americana Forbes, of boreal America, extending south to New Jersey and Colorado.

Linnæa longiflora (Torr.) Howell (*L. borealis* var. *longiflora* Torr.), of western America and eastern Asia.

There seems to be still a fourth undescribed species, judging from rather fragmentary specimens from Kamchatka and neighboring islands. These have very small flowers and leaves, scarcely larger than those of the common cranberry.

SHORTER NOTES

A KENTUCKY CORNEL.—Several months since, Miss Sadie F. Price sent me flowering specimens of a *Cornus*, which she had found growing on river banks near Bowling Green. Later, at my request, she furnished me with fruiting specimens from the same locality. This material is, apparently, not referable to any species thus far described, and may hereafter be known as :

Cornus Priceae.—A branching shrub 1–2.5 m. tall, with red and finely pubescent twigs. Leaves numerous; blades elliptic to ovate-elliptic or ovate, 5–12 cm. long, rather leathery, usually acuminate, deep green and roughish-pubescent above, pale and more copiously, but rather softly pubescent and prominently veined beneath; petioles 1–2 cm. long, pubescent like the twigs: corymbs 2–3 cm. broad during anthesis, 4–6 cm. broad at maturity: peduncles and pedicels closely and harshly pubescent: sepals triangular: corolla white, about 7 mm. broad: petals 4, oblong-lanceolate to linear-lanceolate: filaments slightly shorter than the petals: drupes about 3 mm. in diameter, subglobose, white; stone about 2 mm. in diameter, scarcely longer than broad, faintly pitted.

On bluffs of the Barren River, near Bowling Green, Kentucky. The species flowers late in the spring and matures its fruit about the middle of the summer. The fruiting specimens I have were collected on July 27th. The specimens on which the species is founded are preserved in the herbarium of the New York Botanical Garden.

Cornus Priceae is related to *Cornus asperifolia* and *C. microcarpa*. Its leaves somewhat resemble those of the former spe-

cies, while its fruit is more like that of the latter, especially in size. The newly described species is peculiar in that it bears smaller fruit than any other North American cornel. Heretofore, *Cornus microcarpa* of the southeastern Gulf States was characteristic in bearing the smallest fruit, but the drupes of *C. Priceae* average about one third smaller and have a very differently shaped stone.—JOHN K. SMALL.

A NEW CRATAEGUS FROM WASHINGTON.—*Crataegus Piperi*. A much branched shrub 2–3 m. high. Bark of older stems light gray, that of the younger twigs brown, the lenticels conspicuous, the branches of the season and the inflorescence strigose-villous; thorns 3–5 cm. long, dark brown, shining, straight or nearly so, rather slender, somewhat reflexed: petioles 1.5–2 cm. long, bearing several glands; leaf-blades broadly oval in outline, sparingly strigose on both sides, dark and glossy above, paler and dull beneath, incised and doubly serrate at and above the middle, but merely serrate on the cuneate base; teeth sharp and gland-tipped; apex short-acuminate: corymbs 4–12-flowered; pedicels and hypanthium densely villous: sepals about 4 mm. long, prominently glandular-dentate: fruit spherical or nearly so, about 12 mm. in diameter, coral-red, sparingly pubescent even when mature.

On springy gravelly hillsides, Pullman, Washington, C. V. Piper, no. 1535 (type specimen in the herbarium of the New York Botanical Garden). Professor Piper writes that the foliage turns dull brown in autumn.—N. L. BRITTON.

CIRCAEA FRUIT DEVOID OF HOOKED BRISTLES.*—Several specimens of a smooth-fruited *Circaea* were found July 29, 1900, when a small party of us were collecting in some low woods, bordering Ten-mile creek, about three miles west of Toledo, Ohio. These plants enjoyed the same rich alluvial deposits with *C. Lutetiana*, which appeared in abundance.

Careful observation was necessary to detect the smooth-fruited form, and it seems likely that this plant is much more common

* One of the specimens mentioned by Mr. Burtlehaus was exhibited to the Club at the meeting of February 12, 1901. It is interesting as necessitating a modification of the characters of *Circaea*, the fruits being entirely smooth and glabrous. Otherwise, as Mr. Burtlehaus remarks, the plant is essentially identical with the North American *C. Lutetiana*; it also matches a specimen received by Dr. Torrey from Agardh, collected in Scania, Sweden, and named *C. intermedia*, but the true *C. intermedia* Ehrh., from Central Europe, is evidently different.—N. L. BRITTON.

than is supposed but is mistaken for *C. Lutetiana*, which it so closely resembles.—F. H. BURGLEHAUS.

THE MIGNONETTE AS CLASS ILLUSTRATION FOR ASCENT OF SAP.—The garden mignonette when in flower is a suitable plant with which to test the upward flow of liquid in cut stems, and by means of it, when the inflorescence is many inches long, the rate of ascent may, in some measure, be obtained without destroying the stem. This is because the petals are delicately fringed with white, and into these the liquid will pass and quickly show a beautiful color, whether blue, red, or other that may be used. The fine somewhat spatulate lobes of the corolla will first show the color in the main vein, but shortly after it will increase and become diffused throughout all the middle of the lobe, the outermost and purely cellular portion being the last to be tinged. Methyl-blue has proved the most striking color for class illustration.—BYRON D. HALSTED.

A RARE PLANT FROM WESTERN TEXAS.—Last summer, when collecting in western Texas, I found a parasite on *Dalea formosa*, which I took first, after a careless examination, for a *Cuscuta*. But in the winter, when I studied my plants from western Texas more carefully, I found that it was a very different plant and was more related to the Loranthaceae than to anything else. Lately I purchased the *Plantae Novae Thurberianae* and here I found my plant described by Dr. Asa Gray as *Pilostyles Thurberi* (now *Apodanthes Thurberi* B. & H.). This plant is the only representative of the Rafflesiaceae in the United States. It was first collected by Mr. Thurber on *Dalea Emoryi*, along the Gila River, in western Arizona.—HENRY EGGERT.

REVIEWS

THE GENUS LYCOPodium: A CRITICISM

BY FRANCIS E. LLOYD

The part of Engler and Prantl's *Die natürlichen Pflanzenfamilien* dealing with the Lycopodiaceae * has lately appeared, and

* E. Pritzel. Lycopodiaceae. Engler & Prantl, *Die natürlichen Pflanzenfamilien* 1⁴: 563-606. 1900.

the treatment there given to the genus *Lycopodium* by Pritzel is open to some criticism concerning certain matters, both of fact and of opinion.

Under Section V. *Clavata*, there are given two subsections characterized as follows :

A. Leaves of one sort, shoots externally radial in structure.

B. Shoots bilateral, often flattened. Leaves in 4–8 rows, of two kinds, the lateral flat, upwardly curved, spreading, broadly emarginate, the upper and lower smaller, linear and appressed.

The species found in North America which are placed under the former are *Lycopodium annotinum*, *L. alpinum*, *L. sabinaefolium*, *L. Sitchense* and *L. clavatum*. Of these, the first and the last two are undoubtedly to be placed in this category, a statement which cannot apply to the other two, namely, *L. alpinum* and *L. sabinaefolium*. *L. sabinaefolium* has been for many years confused with *L. Sitchense*, but the two differ, among other respects, in that the former has a dorsiventral structure with leaves on the ultimate aërial branches always in four rows, while the ultimate branches of *L. Sitchense* are of radial structure with leaves in five rows.

L. alpinum, on the other hand, has a most distinct and easily recognizable bilaterality in its twigs. The leaves of this plant are indeed of three forms ; those of the upper row are “narrowly ovate, acute, those of the lateral rows thick, with one asymmetrically placed nerve, laterally truncate, acute, falcate, curved toward the under side, those of the under side trowel-shaped.”*

In view of these differences, *Lycopodium sabinaefolium* and *L. alpinum* should be placed with *L. complanatum* and *L. Chamaecyparissus*, the propriety of which is practically admitted by Pritzel. Speaking of *L. Fawcettii* and *L. Wightianum* he says: “The latter plants evidently form a transition to the doubtless nearly related *L. alpinum*, to which all these species stand closely related.” If we place these species in Section B of Pritzel, we should then have a series of North American forms which show as many degrees of divergence from a more primitive type.

* Lloyd, F. E., and Underwood, L. M. A Review of the Species of *Lycopodium* in North America. Bull. Torr. Club, 27 : 147–168. 21 Ap. 1900.

Such a type probably resembled *Lycopodium sabinæfolium*, rather than *L. alpinum*, as Pritzel suggests, for the latter on account of the trimorphism of its leaves and remarkably developed dorsiventrality forms a species of extreme divergence, while *L. sabinæfolium* has a far more generalized form. Of the radially symmetrical species, *L. Sitchense* would justly claim to lie close to the original form from which the dorsiventral plants under discussion have arisen.

The degrees of specialization seen in the North American continental species may be expressed in the following linear series: *Lycopodium sabinæfolium*, *L. Chamaecyparissus*, *L. complanatum* and *L. alpinum*.

Referring to the diagnosis of Section B, it may further be pointed out that the leaves of the upper and lower rows are not always appressed. The upper ones in *L. alpinum* and the lower ones in *L. Chamaecyparissus* are indeed so. In *L. complanatum* and *L. sabinæfolium* the leaves of both upper and under rows are spreading.

Under Section B, Pritzel places *Lycopodium complanatum* and *L. Fawcettii* with *L. Chamaecyparissus* as a variety of *L. complanatum*. The relation of these two last named plants has been heretofore a matter of doubt, but the facts which have already been set forth* would seem fairly to settle the question so far as North America is concerned.† Here the two plants may be found growing in exactly the same habitat, but still differing anatomically, in external features and in physiological characters. The more obvious characters of the species *L. complanatum* are seen in the ultimate shoots which are distinctly plagiotropous, much flattened dorsiventrally, with leaves of the under row much reduced, spreading, and not emarginate. The rhizome is above ground. The spores ripen at least as much as four weeks later than those of *L. Chamaecyparissus*, which has

* Lloyd, F. E. Two hitherto confused species of *Lycopodium*. Bull. Torr. Club, 26: 559-567. 15 N. 1899.

† While at Kew during the past summer I saw the type of *Lycopodium tristachyum* Pursh, Fl. Am. Sept. 2: 653. 1814, and find that it is exactly the species separated by Al. Braun many years later as *L. Chamaecyparissus*. The earlier name will therefore replace the later and another of Pursh's species can be justified.—L. M. UNDERWOOD.

orthotropous annually innovating branchlets, a much less pronounced dorsiventrality, evidently emarginate, appressed under leaves and an underground rhizome. No intermediate conditions were found to reward a diligent and repeated search on the part of two observers over an acre of ground where both plants were growing side by side in great abundance. One is therefore irresistibly driven to the conclusion, no matter what view may be taken of the question of species, that here at least are distinct plants which must be completely separated in order satisfactorily to recognize their differences.

Finally, the authorities for *Lycopodium Fawcettii* and *L. porophilum* are quoted incorrectly. It would appear that there is but one alternative in such matters, either to leave the authority out altogether or to give it correctly.

NEWS ITEMS

William Austin Cannon, A.M. (Stanford University), has been reappointed Fellow in Botany in Columbia University. Mr. Cannon is making a special study of certain features of hybridization in plants.

Mr. Jared G. Smith, of the U. S. Department of Agriculture, has gone to Honolulu to assume the directorship of the Hawaiian Agricultural Experiment Station.

Mr. Roland M. Harper, graduate student in the Botanical Department of Columbia University, is temporarily in Washington, D. C., as special assistant in the United States National Herbarium.

Professor William F. Ganong's paper, entitled "Suggestions for an Attempt to secure a standard College Entrance Option in Botany," read before the Society for Plant Morphology and Physiology at the Baltimore meeting, December 28, 1900, is published in *Science* for April 19, 1901.

A suggestive contribution to the literature bearing upon questions of nomenclature is "The Determination of the Type in composite Genera of Animals and Plants," by President David Starr Jordan, printed in *Science* for March 29, 1901.

The annual meeting and exhibition of the Horticultural Society of New York was held at the Museum of the New York Botanical Garden, May 8 and 9. Prizes to the amount of \$700 were offered, \$500 by the Botanical Garden and \$200 by the Horticultural Society.

Mr. George V. Nash has returned from the Royal Gardens at Kew with about 1,300 species of living plants for the New York Botanical Garden. Through the courtesy of Sir W. T. Thiselton-Dyer, the Director of the Royal Gardens, further consignments are expected in the near future.

The report of Prof. Charles H. Peck, State Botanist of New York, for the year 1899, has recently been distributed. In addition to the other matter, it contains as usual an important contribution to the knowledge of our fleshy fungi. Vol. 3; No. 4, of the Memoirs of the New York State Museum, a quarto volume containing descriptions and illustrations of the edible and unwholesome fungi of New York—the second volume of the series—was issued at about the same time.

Thomas Conrad Porter, D.D., LL.D., Emeritus Professor of Botany in Lafayette College, died suddenly at Easton, Pa., on April 27th, in the 80th year of his age. He was well known as a botanist, especially by his contributions to our knowledge of the flora of Colorado and of Pennsylvania. He won distinction in the literary field also, being the first to call attention to the resemblance between "Hiawatha" and the Finnish epic *Kalevala*, and writing several well-known translations of German poems.

The Departmental Committee on Botanical Work and Collections at the British Museum and at Kew has recently reported to the Lords Commissioners of His Majesty's Treasury, in part as follows: "That the whole of the botanic collections at the British Museum now administered by the Keeper of the Department of Botany under the Trustees, with the exception of the collections exhibited to the public, be transferred to the Royal Botanic Gardens, Kew, and placed in the charge of the First Commissioner of His Majesty's Works and Public Buildings under conditions indicated below, adequate accommodations being there provided for them."

TORREYA

June, 1901

"WHEN IN ROME DO AS THE ROMANS DO"

BY P. A. RYDBERG

Professor E. L. Greene has lately published a very interesting article in the *Catholic University Bulletin* under the title, "Some Literary Aspects of American Botany" in which he criticizes especially the forms of titles used by botanical authors in America. I intend here to point out some misuses in naming plants. If, in attempting to do this, I should myself make some blunders, I trust they may be pardoned and corrected by some more competent critic.*

The old proverb, "When in Rome do as the Romans do," may well be applied to the use of Latin in botanical descriptions and terms. In other words, when we use the Latin language in science we should always try to use it as a Roman would have done. Latin descriptions such as two which were published in one of our leading botanical journals a few years ago † bring discredit to the author as well as to the journal that prints them.

This time I shall, however, dwell only upon specific names given in the honor of some person. Two methods have been used by biologists, viz., the Latin genitive form of the proper noun and an adjective formed from the same by appending *-anus*, *-ana*, *-anum*. Many botanists have agreed to use the former when the person in whose honor the plant is to be named has discovered it, described it or done any other work in connection

* Even the best may make mistakes sometimes, as was illustrated in the article cited above, where Professor Greene misquoted a title he criticized. On page 153 appears "Contributions to the Comparative Histology of Pulvini and the Resulting Pholeolitic Movements," and on page 157, "Pholiotic Movements" instead of " * * * Photeolic Movements" as it reads in the original.

† Bot. Gaz. 26: 268, 269. 1898.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 5, comprising pages 49-60, was issued May 22, 1901.]

with it, and the latter when the author wishes to honor some friend without the latter being otherwise connected with the plant. The acceptance of this distinction is far from universal, however.

If a friend happens to discover an undescribed species and one wishes to name it after him, it is important to know how to give his name in a proper Latin form. The Berlin botanists have adopted the following rules: If the name ends in a consonant other than *r*, add *-ii* to the name, but if the name ends in a vowel or *r*, add *-i*.* We therefore say *Carex Bicknellii*, but *C. Torreyi* and *C. Fraseri*. The only exception to these rules admitted by the Berlin botanists is in case the name ends in *a*, when it follows the first declension with *-ae* in the genitive, as for instance *Physalis Lagascae*, named after the Spanish botanist Lagasca.

The adding of *-ii* or *-i* to the proper name of any barbarian language has not come down to us from the classic Latin; for the old Romans latinized names in many different ways, and if they could not give it a good Latin form, they adopted it as it was and made it indeclinable. The custom mentioned comes to us from the middle ages, when Latin was the language of the learned and every learned man must have a Latin name. Most of them formed this by adding *-ius* or *-us* to the name, so that Des Cartes became *Cartesius*, Rudbeck, *Rudbeckius*, and Ray, *Raius*; others, however, translated their names, as for instance Bock, who called himself *Tragus*.

The adding of *-ius* and *-us* in the nominative and *-ii* and *-i* in the genitive is good, as a rule, whenever the name is not already in good Latin form. It would never occur to a Roman to write *Lagascai* as the genitive of Lagasca, and the Berlin botanists have seen it in that light, but would it not be as ludicrous in the eyes of a Roman to see the genitive of Magnus written *Magnusii*? And still the Berlinese cite this as the proper form. Names such as Retzius, Hieronymus, Wislizenus, etc., have a good Latin nominative form (*Hieronymus* was used in old Latin), and no ending needs to be added. It would be worse than grammar school Latin to write in the genitive *Retziusii*, *Hieronymusii* and *Wislizenusii*. American botanists have, in general, refrained from such forms. The only name that in America has been treated

* If the friend were a lady, *-iae* and *-ae* should then be substituted, respectively.

somewhat in the Berlin fashion, is that of a German, Mr. Purpus, in whose honor *Eriogonum Purpusi*, etc., have been named; but the Americans have satisfied themselves with only one *-i* at the end.

The use of *-i* instead of *-ii* even after a consonant has been very common in this country. Watson, for instance, almost always used one *-i*. Plants named after Dr. Chapman are nearly always *Chapmani* (one *-i*) and there are perhaps ten species named *Engelmanni* (one *-i*) to one called *Engelmannii* (two *-i*'s). In the mediaeval Latin names ending in *-mann* were written with the ending *-mannus*, without an *i*. The genitive therefore had only one *-i*. Whether we should keep up this tradition or not is a matter of taste. We have no precedent in classical Latin to follow. There are cases, however, where a consonant should be followed by only one *-i* as in *Bernhardi*, *Gerardi*, etc., as Bernhard and Gerard have old Latin forms in *-us*, *Bernhardus*, *Gerardus*. In the same way, I think, we should write *Richardi*, *Howardi*, *Harvardi*, *Bongardi*, etc., all with one *-i*.

Names ending in *r* take according to the Berlin rule one *-i*. This is not because *r* is a semivowel and the nominative therefore should end in *-us* instead of *-ius*, but simply because those ending in *-er* have as they stand a Latin nominative ending, and the Berliners let the few ending in *-ar*, *-ir*, *-or*, *-ur* follow the same rule. An old Roman would never have done this. The latter names should follow the third declension, like the Latin words, *nectar*, *victor*, *robur*, *vultur*, etc. Fendler, Berlandier, Fraser, Heller, Carpenter, Porter, etc., being in good Latin form as they stand, follow the second declension regularly, with *Fendleri*, *Berlandieri*, etc., in the genitive; but Bolivar, Victor, Arthur and Muir should have the genitives *Bolivaris*, *Victoris*, *Arthuris* and *Muiris*, unless the last may be regarded as an exception and follow the declension of *vir* (*-i*).

According to the Berlin rules, names ending in a vowel (except *a*) should take one *-i*. Those ending in *-a*, follow the first declension. Why should not those ending in *-o* follow the third? All foreign words ending in *-o*, taken into Latin, followed the third declension; and this was not only the case with Greek words, but also those from the Phoenician, the Egyptian and

other barbaric tongues. Why should we not follow the same custom in botanical names? Ledebour wrote *Claytonia Chamissoi*; but Eschscholtz had before him in manuscript, *C. Chamissonis*. Many of the later botanists have used the proper form. We have, therefore, *Aquilegia Ottonis*, *Cyperus Ottonis*, *Lupinus Chamissonis*, *Viburnum Demetronis*, *Sullivantia Ohionis*. These forms are much more common and of course far better than such as *Astragalus Serenoi*.

But if names ending in *-o* should follow the third declension, then should also those ending in *-on*. Here, however, botanists have seldom tried to follow Latin customs. We find both *Brittoni*, *Eatoni*, etc., and *Brittonii*, *Eatonii*; but not *Brittonis*, *Eatonis*, etc., which would be better. Besides myself, who have used *Wootonis* and *Congdonis* as specific names, I think no American botanist has used a genitive in *-onis*, in naming a plant in honor of a person whose name ends in *-on*. I know of one case in which such a genitive was used, but the plant was not named after a person. I refer to *Astragalus Zionis* Jones.

A German may claim that Anton has the Latin form *Antonius*, which follows the second declension with *-ii* in the genitive; but we must remember that Anton is a German and Scandinavian form and that the name is written in French Antoine and in English Anthony, while most of the names ending in *-on* are French or English, and in the latter case derived from the Norman-French or formed under its influence. The majority of modern French words ending in *-on* came from Latin words ending in *-o* or *-on*, both with *-onis* in the genitive. I think, therefore, that all names ending in *-on*, at least those belonging to any of the Romance languages or derived from them, should follow the third declension.

The extension of this rule to names ending in *-son*, as Anderson, Nelson, etc., is perhaps of doubtful propriety. These are all of Scandinavian origin and have a peculiar history. In Sweden they have never, until in later years, been regarded or treated as family names. Peterson meant Peter's son and nothing more. If Peter Anderson had a son by the name of John, he would be known not as John Anderson, but as John Peterson; and John's son Nels would be Nels Johnson. From the middle ages to the

later part of the eighteenth century, these names were often written in Latin. The first Protestant Archbishop of Sweden was Lars Peterson, who usually wrote his name *Laurentius Petri* (the word *filius* being understood). In Swedish history we read both of *Olaus Magnus* (Big Olof, so called for his size) and *Olaus Magni* (Olof Magnuson). In the genitive both names would be *Olai Magni*. The old way of writing Johnson, Anderson, Larson, etc., could scarcely be used in botanical names, as it would cause much confusion, and the names would scarcely be recognizable. The three above mentioned would be respectively, *Johannis*, *Andree*, and *Laurentii*. If a Roman had seen Anderson written, without knowing the meaning or derivation, he would very likely have written the genitive as *Andersonis*. He might perhaps have given it the Latin form *Andersonius* (-ii); but never as many of our botanists do, *Andersonus* (-i).

If a Roman had seen the name Ames, he would probably have written it in the genitive *Amis*, according to the third declension. It is perhaps safer to latinize such names and write *Amesius* (-ii), in the same way as Des Cartes became *Cartesius* (-ii).

From the foregoing it would appear that the Berlin rules must be modified in order to accord with good Latin usage, and that the latinizing of proper nouns is a matter that needs the attention of a botanical congress.

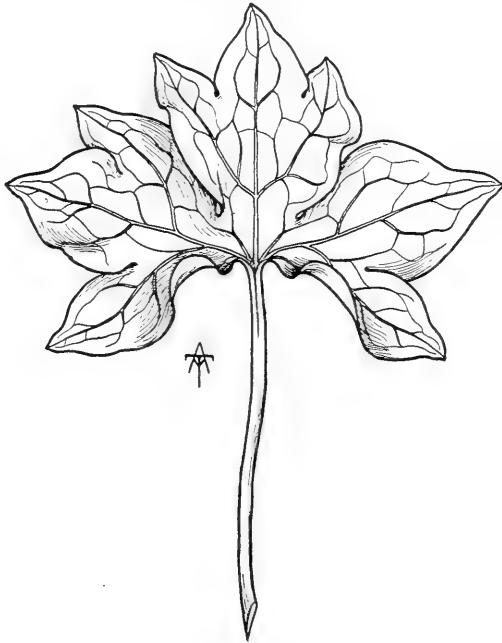
HETEROPHYLLY IN HEPATICA ACUTA

BY S. H. BURNHAM

A few years ago, while collecting in an old rich wood near Vaughns, Washington County, New York, I found several plants of an interesting acute-leaved *Hepatica*, and transplanted a single plant in my wild garden, where the leaves have remained constantly seven- to nine-lobed. The normal form has leaves with three acute lobes, sometimes passing into *Hepatica Hepatica* (L.) Karst., with which it sometimes grows, though it usually blooms a week earlier in northern New York. Often, leaves are five-lobed; but rarely is the lobing carried so far as in the above plants.

In the Bulletin of the Torrey Botanical Club, 8: 36. 1881, is a note with illustration of a leaf of the round-lobed *Hepatica* with seven lobes, which was exhibited by Mr. Gerard at a meeting of the Club. He says all the leaves of the plant possessed the same peculiarity, "the middle lobe being deeply trilobate and the lateral ones bilobate, thus making an approach toward the leaf forms found in the genus *Anemone*."

Professor W. R. Dudley, in his Cayuga Flora, alludes to "forms with five- and even seven-lobed leaves in rich shaded soil at Big



Gully, etc." In the Columbia Herbarium is a specimen from Lookout Mountain, Tenn., with eight-lobed leaves, collected by Dr. A. W. Chapman. There is also a specimen from northern New Jersey, at State Line, collected by Dr. N. L. Britton, June 6, 1885, with five- to seven-lobed leaves.

Thanks are due to Miss Alexandrina Taylor for the care with which she has drawn one of the beautiful leaves of the Washington County plant.

AN ALLEGHANIAN RUDBECKIA

BY JOHN K. SMALL

While on excursions into various portions of the southern Alleghanias and the Blue Ridge, I have quite frequently met with a very characteristic *Rudbeckia*. It occurs more frequently at altitudes between 1000 and 1600 meters, although sometimes it may be found at elevations a little lower or considerably higher than those just indicated. As far as its biological distribution is concerned, it is mainly confined to the Alleghanian life-zone and thrives best in such localities as are inhabited by *Solidago monticola*, *Gaylussacia ursina* and *Vaccinium pallidum*. So far as I can learn, this species has never been described, but may now be characterized as follows :

Rudbeckia monticola

Perennial by short horizontal or oblique rootstocks. Foliage hirsute or hirsute-hispid : stems 3-11 dm. tall, sometimes tufted, normally simple, occasionally branched above : leaves few ; blades oblong, elliptical, oval or ovate, 5-10 cm. long, sharply serrate, sometimes shallowly so, those of the basal and lower stem-leaves with winged petioles or petiole-like bases, those of the upper stem-leaves sessile and usually partly clasping by their broad bases : bracts of the involucre linear to linear-lanceolate, 1-1.5 cm. long, bristly hirsute, reflexed : ray-flowers several ; ligules bright yellow, 2-3.5 cm. long : disk hemispheric to ovoid, 12-18 mm. broad, dark purple-brown to almost black at maturity : bractlets acute, ciliate near the slightly broadened tips : disk-corollas 3-3.5 mm. long : achenes 2.5 mm. long, slightly enlarged upward, finely longitudinally ribbed and very minutely pitted.

In woods, West Virginia to North Carolina, Georgia, Tennessee and Alabama. Summer.

Rudbeckia monticola is related to *R. hirta* from which it may easily be separated at sight by the sharply serrate blades of the upper stem-leaves with their broad partly clasping bases. The type is preserved in the herbarium of the New York Botanical Garden. The following cited specimens belong here :

WEST VIRGINIA : White Sulphur Springs, July 16, 1892, *A. Brown*.

NORTH CAROLINA : Haywood Co., July, 1885, *M. E. Hyams* ; Swain Co., July 12, 1891, *Beardslee & Kofoid* ; Biltmore, June 10, 1896, Biltmore Herbarium no. 852 ; Hendersonville, June 29, 1898, Biltmore Herbarium no. 852a.

TENNESSEE : White Cliff Springs, July 11, 1894, *T. H. Kearney, Jr.* ; Lookout Mountain, June 28, 1897, *H. Eggert* ; Wolf Creek, August, 1896, *A. Ruth*, no. 4055.

GEORGIA: Tallulah Falls, August 8, 1893, *J. K. Small*; Thomas Bald, August 9, 1893, *J. K. Small*; Estotoah Falls, August 11-12, 1893, *J. K. Small* (type); Stone Mountain, July 27, 1893, *J. K. Small*.

ALABAMA: Auburn, June 5, 1897, *Earle & Baker*, no. 276.

DIEMBRYONY IN CORN

BY BYRON D. HALSTED

In making some germination tests of corn upon a large scale a single grain was met with that showed a double embryo—one



apparently normal and the other secondary. The grain in germination was lying with the embryo side downward so that the main plantlet needed to turn upward around one side of the grain making a J-shaped curve. The smaller shoot grew nearly parallel with the first one and stood close to it, although much smaller. The grain was transferred from the germinating dish to earth in a flower pot and supplied with conditions for further growth, at which time each plantlet had a main root.

After growing as long as the smaller plant would, the two were removed and a photograph taken from which the little side engraving has been made.

It is seen that one plant grew quite normally, while the other remained small and attempted to produce two ears, but without tassel, and no grains were obtained.

It only needs to be said that the case in hand was a yellow grain from an ear picked upon the College Farm and brought to me, because it was the only one of a large field that had dark, nearly cherry-colored grains mixed in almost equal numbers with

the yellow grains. It is regretted that a sketch of the two embryos was not made before the grain was placed in the earth for further growth. Out of very many thousands of germinating grains of corn, this is the only one showing diembryony that has come to my notice.

RUTGERS COLLEGE, May 4, 1901.

REVIEWS

A work that is sure to play an important part in popularizing botanical studies on the Pacific Coast is the recently published "Flora of Western Middle California" * by Dr. Willis Linn Jepson, Assistant Professor of Botany in the University of California. This is a carefully written and attractively printed descriptive manual, with keys to the families, genera, and species. In many species a considerable range of variability is recognized, especially in vegetative characters, under conditions which are definitely named. New species and varieties are described in various genera. In the matter of nomenclature, it is not wholly obvious just what considerations have determined the choice of generic names. The nomenclature is evidently not that of Berlin, Kew, Harvard, the Rochester Code, or of the Flora Franciscana. With considerable allowance for the inherent difficulties of making one's practice seem always consistent and logical to another, it may be said that Professor Jepson's selection of names has the appearance of being an arbitrary compromise between the so-called "conservative" and "reform" tendencies. The influence of the American principle of "Once a synonym, always a synonym" is doubtless to be recognized in the substitution of *Tumion* Raf. for *Torreya* Arn., *Osmaronia* Greene for *Nuttallia* T. & G., and *Xylothermia* Greene for *Pickeringia* Nutt. To the "priority of place" idea is evidently to be attributed the acceptance of *Tissa* Adans. in the place of *Buda* Adans., while simple priority of publication is apparently responsible for the adoption of *Panicularia* Fabric. for *Glyceria* R. Br., *Razoumofskyia* Hoffm. for *Arceuthobium* Bieb., *Koellia* Moench for *Pycnanthemum*

* Jepson, W. L. A Flora of Western Middle California. 8vo. Pp. iv + 625. 16 Ap. 1901. Encina Publishing Co., Berkeley. Price \$2.50.

Michx., *Bolchia* Raf. for *Downingia* Torr., *Ptiloria* Raf. for *Stephanomeria* Nutt., etc. In these changes from the usage of the "Botany of California," there is no suggestion of the fifty-year limit proposed by the Berlin botanists and there is little evidence of mercy toward names which, according to some writers, have become so consecrated by long usage as to be out of the reach of modern nomenclatural legislation. Yet several generic names equally vulnerable, like *Capsella* Medic., *Echinocystis* T. & G., and *Dicentra* Bernh., are retained. But these possibly await modification in the second edition, which the manifest merits and popular qualities of the work will doubtless soon make a necessity. [M. A. H.]

CORRESPONDENCE

"A SIMPLE DYNAMOMETER"

The discussion of this particular apparatus would not deserve more space, did not the criticism involve a principle applicable to a number of instruments for measuring the force exerted by plants. In his reply* to my former letter, Dr. Richards implies that I misunderstood his experiment; rather, I think, he has missed the point of my objection. I had no thought of criticizing his device because it does not measure the force of imbibition in all directions. The difficulty is that the proposed dynamometer does not register correctly *any* component of the force of swelling, for the simple reason that the spring scale is not adapted to do it. Gravitation can act through an indefinite distance and the weight in the pan descends until the distortion of the spring is as great as the force acting can produce. In swelling, on the contrary, the force to be measured acts through a very limited distance only, and when the limit of its thrust is reached the index stops, whether it indicates an ounce or a ton. The principle is that distortion of a system, however registered, can never be used to measure correctly any force, unless the possible distortion is greater than that necessary to produce the maximum registration of the instrument.

The caution regarding overloading, therefore, is not pertinent,

* TORREYA, I: 48. Ap. 1901.

because, owing to the limited displacement by the swelling, the spring could not easily be loaded beyond its capacity to register, although any component of the force acting is really vastly in excess of its powers to register in units of weight.

The objections made above do indeed apply to any apparatus not used in accordance with the principle enunciated. But Detmer is careful to say that his device* is only for the purpose of showing that external work is done by swelling seeds.

C. R. BARNES.

Notwithstanding the careful explanation given above by Professor Barnes the writer is still of the opinion that overloading from the standpoint of the *strength* of the spring is, as previously stated, entirely possible, and it seems too that this is the critical point.—H. M. RICHARDS.

NEWS ITEMS

Volume 7 of the Contributions from the Department of Botany of Columbia University has recently been completed by the publication of the 175th number of the series.

Dr. H. M. Richards, Dr. P. A. Rydberg and Miss Louise B. Dunn are spending their summer vacations in Europe.

Dr. D. T. MacDougal left New York on June 2d to conduct some special botanical investigations in western Montana.

Tracy Elliot Hazen, Ph.D. (Columbia University, 1900), has been appointed Director of the Fairbanks Museum at St. Johnsbury, Vermont, and enters upon the duties of the position this month.

Mr. Frederick H. Blodgett, recently a graduate student in Columbia University, is now an assistant in the botanical department of the Field Columbian Museum, Chicago.

Edward W. Berry, of Passaic, N. J., a member of the Torrey Botanical Club, has been awarded the Walker Prize of fifty dollars by the Boston Society of Natural History for an essay on *Liriodendron*.

* Pflanzen-Phys. Prakt. 119.

Professor L. M. Underwood of Columbia University, and Mr. O. F. Cook and party, of the U. S. Department of Agriculture, sailed for Porto Rico on June 8th for the purpose of studying the flora of that island.

The death of M. Henri Philibert, the European specialist in the genus *Bryum*, occurred on the 14th of May at Aix in France in his 79th year. He had just added a tenth article to his series of studies on the peristome, which have appeared in the *Revue Bryologique*.

The tablet in memory of Asa Gray in the Hall of Fame of the New York University was unveiled on May 30 by Professors B. D. Halsted, B. L. Robinson and L. M. Underwood, representing the Botanical Society of America.

The third session of the Rhode Island Summer School for Nature Study will be held at the Rhode Island College of Agriculture and Mechanic Arts, Kingston, R. I., from July 5 to July 20. The botanical instruction is in charge of W. W. Bailey, H. L. Mellow, F. W. Card, A. B. Seymour and G. E. Adams.

"The Sea-Beach at Ebb-Tide" is the title of a recent book written by Augusta Foote Arnold and published by the Century Company. It contains non-technical descriptions and numerous illustrations of the larger and more common marine plants of the United States, together with a similar account of the littoral animals.

The entire palaeobotanical collection of Columbia University, and the books on palaeobotany from the University Library, except such minor part thereof as is needed at the University for undergraduate instruction, will be deposited with the New York Botanical Garden during the coming summer, under the terms of a supplementary agreement recently made between the two institutions. The museum of palaeobotany will be installed in one of the well-lighted basement halls of the Museum Building of the Garden.

TORREYA

July, 1901

JUNCOIDES IN THE SOUTHEASTERN STATES

BY JOHN K. SMALL

While collecting about the summit of Table Rock in western North Carolina, in company with Mr. Heller, specimens of a species of *Juncoides* in every way smaller than the so-called *Juncoides campestre* were gathered and found to be bulblet-bearing at the base. Further investigation showed that the same form had previously been collected on Lookout Mountain, Tennessee, by Prof. A. Wood and had by him been described under varietal rank, he evidently not thinking it worthy of being considered a species. Later experience with the genus in the Southeast has led me to the conclusions expressed in the following brief synopsis.

JUNCOIDES Adans.

Differs from *Juncus* by its closed leaf-sheaths, the 1-celled ovary with basal placentae which support 3 ovules and later 3 seeds.

KEY TO THE SPECIES.

- | | |
|---|--------------------------|
| Peduncles terminated by 1 or rarely 2 flowers: capsule of an ovoid type. | 1. <i>J. pilosum</i> . |
| Peduncles terminated by compact spikes: capsule of an obovoid type. | |
| Sepals and petals 3-4 mm. long: capsules much surpassed by the perianth. | 2. <i>J. echinatum</i> . |
| Sepals and petals 2-2.5 mm. long: capsules surpassing the perianth or about equalling it. | 3. <i>J. bulbosum</i> . |

1. *JUNCOIDES PILOSUM* (L.) Kuntze. Stems 1-3 dm. tall, 2-4-leaved. Leaf-blades 3-8 mm. wide, webby, blunt and almost gland-like at the apex: peduncles filiform, equal or nearly so: perianth 2.5-3 mm. long; sepals and petals triangular-ovate, brown except the hyaline margins: capsule usually about $\frac{1}{4}$ longer than the perianth, sometimes but slightly longer.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 6, comprising pages 61-72, was issued June 20, 1901.]

In woods, New Brunswick to Alaska, Georgia, Tennessee, Michigan and Oregon. Also in Europe and Asia.

Luzula Carolinac S. Wats., founded on a specimen from Grandfather Mountain, North Carolina, is *Juncooides pilosum*. The elongated bract described by Dr. Watson is the upper leaf of the stem and not the bract subtending the inflorescence.

2. ***Juncooides echinatum*** n. sp. . Base of plant not bulblet-bearing. Foliage webby-pubescent: stems 2.5–5 dm. tall: peduncles conspicuously unequal, each terminated by an oblong or cylindrical spike: sepals and petals lanceolate, 3–4 mm. long, acuminate, greenish or pale brown, soft and hyaline at the tip: capsule obovoid, 2.5–3 mm. long, manifestly longer than thick.

In woodlands, North Carolina to Georgia and Alabama.

This species is the representative of *Juncooides campestre* in the Southern States. The following specimens belong here:

ALABAMA: Auburn, April 17, 1897, *Earl & Baker*. (Type, in the herbarium of the New York Botanical Garden.)

NORTH CAROLINA: Biltmore, May 14, 1897, Biltmore Herb. no. 565.

3. ***Juncooides bulbosum*** (Wood). Base of plant accompanied by bulblets. Foliage almost glabrous or somewhat webby on the leaf-margins and at the top of the sheaths: stems 1–4 dm. tall: spikes shorter than those of *J. echinatum*: sepals and petals ovate-lanceolate or lanceolate, 2–2.5 mm. long, brownish, acuminate, neither manifestly soft nor hyaline at the apex: capsule broadly obovoid or globose-obovoid, surpassing the sepals or sometimes about equalling them. [*Luzula campestris* var. *bulbosa* Wood, Cl. Book, 753. 1863.]

In woods, thickets and open sandy places, Virginia to Georgia, Kansas and Texas.

This species is apparently quite common within the range given above, but very few specimens were collected until within the last four or five years. The following belong here:

VIRGINIA: Summit of White Top Mountain, June 26, 1892, *N. L. & E. G. Britton* and *A. M. Vail*.

NORTH CAROLINA: Summit of Table Rock, July 2, 1891, *J. K. Small* and *A. A. Heller*.

TENNESSEE: Lookout Mountain, *A. Wood*; Jackson, March, 1892, *S. M. Bain*, no. 172, at least in part; Franklin County,

June 8, 1897, *H. Eggert*; Knoxville, April, 1897, *A. Ruth*, no. 1101.

MISSISSIPPI: Topelo, April 6, 1889, *S. M. Tracy*.

TEXAS: Houston, April 10, 1872, *E. Hall*, no. 655; Houston, April 17, 1900, *B. F. Bush*, no. 32; Uvalde, March 20, 1891, *E. N. Plank*.

ARKANSAS: Prescott, April 9, 1900, *B. F. Bush*, no. 552 Benton County, *E. N. Plank*, no. 45.

KANSAS: Cherokee County, 1896, *A. S. Hitchcock*, no. 844.

AMSONIA AMSONIA IN NEW JERSEY

BY B. S. MILLER

May 23d a friend sent me a small specimen to identify, as it had created quite a discussion at a card party. It was seen from the roadside and picked to match a gown. Vanity, after all, is of some use in this world, as it has been the means of establishing this dainty little blue flower in New Jersey. Professor Britton verified it for me, as I saw it was not found so far north and in such a dry locality. There were fourteen clumps of this plant growing in a high, dry, rolling field, rocky and of sandy soil. It is a ten-acre lot cleared for building purposes, woods of oaks, chestnuts and hickories growing about three sides of it. The plants show evidence of being there some time, for when the grass is mown it has been cut down and old stalks are still on the roots—four or five on some. There were such plants as these growing in this same lot, which will give an idea of the poor soil. Three large patches of *Lupinus perennis*, and in the midst of one, I found six clumps of *Amsonia*; as the blue being a much more delicate shade, one could distinguish it from a distance. *Fragaria Virginiana*, *Trifolium pratense*, *Rubus Canadensis*, very abundant, *Potentilla argentea*, *Antennaria plantaginifolia*., *Chrysanthemum Leucanthemum* and small patches of *Pteridium*

apulinum. On speaking of it to a naturalist, Mr. Hales, he said it was originally brought to Ridgewood from the South by a Mr. Fuller, who had an experimental garden. It would not grow on his ground, so he gave some to Mr. Hales, who has a reclaimed meadow for a garden, and there the plant was much more beautiful—a large clump, twenty-five years old, fully four feet around and about that high, while what I found was only about a foot to a foot and a half high and not so thrifty. This same Mr. Fuller gave some to the people who own this lot and it has grown in their garden. Now this lot is about a quarter of a mile from this garden where the original plant was, so it has spread by means of the wind or birds. The odd fact to me is, that though it grows in “damp soil” it has not spread from Mr. Hale’s garden, but from the latter place which is very high and dry, this part of Ridgewood being one of the highest parts of Bergen County.

LYCOPODIUM TRISTACHYUM

BY E. J. HILL

When Prof. Lloyd’s article “Two hitherto confused Species of Lycopodium” (Bull. Torr. Club, 27: 559. 1899) appeared, my specimens, labeled *L. complanatum* L., were examined with a view to test them by the characters mentioned and several of them were found to agree with the description of *L. tristachyum* Pursh (*L. Chamaecyparissus* A. Braun). Some had already been designated by this name as varietal, and their peculiarities noticed. One of these was the burial of the rhizome from three to nine centimeters below the surface of the ground, considerable digging often being required to uncover them. They have all been found in sandy soil, in woods of pine or mixed pine and oak. The rhizomes and the basal parts of the aërial shoots are pale, being blanched by exclusion of the light. The ultimate branches are numerous and crowded, commonly narrower and much less

limited to one plane than those of *L. complanatum*. The branches by their abundance make a very heavy top. Mounted specimens generally have a heaped appearance, the branches lying upon each other in several layers, while specimens of *L. complanatum* are nearly or quite flat. The time of collecting has been August and October. The bracteal leaves and sporangia have been found to be yellow as early as August 2d, and the spores beginning to be shed. In October the sporangia had all become empty. One obtained at Ha! Ha! Bay, Quebec, Can., August 25th, was less mature, the sporangia closed and the bracteal leaves but slightly yellowed. Others collected at the same time were shedding their spores. Climatic reasons will probably account for the later ripening. In the same region the Early Blueberry (*Vaccinium Pennsylvanicum*) and the Canada Blueberry (*V. Canadense*) were found to be contemporary in the ripening of their fruit. They grew intermingled, the fruit of both equally abundant on the bushes. In the latitude of Chicago the former begins to ripen the last of June; the latter, occurring a little farther north, ripens in August.

The following are the stations and times of collecting the specimens of *L. tristachyum* Pursh, in my possession: Fruitport, Mich., August 2, 1872; Indian River, Mich., August 3, 1878; Miller, Ind., October 2, 1881; Ha! Ha! Bay, Quebec, August 25, 1888. The three former localities are contiguous to Lake Michigan, Miller being in the dune region at the head of the lake, Indian River in a dune locality near its northern end, and Fruitport midway on the eastern shore. From all I recall about the Lycopodiums I had identified as *L. complanatum*, but did not take specimens for preservation, I feel quite safe in stating from the impression its habit has left in memory that *L. tristachyum* is the more common in places where I have met with the two species in the upper lake region. Those growing at Miller, Ind., do not seem to fruit very freely, the shoots being commonly found barren.

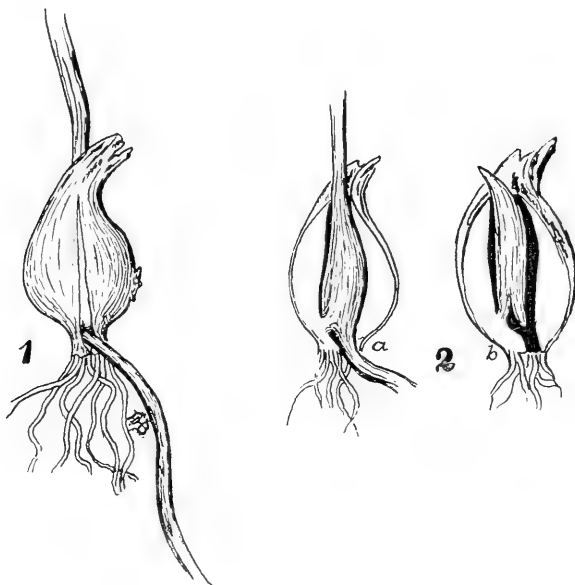
A TULIP WITH A RUNNER

BY FREDERICK H. BLODGETT

A number of young tulip bulbs were planted in November, in a shallow box for indoor cultivation. On January 23, 1901, one of these plants was removed from the soil for examination. The leaf was several inches long, but still tightly rolled, as the plants were kept in a dark room.* From the bottom of the bulb a runner extended obliquely downward for two inches or more. The tip was broken in lifting the plant from the soil, so that it could not be examined. The appearance of the bulb is shown, natural size, at Fig. 1.

FIG. 1.

FIG. 2.



The bulb was cut open in the plane of the runner. In origin the runner was found to be quite similar to those of *Erythronium*. The base of the runner and that of the leaf stalk are continuous, and form a continuous core through the center of the bulb. By the side of this core there was another, much less developed. The leaf portion of this core was hardly differentiated from the

*This was part of the etiolation experiments by Dr. D. T. MacDougal, who kindly gave the specimen to the author.

common central mass, but the runner was easily recognized as a small bud projecting downward from the bottom of the core. In Fig. 2 the two cores are shown as they appeared in place within the bulb. The smaller core is hidden beneath the larger in the first figure (2, *a*).

The two cores were united to each other and to the bulb tissue by a common stem or stalk. The stalk of the smaller core was longer than the other, as is seen in the figure (2, *b*). This stalk, or point of union between bulb tissue and sprout or vegetative tissue is not at the point nearest to the root fibers as is the case in *Erythronium*, but is at a little distance from that point. The roots form a compact bundle of fibers at the bottom, rather than at one side of the base, of the bulb. But the runner issues in the two genera (*Erythronium* and *Tulipa*) from the bottom of the immature bulbs, when produced.

VARIETAL AND SPECIFIC NAMES

BY T. D. A. COCKERELL

I am very glad to see (Bull. Torr. Club, May, p. 300) that Dr. Robinson has frankly discussed the important question of the status of varietal names; it is a question which has been overlooked or evaded by many botanists, with the result that the existing nomenclature is often inconsistent.

I am by no means prepared to admit, of course, that what is good in zoölogy is not also good in botany; and there are certain considerations which Dr. Robinson has apparently overlooked.

Generic and subgeneric names are expressions of arbitrarily-formed groups which have justification simply in their convenience. From a Darwinian standpoint, these groups must contain species which are not less related to one another than to species assigned to other genera or subgenera. There is to be, in fact, a natural continuity or contiguity, as with the inches on a foot-rule. But granting this, it is then a matter of taste or custom how large such divisions may be made. The subgenera of one generation or one author are often the genera of the next.

Species and subspecies, on the other hand, are units isolated by nature. It is not a matter of taste how many species exist, though one might imagine so, to read the current botanical literature. Ultimately we shall have to know how many forms stand physiologically isolated from one another, and these will be recognized as true species. Subspecies are similar, except that at some point the isolation is as yet incomplete. The word variety may as well be abandoned as a distinct category ; but it is useful as a refuge when we do not know the proper status of a plant.

The "form" (*forma*) is really something different. As I understand it, it expresses a phase existing wholly within specific limits ; a result of the variability of the organism, spontaneous or induced by external conditions. I thoroughly believe in the classification and naming of forms, as the study of these phenomena greatly assists us to understand the origin of species ; but the form is not to be confused with the subspecies or variety proper. I think, myself, that even names given to forms should be recognized when it is found that they represent valid subspecies or species ; but if there is to be a distinction made and a line drawn, surely it must be between the subspecies and form ; not between the species and subspecies. This is the more necessary, because while we can usually (or at least frequently) tell when we are dealing with a form, it is much harder to draw the line between species and subspecies. The evidence for the status of the form may be simple and positive ; that for the status of the species is negative, and to affirm that it *does not* anywhere intergrade with its nearest ally, would require knowledge that we rarely possess when describing.

The trouble about the homonyms results from the practice of suppressing a name because it has been used in a varietal sense under a different species of the genus. This seems to me an unnecessary and mischievous procedure, and I live in the hope that it will at length be universally condemned. The law of homonyms is at best a necessary evil, and it should be made to bear on us as lightly as possible.

AN ALPINE BOTANICAL GARDEN

In a recent article published in the *Revue Philomathique de Bordeaux et du Sud-Ouest*, M. Henri Devaux describes most interestingly the Alpine Botanic Garden of the University of Lausanne. This Garden was founded a few years ago by Professor Wilczek at Pont-de-Nant which is situated at the entrance of the Canton du Vallais, some two hours' drive up from Bex at an altitude of 1,300 meters, surrounded by peaks and glaciers ranging from 2,500 to 2,900 meters. It is in a narrow valley protected from the east, west and north winds, but receives from the south the "Thalwind," a strong current of glacial air from the surrounding peaks, which united with the intense humidity combines to make climatic conditions favorable to the cultivation and growth of the vegetation of a much higher altitude and where such plants as *Campanula Cenisia* (2,600 m.), *Viola Cenisia* (2,000 m.), *Crepis pygmaca* (2,400 m.), and *Geum reptans* (2,500 m.) thrive. A small brook traverses the garden which with the intensely heavy dew of that high altitude is sufficient for the watering of the plants.

After many attempts Prof. Wilczek gave up the systematic arrangement of the classification of the plants growing in the Garden and resolved to form "*physiological associations*" resembling as closely as possible the biological and geographical groups found in nature. A Salicetum has been started; a collection of alpine willows with which have been planted those herbaceous plants that are grouped with them in a wild state. An alpine meadow brings together Gramineae, *Pedicularis*, and their associates. In a wood and along the brook have been cultivated such plants as *Lonicera*, *Ribes*, Maples, Ericaceae, *Rubus*, *Prenanthes*, *Dentaria*, *Lycopodium*, *Selaginella* and a multitude of ferns as well as various kinds of shade-loving Orchids, *Listera*, *Coral-larhiza*, *Goodyera* and others. Rock-loving plants are planted together in an artificial rock garden where natural conditions have been copied as nearly as possible and where *Saxifraga*, *Heldreichia*, *Crepis pygmaca*, *Viola Cenisia*, *Poa minor* and others of their kind flourish. On these groups of rock a very clear

demonstration is given of the influence of surroundings and exposure on plants. Each group has of course a sunny and shaded side, a dry and a humid surface; and a notable and striking distinction is established between the vegetation of the north and south side of the same hillside. On the south side with fullest exposure to the sun and drought are established the xerophilous plants, *Potentillas*, pinks, Geraniaceae, *Artemisia Pedemontana*, *Achillea argentæ*, as well as most all of the labiates. On the north side are the hygrophylous plants, *Saxifrages*, *Rhododendron*, *Mimulus*, various *Silenes*, *Valeriana Celtica*, etc.

It is thus shown in these few notes that the garden is not only a collection of alpine plants but also of alpine conditions gathered into a small space and easily accessible for study. Not the least interesting and valuable collection and certainly a unique one in its way, is that of the mosses. The region is bryologically a remarkably rich one, and the project has been formed by the Director, Professor Wilczek, and the distinguished bryologist M. Jules Amann, to list the species of mosses growing on the rocks, which after numbering the rocks, will establish a catalogue of the mosses of the valley. On many of the boulders as many as forty species have been enumerated.

A. M. V.

SHORTER NOTES.

TULIPA SYLVESTRIS IN THE FLORA OF THE UNITED STATES.—On May 6th, while driving along a thicket in a rich ravine near Sellersville, Pa., I discovered the *Tulipa sylvestris* L. growing in considerable abundance. Later it was found in the meadows a mile up the stream. Upon inquiry it was ascertained that it had been growing there for at least five years.

At the same time it was reported from Lansdale, Pa., a point ten miles from the first mentioned locality. Here it was found in a meadow, from which it had spread into an adjoining truck-patch, and thence into a wooded ravine.

It is thoroughly established in both localities, and should be included in the flora of the United States.—C. D. FRETZ, M.D.

NOCCA AND CRACCA.—In the recently published contributions from the Gray Herbarium of Harvard University (new series), No. 20 (Proc. Am. Acad. 36 : 467), Dr. B. L. Robinson gives us a "Synopsis of the Genus *Nocca*." He remarks: "The name *Nocca* (given by Cavanilles in 1795 in honor of Dominico Nocca, professor of botany at Padua) is clearly the one to be employed for this genus by those who wish to apply consistently the generally conservative Berlin Rules. From the definite characterization and excellent figure given by Cavanilles there can be no doubt as to the identity of his genus *Nocca*, and the fact that the name was taken up in the same sense within fifty years by Persoon, Jacquin, La Llave, and Sweet, should establish its validity."

Dr. Robinson's acceptance of *Nocca* and his rejection of *Cracca* are inconsistent; it is clear that he construes his "generally-conservative" Berlin-fifty-year-limit-rule to suit his fancy. The genus *Cracca* was employed by Linnaeus in *Species Plantarum*, 1753, for six species, all subsequently referred to the later genus *Tephrosia* of Persoon, 1807; in 1769, sixteen years after Linnaeus' publication, *Cracca* was used by J. Hill in "Hortus Kewensis" for *C. Virginiana*, one of the Linnaean species, so its validity is well enough established. Of course the phonetics of these generic names are not very usual, but if Dr. Robinson can go *Nocca* there seems no good reason why he should not go *Cracca*.—N. L. BRITTON.

NOMENCIATORIAL NOTE.—New names have recently been proposed for two of the commonest plants of the Rocky Mountain region. Before accepting them as they stand, certain questions have to be raised, as follows:

1. *Castilleia alpina* (Porter). This was described as a variety of what we used to call *C. pallida*. It was said to be woolly pubescent, few-flowered, flowers almost concealed in uncolored floral leaves. It is, as I understand it, the form of the species found in the Hudsonian zone, hardly specifically separable from the plant so common lower down. Now Dr. Rydberg (Bull. Torr. Bot. Club, 28 : 29) calls the ordinary plant of lower elevations

C. luteovirens. This may be distinct from *alpina*, but whether it is or not, surely *alpina* stands.

2. *Trifolium heterodon* (Watson). This was introduced (Proc. Am. Acad. 8: 130) as a variety of the plant we used to call *T. involucreatum*. Now Dr. Greene says this is not *involucreatum*, and proposes for it the name *T. Fendleri*. It seems doubtful whether *Fendleri* is a species distinct from *heterodon*, but in any case the name of prior date is valid.—T. D. A. COCKERELL.

MOSES OF THE CATSKILL MOUNTAINS, N. Y.—The Decoration Day trip of the Torrey Club to Woodland Valley resulted in a fine collection of mosses. The best discovery was *Bryum proligerum*, which was found fruiting at one station; it usually propagates by slender, branching gemmae from the axils of the upper leaves. We also found one log covered with *Dicranum viride* in fine fruit and on one old sugar maple gathered *Zygodon viridissimus*. *Buxbaumia aphylla* was in fine condition on a roadside bank and on dripping ledges of a quarry were found *Bartramia Oederiana*, *Trichostomum tenuirostre*, *Homalia gracilis* and *Bryum capillare*. On Slide Mountain at an elevation of 3,500 ft., on cliffs and ledges among balsams, were collected fine specimens of *Raphidostegium Jamesii* and *R. laxepatulum*; *Plagiothecium striatellum* and *P. Müllerianum*; *Hylocomium umbratum* and *H. Pyrenaicum*; *Dicranum fuscescens* and *D. longifolium*.

ELIZABETH G. BRITTON.

NEWS ITEMS

Dr. Marshall A. Howe, who has recently been appointed an assistant Curator in the New York Botanical Garden, is spending the months of July and August in Nova Scotia and Newfoundland, making collections for the Garden. He is accompanied by Clifton D. Howe, Fellow in Botany in the University of Chicago, and by William Lang, a Museum Aid at the Garden.

Dr. Alexander P. Anderson, recently of Clemson College, South Carolina, and of the University of Minnesota, has been appointed Curator of the Herbarium of Columbia University.

TORREYA

August, 1901

VANISHING WILD FLOWERS

BY ELIZABETH G. BRITTON

A number of articles on this topic have been published this year. They have awakened the interest of many readers, caused much comment and discussion, and prompted investigation as to the reasons for this calamity, which, if it does actually come to pass, is as much to be deplored as the extermination of the buffalo, the seal or the beaver. As in the case of mammals and birds, greed and thoughtlessness combine to do the harm, and fashion and selfishness are the motives.

The New York Tribune of May 5th had the following article:

"Now that spring is really here, the picnicking parties are invading the woods north of the Harlem, and have begun the annual systematic destruction of a large proportion of all wild flowers within reach. The authorities of the Botanical Gardens are on the lookout for them, and within their own precincts will guard the blossoms as thoroughly as possible under a well planned system; but the rest of the Bronx will be at their mercy, and that means death to many a poor little plant. It is not that these ruthless explorers fail to appreciate the beauty of flowers—they "just love them," in all probability. The trouble arises from their ignorance of the extent of the damage they do, and from an utter inability to comprehend that a flower or anything in the vegetable world has rights which the lord of creation himself is bound to respect. Thanks to the picnickers and alleged botanists, the arbutus, loveliest of spring blossoms, has been almost exterminated in the Bronx region. Its delicate pink and white used once upon a time to hide under the leaves all through the northern woods in that part of the suburbs; now it may be found only in spots where it commands less enthusiastic admiration. The mountain laurel has shared a similar fate."

“The most curious feature of this destructive energy is that the plants and flowers so carelessly torn from their homes probably give little or no satisfaction to those who take them away with them. Is there, for instance, a more unsatisfactory flower to make attractive in a vase than the arbutus? It pines for its screen of leaves; the loveliness that seems so perfect when half hidden becomes quite inadequate when pulled out into the glare of the day and put down in a city room. The same is true of most other delicate wood plants. They depend upon the charm of their surroundings.” In *The House Beautiful*, July, 1901.

“Is there a flower lover who has gone out into the country with a party of young people unaccustomed to find themselves surrounded with green who has not noted with something very like hopeless rage the immediate rush on every growing thing in the neighborhood, its instant uprooting and subsequent careless tossing aside? Later in the day, before going home, when all the blossoms in the immediate neighborhood have been destroyed, there is a search for fresh fields, and another spot is denuded. A few dejected blossoms are all that is left when home is reached; nothing of any value remains out of all the lives butchered to make an East Side holiday. The saddest part of it is, not that the children do it, for that might be pardoned on the score of ignorance, but that those in authority permit it without a remonstrance.”

“The flower’s right to existence nobody takes into account, or the harm done to the children by allowing them to think that they may destroy life as they choose.”

And in this connection arises the question of public rights on private property. I know that less than fifty miles from New York, a man of wide and varied culture and sympathies, a member of a variety of horticultural and agricultural societies, owning a large tract of land away from any large town, has attempted to plant the waste roadside places and private woodland with wild and cultivated flowers, and repeatedly seen great bunches of them carried off by people, walking or driving by, who did not realize all the trouble and expense he had been to, in order to beautify the roadsides *for them* and *for others* who might come later. Many a prized Azalea bush has been rifled before its owner knew it, often thoughtlessly and without evil intention by those who “just love them.”

The destruction of wild flowers not only takes place while they are in bloom but there is another cause which is even worse than picking and that is fire. In early spring, March and April, when the woods are dry and high winds prevail, a match thrown carelessly among the dry leaves will start a fire which soon attains serious proportions and is often difficult to conquer, so that in a short time nothing remains but charred stems and scorched earth from which weeds only can derive sustenance. Fires often result, in the New York Botanical Garden, from the carelessness of smokers, and they always start near the paths.

The same selfish disregard of consequences impels picnic parties to come and scatter unsightly papers, boxes and broken glass, in spite of the fact that according to the city ordinances they are guilty of a misdemeanor and liable for each offence to a fine of from one to five dollars.

These evils are due to thoughtlessness and selfishness; now let us see what fashion is doing. In the July number of the *House Beautiful* occurs the following paragraph:

“The rarest flower in Europe, the edelweiss, is becoming scarcer every year, and unless measures are taken to prevent indiscriminate gathering it is likely to disappear altogether. The edelweiss only grows 2,500 or 3,000 yards above the level of the sea and under special climatic conditions. Unfortunately, the edelweiss has become the ‘fashionable’ flower in Germany since the Emperor commenced wearing it.”

The truth of the matter is that for commercial purposes, the wild supply of edelweiss has long been insufficient and for many years it has been impossible to gather it “indiscriminately,” for it is only to be found in the most inaccessible places. But it has long been cultivated for sale to tourists and makers of souvenirs. In fact, the edelweiss is not difficult to grow in suitable localities, and even in unsuitable ones for it, such as the New York Botanical Garden, it has grown and blossomed for two years in succession, in one of the Composite beds of the Herbaceous Grounds, next to its North American allies, the everlastings and cudweeds. The living plants were obtained from the Buffalo Botanical Garden, where it has also been grown, but a succession of hot, dry summers has killed it. In the shaded and moist rock-garden yet to be built it may probably be made to live.

It would be interesting to learn how many boxes of arbutus are annually mailed in the United States and how near extermination it is at the several stations where it was formerly abundant. We know that at Lakewood there is little of it left, and we hope that George Gould will protect it within the limits of his estate. It is the only way that certain rare plants and birds have been preserved in England, and we are rapidly finding such restrictions necessary. At Natural Bridge all persons are forbidden picking wild flowers. Various places have their fashionable favorites; in the Berkshires it is the fringed gentian, in Boston the *Sabbatia*, at several places in Pennsylvania it is the *Rhododendron*, *Kalmia* and *Asalca*, and New York may well claim first place as destroyer of the Holly and *Prinos* berry. We may well ask, also, where will the Christmas trees and greens come from in the future, if they do not cultivate the balsams and spruces, and cease the reckless destruction of ground-pine and laurel. We are sending now to the southern states for most of the holly and mistletoe and to the states northeast of us for Christmas trees.

Before it became the fashion to use "Galaxy" for funeral wreaths, *Galax* was very abundant in the southern Alleghanies, but now that the leaves are picked by the crate-full, it is becoming more expensive. It is to be hoped that they do not "kill the goose that lays the golden egg."

The custom of filling jardinières with ferns has destroyed many pretty nooks in Bronx Park and is the cause of endless trouble, as the propensity to take them and ignore the signs, seems to be a prevalent feminine failing. None of our native ferns are particularly suited to this purpose, however, and invariably need frequent renewing, so that it would be easy to exterminate any one species very soon, if the depredations were permitted and continued. In the heat of summer nothing is more beautiful and restful than a fern bank; but the sight will not be allowed to New-Yorkers if energetic folk who "must have green things about" have their way. Much care has been taken to transplant into suitably prepared nooks and crevices of the Fern corner, the rarer species and varieties of North American ferns and to surround them with beds of mosses and rocks and shade. The Walking-fern has been exceedingly difficult to establish. There are several stations for this fern within a radius of fifty miles from New

York City, but the stations are kept secret by those members of the "Torrey Botanical Club" who know them, for fear that it will be exterminated. This is the experience of a New England botanist who mourns about her losses in Rhodora for March. "We find the 'Walking-leaf'—to use Dr. Bigelow's English name for the *Camptosorus*—but a pretty habit that it has may be the death of it. Growing amongst mosses and other low plants that need but little depth of soil, and whose interlaced roots weave the whole together, it frequently carpets the flat tops of rocks—a beautiful sight which draws the attention even of idle picknickers who, not realizing that they are destroying years of growth, find it amusing to peel off these mats and then, without a pitying thought, throw them on the ground to die. Thus they have laid bare the rocks within sight of their walks; but away from the paths the interesting fern is still common."

In Connecticut the Hartford or Climbing fern was so nearly exterminated for decorative purposes that a law was passed protecting it. We hope that the newly-awakened popular interest in ferns will not lead to the same sad results, but rather cultivate the love of these beautiful plants and help to protect them.

The Natural Science Committee of the Associate Alumnae of the Normal College has been doing a good work, among the children of the East side, in distributing "Nature Material," holding flower-shows in various places and making "loan-collections" for the use of the teachers. We quote from the last Annual Report which reaches 1,500 members.

During the past year the Natural Science Committee has done all in its power to arouse greater interest in Nature Study, especially among the teachers and children of the public schools. With this object in view, the following lines of work have been carried on:

First, the distribution of "nature material" to the Alumnae School Representatives. There have been five of these distributions and the specimens have been as far as possible "according to season," that the children might come into touch with what was going on in the great world of nature, even though obliged to spend their days amid brick and mortar.

October 12, 1900. Fruits and seeds of all kinds, as well as some of the late flowers, as witch-hazel and fringed gentian.

December 7, 1900. Evergreens of many kinds, holly, ground-pine, etc.

January 16, 1901. Birds' nests, cocoons, starfish, sea-urchins, shells, minerals, etc.

February 28, 1901. Budding twigs in great variety, also mosses, lichens, fungi and sea-weeds.

April 16, 1901. Material for aquaria: frogspawn, tadpoles, snails and aquatic plants. A number of maple seedlings in paper pots were also distributed. In a number of instances barrels of labeled specimens have been sent direct to various down-town schools. "About twenty boxes and baskets were sent every week to the ten vacation schools."

"Through the distributions we reach the teachers, but by means of the flower shows we come into direct touch with the children. Last May the experiment was tried of holding a flower show in one of the down-town schools. It proved even more successful than we had anticipated and we hope to make this a permanent branch of our work, as it seems to be more far-reaching in its effects than anything else we undertake. The flowers are *enjoyed*, not only by the children of the school in which the exhibition is held, but by the neighboring schools which are invited to visit the show after school hours; the mothers of the children are asked to come, and if there chances to be a little leisure time the children from the street are invited in."

It is evident from the above quotations that such wholesale quantities as these must be judiciously selected, or there will be no wild flowers left within easy transportation of the city. One member is reported to have sent 150 *pitcher-plants* from a bog at Plymouth, Massachusetts! We question the wisdom of gathering either fringed gentians, pitcher-plants or christmas-fern, in quantities sufficient for distribution to seventy-five teachers, and we hope the pupils of country schools may be guided to make a wise selection, if they are encouraged to send flowers in quantities to the city schools.

The flowers which may be picked in large quantities, without likelihood of extermination are dandelions, violets, daisies, buttercups, black-eyed Susan, wild carrot, clovers, sweet melilot, golden-rod, asters, and grasses innumerable. But the rarer, dainty woodland wild flowers, that fade as soon as they are picked

such as spring-beauties, dogtooth-violets, bloodroot and hepaticas, columbines, anemone, arbutus and pyxie, azalea and laurel, wilk pinks, geraniums and roses and lilies and orchids, dogwood and viburnums, are far better left to reproduce their kind and add new loveliness in new places next year and for many years after. Several times since our connection with the New York Botanical Garden I have stopped children and teachers who were picking flowers or breaking branches of trees, and have been told it was for "nature study" or for "school" and when asked if they did not know it was against the rules of all public parks to pick anything, they almost invariably replied either that they had been in the habit of picking in this place before it became a Park or a Garden and did not see why they should not continue to do so; or they implied that the object for which they were to be used justified the breach of law. The making of loan collections for the teachers is an excellent plan, and the accumulation of local floras at two or three different educational institutions also will help them. For the children, there are the Museums of National History and Botany and the Children's Museum in Brooklyn, but we hope that besides these, we shall have for a long time yet, places near the city, where the wild flowers may be seen growing and that the children of the public schools may not only learn to "*know them by name and enjoy them,*" but *leave them* to continue their growth. The greatest destruction of all, comes from the draining, clearing and cultivating of wild lands; and in the vicinity of large cities, by the continued extension of their limits; this, of course, is unavoidable.

The Metropolitan Park Commission of Boston has printed a Flora of the parks within their jurisdiction, compiled by various local botanists who volunteered their services, organizing and coöperating for this purpose. It was published in 1896 and special localities were given for a number of rare plants, among them *Pogonia verticillata*, *Habenaria fimbriata*, *Epigaea repens*, *Kalmia latifolia* and *Conopholis Americana* and in the preface we find the following references to them: "The public should be exhorted, if they come across such plants as these, to preserve them rigidly. The true botanist and lover of nature needs no such exhortation."

It would be interesting to know, whether any injurious results

have followed its publication, or whether the Boston public has reached such a high degree of culture both moral and aesthetic that no one makes an exception even of himself?

But the climax has been reached in an advertisement which has been printed in *Rhodora*, the Journal of the New England Botanical Club, since May. It announces that on the Bangor and Aroostook Railroad, there is to be had the "best botanizing in the Eastern States," and proceeds to give the names of stations and lists of rare plants to the length of two whole pages. We ask with amazement, where did they get the information? What botanist sold his birthright for a few railroad passes? Fortunately, many of the plants listed are so rare that only the discriminating and trained botanical specialist will be sure to find them, and the general public will hunt a long time and not know them when they see them.

Mr. Redfield used to tell the story of Rafinesque that when he first found *Corema Conradii*, he threw himself down upon it and stretching out his arms, said "all that I cover is mine." It is not always the most enlightened who are the most unselfish. There have been botanists, even in the Torrey Club, who uprooted plants wantonly and made no good use of them after they were picked. But the custom of carrying "tin trunks" has been largely superseded by presses, and only a few duplicates are now made of each species.

The flora of Great Britain is, perhaps, the best known of any in the world; and there is more knowledge among the working people of special and difficult branches of botany, probably than in any other country, Germany not excepted. Dr. Braithwaite told me that he had sold a great many copies of the *British Moss-flora* to the Manchester weavers.

But many of their rarest plants have been exterminated by botanists, as shown by the following quotations taken from the *Journal of Botany* for July :

"The accuracy in general matters for which the *Daily Mail* has long been conspicuous, extends to its botanical information. We reproduce the most recent item in the hope that the publicity now given to the methods of the 'professional botanist' will cause him to abstain from this nefarious means of adding to his income.

"Four of the daintiest of English wild plants are rapidly dis-

appearing from this country, and one, at any rate, can rarely be seen outside Kew gardens. This is the *Cypripedium Calceolus* commonly known as the 'lady's slipper.' It is really a wild orchid, with a pretty yellow flower resembling in shape the article which has given it its popular name. The other vanishing plants are the *Osmunda regalis*, the *Scolopendrium vulgare* (hart's tongue), and the *Asplenium viride* (green spleenwort), all of which are ferns. Their disappearance is due to the depredations of the tourist, especially of the cyclist, and the professional botanist, who scours the woods and disposes of his 'finds' for a few pence in the streets of the nearest large town."—*Daily Mail*, June 26.

"There can, however, be little doubt that, apart from the ravages of 'professional botanists' and the destructive efforts of various local bodies, who throughout the country are engaged in destroying grassy roadsides and scarifying hedgebanks, to the great advantage of the nettles, docks and other weeds which take the place of the native vegetation, our British plants are threatened with a new danger."

"I have before me the programme of the Essex Technical Instruction Committee for Field Studies in Natural History. The course for 1901 is intended to instruct teachers in the elements of botany by means of rambles in search of wild flowers. One leading feature is a vacation course of ten days in the New Forest. The teachers are to be accompanied by local guides, and their attention is particularly directed to the rarest species, which are specially named, as well as the places in which they are known to grow. To collect, dry and identify plants is the chief aim of the leaders, who not only urge every teacher to make his own collection, but suggest that duplicate plants will prove useful for 'special fascicles.' It seems to me lamentable that teachers should be advised to study natural history by schedules, and to gather plants merely in order to name and dry them. I imagine that they will be worse and not better for working through so dry and barren a course. Nothing shows the want of judgment of the promoters more clearly than that untrained botanists should be seriously advised to pay particular attention to the difficult and uncertain subspecies of the common bramble. But all of us, whether we are concerned with the teaching of botany or not, have an interest in the preservation of

our native plants. The Essex Committee is simply organizing a raid upon plants which are already near to extinction. I hope that they will fail to discover the rarities which they selfishly covet; their enterprise is, I venture to say, an injury to natural history and to education alike. It may not be too late to get this programme cancelled, and I would beg those who care for live natural history to use their influence in diverting the attention of the Essex collectors to some other pursuit where they will do less harm."

ON SCIRPUS ROBUSTUS PURSH AND CERTAIN OF ITS NEAR ALLIES

BY EUGENE P. BICKNELL

A recent article by Mr. M. L. Fernald in *Rhodora*, 2: 239 ("Representatives of *Scirpus maritimus* in America") brings to notice a common eastern bulrush hitherto concealed under the species *Scirpus robustus* Pursh.

Mr. Fernald's paper, of much interest in itself, was of particular interest to me for the reason that this same bulrush clearly announced itself to me in the field several years ago, when I was led over the same technical ground traversed by Mr. Fernald's more recent study, and to conclusions similar to but not identical with those there expressed.

Mr. Fernald's conclusion is that the new plant is related to *Scirpus robustus* as a variety, by which term I understand a state or condition of that species or a tendency of the plant, from whatever cause, to express itself in a particular form more or less divergent from the recognized type.

My own conclusions were that the plant was probably not a very remote derivative, or ancestor, of *Scirpus robustus*, but that the two plants had, nevertheless, reached a condition of organic separateness—of individualization—which could be rightly expressed only in terms of absolute distinctness at species. Here was a case, it seemed to me, one of many, indeed, where extremely close relationship would probably refuse to be transformed under any conditions of environment into actual organic identity.

Mr. Fernald finds this new eastern plant to be identical with the *Scirpus paludosus* A. Nelson from Wyoming. This being true I cannot doubt that the plant should continue to be known

by the specific name conferred by Mr. Nelson rather than by the varietal form proposed by Mr. Fernald.

My own observations on the two plants were made near Van Cortlandt, New York City, where both occurred near together in the same marshes, *S. robustus* mostly along muddy ditches, *S. paludosus* on the open salt meadows or along their borders. I have since found *S. paludosus* abundant on muddy or sandy flats along the coast as far east as Mt. Desert.

Not the least noteworthy distinction between the two plants where they occur together is in their time of flowering, *S. paludosus* coming into bloom three or four weeks before its near relative, sometimes being in full bloom while yet its companion species shows not the first signs of developing spikes. I have found it blooming as early as the third week in May, while the spikes of *S. robustus* do not usually appear until towards the middle of June. Furthermore *S. paludosus* often or usually grows in close colonies, *S. robustus* in scattered groups. My field notes record the following comparative differences between the two as they occur at New York: *S. robustus* is habitually much taller and more leafy, mostly with longer and broader leaves and stouter culms; *S. paludosus* is lower and stiffer, with much shorter and narrower leaves. It is in fact often extremely slender throughout, and though becoming 6 dm. or more tall often bears dense clusters of fruiting spikes when only a few inches high. *S. robustus* becomes 1.5 meters tall, and small examples are usually sterile or only imperfectly floriferous. The dense clusters of mostly ovate, sessile spikes have already been described by Mr. Fernald. In addition I find the scales to be usually darker and relatively shorter, finally becoming more lacerate and the achenes often also darker, thicker and more broadly obovate or sub-orbicular, and the styles shorter. The underground tuber-bearing stems also appear to be quite constantly shorter than those of *S. robustus*.

S. paludosus has undoubtedly much the habit of *S. campestris* Britton, of the prairie region, which is also rated by Mr. Fernald only a variety of *S. robustus*. Of the perfect distinctness of *S. campestris*, however, I can feel no doubt after the examination of fully matured examples showing a form of achene which in

greater narrowness and more pointed apex, besides duller color, was unmistakably different from that of *S. robustus*.

The purpose of this paper, however, is not to announce a mere want of exact accord in the results of two independent studies of the plants in question but rather to bring out the existence of still another New England bulrush of the *S. robustus* group certainly very distinct from any other at present recognized. This plant was collected by me in mature fruit August 20, 1898, on the shore of Somes Sound, Mt. Desert, Maine, growing in company with *S. paludosus*. This plant may appropriately bear the name of Mr. Fernald, through whose critical industry the old genus *Scirpus* in New England has become scarcely recognizable in its lineaments of to-day.

Scirpus Fernaldi sp. nov. Rather pale green, from 4-8 dm. high, the slender culms sharply three-angled and striate: stem-leaves long and narrow, the longer ones equalling or surpassing the inflorescence, 2-6 mm. wide, slenderly attenuate: primary involucre leaf erect, mostly 15-20 cm. long: spikes rather pale, short-ovate or finally broadly ovate, mostly 10-15 mm. long, 1-3 in a sessile or stipitate cluster and 1-5 solitary, on slender stiffly flexuous or crinkled, wiry, diverging peduncles 2-7 cm. long: scales finely close-puberulent, the lower ones often rather widely ascending, membranous, acuminate, entire or bifid or becoming lacerate, the midvein excurrent in a slender flexuous or recurved awn 3-12 mm. long: achene rather yellowish-brown and shining, broadly truncated, obovoid-cuneate, 2.5-3 mm. long, and broad, usually slightly longer than broad, almost equally trigonous or slightly depressed trigonous, the angles rounded or the dorsal swelling more or less umbonate, short-mucronulate and sometimes slightly retuse, the slender style several times the length of the achene, bearing three slender stigmas; bristles shorter than or subequal with the achene.

Type in herbarium of the New York Botanical Garden.

The pale, short-ovoid spikes, some of them on slender, elongated peduncles, and bluntly trigonous achenes, mark this plant off distinctly from all of its near allies.

A WEEPING CRATAEGUS

BY JOHN K. SMALL

Several years ago Mr. A. H. Curtiss sent me specimens of a very slender *Crataegus* which he had collected near Crestview in

western Florida. A year later the collectors of the Biltmore Herbarium secured more complete specimens from the same locality, some of which, together with the field notes, Mr. C. D. Beadle has kindly placed in my hands. The species may be characterized as follows:

Crataegus lacrimata

A small tree 4-5 meters tall, with a single trunk 1-2 dm. thick, or more frequently with several main stems 1-2 meters long, the branches "weeping." Bark of the branches gray, often slightly scaly: branches and twigs zigzag, armed with thorns or thorn-like spurs 1-3 cm. long: leaves numerous; blades firm or leathery, cuneate-spatulate, 1-2 cm. long, or rarely slightly longer, predominately truncate or rounded at the apex or often a few of them merely blunt or acutish, toothed mainly at the apex or above the middle, with a minute dark gland terminating each tooth, 3-nerved, glabrous at least when mature, cuneately narrowed into slender finely pubescent petioles: corymbs 2-4-flowered, or sometimes developing a single flower: pedicels 8-13 mm. long, glabrous at least in age, occasionally bearing a few linear-filiform deciduous scales: hypanthium turbinate, the lower part even, the upper and more spreading part ridged: sepals 2.5-3 mm. long, about as long as the hypanthium, lanceolate or triangular-lanceolate from a triangular or more dilated base, entire, glabrous, with reddish or brownish tips, early and permanently recurving: petals 5, white, suborbicular, 5-6 mm. broad: stamens normally 20; anthers yellowish, about 1 mm. long: pomes pyriform when young, becoming globose or nearly so at maturity, yellow, orange or orange-red, with a thin but succulent flesh, crowned with a short neck representing the remains of the top of the hypanthium: mature carpels usually 3, minutely roughened, 5-6 mm. long and nearly as broad.

Along streams in pine woods, near Crestview, Florida.

Crataegus lacrimata is most closely related to *C. lepida* and like it has drooping branches with relatively short internodes; but *C. lepida* is a small thorny shrub seldom over 1 meter tall; it also differs in the glabrous or glabrate foliage and inflorescence and in the longer narrower and more attenuate bases of the leaf-blades. *Crataegus lepida* bears leaves with obovate, orbicular-ovate or nearly orbicular blades which at the time of unfolding are both pubescent and glandular, while the pedicels and hypanthium are tomentose during anthesis, whereas in the case of *C.*

lacrimata the twigs are glabrous or nearly so, the leaves with their narrow blades only slightly if at all pubescent, except on the petioles, and not glandular, while the pedicels and the hypanthium are glabrous. The types specimens (Biltmore Herbarium no. B 17 and B 969) are in the Herbarium of the N. Y. Botanical Garden.

The plants flower during the first half of April, good flowering specimens having been collected on April 8, 1899, while the fruits ripen after the middle of August and have fallen, usually before the first of September.

REVIEWS

Seed Plants*

The first part of the "Morphology of Spermatophytes" deals with the Gymnosperms alone, and is presented as the outgrowth of a course of lectures and laboratory work at Chicago University. A chapter is devoted to each of the four orders, Cycadales, Ginkgoales, Coniferales and Gnetales. In the sections of these chapters on vegetative organs there are a number of half-tone habit illustrations from photographs but the majority of original illustrations are those of the development of the ovule and pollen grain in *Pinus Laricio* by Chamberlain.

The chapter on the Conifers is naturally the most detailed, both from the present importance of the group in the temperate zone, and since more morphological and cytological work has been done on it. The Gnetales are treated purely from comparison of literature owing to difficulty in obtaining material. The internal treatment of each group is what one would expect, dealing first with the vegetative organs including a limited amount of anatomy, more especially of the stem. The spore-producing members, the gametophytes and the embryo are the other sections of these four chapters. One realizes in comparing the review of the embryology of the four groups how much work is still to be done in tracing the stages of the development of the critical regions of the embryo itself. The authors have, it seems, not added to our knowledge on this point. The question of the possible homologies of the ovuliferous scale and bract is considered at some length and a working decision given in favor

* Coulter, John M., and Chamberlain, Charles J. Morphology of Spermatophytes. Part I. Gymnosperms, 8vo., pp. x + 188. D. Appleton & Co., N. Y., 1901. Price, \$1.75.

of regarding the scale as a carpel rather than with Celakovsky, as an outer integument.

The remaining four chapters of the book are a comparative summary of those preceding, with two devoted respectively to fossil gymnosperms and geographical distribution. The fossil forms are treated practically from the standpoint of Scott and there are new illustrations of *Cycadeoidea* from the preparations of Wieland, of Yale. One looks perhaps for a rather more thorough treatment of the intermediate group of Cycadofilices from which, according to the authors, the cycads are derived through the Bennettitales, while the Ginkgoales and Coniferales originate through the Cordaitales. This phylogeny looks to the Filicales as the ancestral group of the Gymnosperms because of the close similarity of the Cycads and Cycadofilices.

The book serves as a very convenient and up to date summary of the literature of the subject; a separate bibliography is given for the five more important chapters and a complete bibliography at the end of the book. The references from the text are made, however, by numbers corresponding to the chapter bibliography, which is not as convenient for the reader as footnotes; and the chronological arrangement of even the shorter bibliographies seems unnecessary. The half-tone illustrations are not always as satisfactory as the older line work especially for anatomical reproductions (see Fig. 47), or for such morphological details as the seedling leaf forms (Fig. 42), of which the arrangement as a whole is excellent. The book undoubtedly provides a useful and concise review of the present knowledge of Gymnosperms.—

LOUISE B. DUNN.

Practical Text-Book of Plant Physiology. By D. T. MACDOUGAL, Ph.D. Longmans, Green & Co., 1901.

In this text-book the author departs somewhat from the usual arrangement of the subject found in the majority of plant physiologies. In the opening chapter on the "Nature and Relations of an Organism" are found excellently clear and concise definitions of such phenomena as rigor, irritability, tonicity, etc., which must be of great service to the student in forming a definite conception of these underlying and often not properly understood principles of plant physiology. Following this chapter are several on the relation of plants to various external agents. In the

first of these, the "Relation of Plants to Mechanical Forces," is found a very full treatment of experiments which have to do with contact stimuli—more particularly by the curling of tendrils—on which the author himself has already done much work.

The third chapter, entitled "Influence of Chemicals upon Plants," treats of this subject in its broadest aspect, including a full list of experiments on the toxic action of various salts. The title of this section may possibly be open to criticism by some, owing to the somewhat limited field which the term "chemicals" covers, in its common, though perhaps not correct, usage.

In the relation of plants to the influence of water, gravity, temperature, electricity and light is found the subject of the next five chapters. In the consideration of the influence of light the author treats it from the interesting standpoint of light as a stimulating rather than as a retarding agent in the matter of phototropic effects.

Chapter nine deals with the "Composition of the Body," or, in other words, with the substances found in plants. Following this the "Exchanges and Movements of Fluids," including osmosis, the transpiration current, etc., are taken up, while "Nutritive Metabolism" is not introduced until the eleventh chapter.

In connection with this we find the subject of the next chapter is "Respiration, Fermentation, and Digestion." Under the last-named head fall the experiments with enzymes which are very complete and practical.

The phenomena of growth in itself, aside from the growth attending curvatures, is kept until almost the last, perhaps that they may be contrasted and compared with those of reproduction, which is very fittingly the final chapter of the book. An appendix of chemical and physical tables and a copious index is included.

Throughout the book we find a clear cut and concise style which to the student will prove a great boon. Particularly are the opening sections of each chapter to be mentioned; they serve to properly orient the reader on what is to follow. When the immense ground to be covered is considered, the very complete list of experiments can but prove satisfactory and almost always well chosen. Several new contrivances, among which is a precision auxanometer, will recommend themselves to the experimenter.

H. M. RICHARDS.

TORREYA

September, 1901

DISTRIBUTION OF PTEROSPORA

BY D. T. MACDOUGAL

Pine Drops (*Pterospora Andromedea* Nutt.) ranges over a region extending from Mexico northward through California and the Rocky Mountain district into British Columbia, appearing east of the Mississippi River in Michigan, and ranging eastward and also southward along the Alleghany Mountains. These two apparently separate areas are probably joined by a belt extending westward through Canada above the headwaters of the Mississippi. The plant is an inhabitant of the pine or transition zone, and its climatal relations are indicated by its limits in southern Arizona, where it occurs only at elevations between 7,000 and 8,000 feet.

In the course of some recent studies on the physiology of this symbiotic saprophyte (*Annals of Botany*, 1899) the author was unable to obtain living specimens from eastern United States, and from facts given by correspondents and brought to light by the author, it was concluded that this species was moving toward extinction. It has become extremely rare east of the Mississippi River: not more than a dozen specimens were found in Arizona in a region three hundred miles long, and not a score have been seen in northern Idaho in two seasons' work in collecting.

During the present season, however, the writer has traversed the Mission Mountains as a member of the Biological Expedition from the University of Montana, and met this plant in great abundance. It is found at altitudes of 3,000 to 4,000 feet in the rich humus of coniferous woods, and at one place east of the southern end of Flathead Lake a hundred stalks were counted within a radius of thirty feet of the observer, and many thousands

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 8, comprising pages 85-100, was issued August 23, 1901.]

were seen in the course of a day's walk. The plant probably attains its greatest density of distribution in this locality.

The plant derives all its food material from humus by the aid of a fungus living in the roots, which form a small compact mass no larger than a golf ball. Any disturbance or departure from the conditions offered by a primitive forest would be detrimental to the growth and development of both the *Pterospora* and the fungus with which it is allied. It will, therefore, probably become extinct in eastern United States, but will retain its foothold among the western mountains until its habitats are ravaged by fire, or by clearing of the forest.

In its habitat in the Mission Mountains, *Pterospora* occurs more abundantly in a given locality than any other known chlorophyllless seed plant.

TWO NEW BUSH CLOVERS (*LESPEDEZA*)

BY EUGENE P. BICKNELL

It may well be doubted whether the notable activity of the last few years in the critical exploration and study of our common flora has yet achieved anything more than a very good beginning.

A few years ago the discovery of a new eastern species was hailed as a botanical event. Now, no season passes but a numerous progeny of new species is transplanted from nature into the pages of our botanical serials, and still in the background many others await their turn. The doors to new discovery, thought by the last generation of botanists to be barred and locked by our earlier manuals, have been easily pushed wide open, and, lo, we find a beginning where our predecessors seemed to find the end.

Among the species of *Lespedeza* that have all this time been awaiting recognition, two well-marked eastern plants may here be distinguished.

Lespedeza velutina

Erect, stout, bushy-branched above or sometimes simple, 0.5-1.25 meters high, the appressed-ascending branches mostly

not over 10–15 cm. long, densely velvety-pubescent throughout, the younger parts soft-canescens. Leaves numerous, crowded, ascending or subappressed, on short petioles mostly 3–5 mm. long, shorter than or slightly exceeding the very narrow, recurved-spreading stipules; leaflets oblong, somewhat narrowed to the base, rounded to the short-mucronulate apex, 25–40 mm. long, 8–18 mm. wide, densely tomentose-ciliate, the odd leaflet usually slightly the largest on a foot-stalk longer than the petiole: inflorescence capitate in dense clusters axillary to the upper leaves or crowded at the ends of stem and branches; heads ovoid or broadly ovoid, subsessile or on obscure petioles becoming 10–15 mm. long: corolla 6.5–8.5 mm. long, subequal with the calyx lobes; standard pure white with a crescent of suffused pink-purple streaks in the middle, oblong and partly conduplicate, nearly horizontal; wings as long as the standard, linear-oblong, narrowed to the tip, white; keel shorter, purplish-margined toward the tip: calyx-lobes linear-lanceolate, attenuate, exceeding the corolla, becoming 8–10 mm. long, densely hoary-pilose: pod oblong or narrowly rhomboid, gradually narrowed to each end, 5–6 mm. long, mostly 2.5 mm. wide, densely short-pubescent; much shorter than the calyx-lobes.

NEW YORK: Woodlawn, border of low thicket, beginning to flower from the middle to the end of August.

MASSACHUSETTS: Beach Bluff, August, 1889, *Wm. E. Wheelock*.

Type from Woodlawn, N. Y., August 28, 1898, flowers; September 25, 1898, fruit: in herb. New York Botanical Garden.

This species, although beautifully distinct from *L. capitata* Michx., resembles that common species so closely in general habit that it is not surprising it has remained undistinguished. The soft velvety pubescence covering both surfaces of the leaves and showing nothing of the appressed and silky character of that of *L. capitata* and its more western variety *sericea*, will alone always easily distinguish *L. velutina* from these near relatives.

It should be noted further that its flowering time is from two to four weeks later than that of *L. capitata*.

Lespedeza Brittonii

Densely soft cinereous-pubescent or tomentose, especially above, with finally spreading hairs, becoming sparsely pubescent below, the upper surface of the leaves thinly subappressed-pubes-

cent to glabrate : roots strong and greatly elongated : stems wand-like and widely ascending, sometimes forming dense growths several yards in extent, 0.6-1.25 meters long, simple or with numerous, short, subappressed branches above, sometimes with longer ascending branches from near the middle : leaves rather light green, thickish, on short petioles mostly 2-10 cm. long, the joints of the leaflets, especially, cinereous-tomentose ; pubescence of lower surface short-tomentulose, that of the midrib denser and more spreading, the margins tomentulose-ciliate ; leaflets oblong, rounded or somewhat narrowed to base and apex, mucronulate, 20-45 mm. long, 8-20 mm. wide, the odd leaflet slightly the largest and on a petiolule 3-10 mm. long : flowering portion of stem elongated and bearing short stiffly subappressed branches and reduced leaves : cleistogamous flowers clustered on short lateral branches : petaliferous flowers short-spicate at the ends of slender peduncles 2-5 cm. long subterminal on the stem and sometimes on the branches ; spikes closely flowered, shorter than their peduncles, short-oblong or globose, sometimes appearing capitate, 10-20 mm. long : flowers very short-petioled or subsessile : corolla 6-8 mm. long, much surpassing the calyx, whitish and pink tinged with purple, which deepens to a streaky purple spot at the base of the standard : calyx-lobes linear-attenuate, 4-5 mm. long : pod ovate or oblong-ovate, abruptly acute to somewhat acuminate, 4.5-6.5 mm. long, twice the length of the calyx-lobes or less, thinly puberulent all over with short subspreading or tomentulose hairs.

MASSACHUSETTS : Boston, Muddy Pond Hills, September 10, 1892, *Edwin Faxon*, herb. Columbia Univ.

NEW YORK : Near Bronxville (two stations), in dry soil outside the borders of woods, flowering in late August and early September.

NEW JERSEY : Quaker Bridge, *C. Pickering*, Herb. Acad. Nat. Sci. Philadelphia.

Type from Bronxville, N. Y., September 4, 1893, flowers ; September 16, 1893, fruit : in herb. N. Y. Botanical Garden.

Somewhat intermediate in characters between *L. Nuttallii* Darl. and forms of *L. procumbens* Michx., but larger than either and well marked throughout as perfectly distinct.

The much smaller and normally trailing *L. procumbens* scarcely needs close comparison. *L. Nuttallii* is a smaller, normally erect and much less pubescent plant, with more delicately and freely branched inflorescence, longer and more slender petioles, thinner and broader leaflets, which are paler and appressed-pubescent beneath, more scattered inflorescence of smaller flowers in smaller

and looser less strongly pedunculate spikes, longer-pedicelled pods, which are longer, narrower and more acuminate, with longer and more or less persistent instead of early deciduous styles, and with the pubescence coarsely appressed-hairy instead of thinly tomentulose.

It would appear that so well distinguished a plant, if not a rare species, would have been often collected unless by reason of its very brief flowering period it has escaped notice when in flower and at other times has been passed over for some common *Meibomia* which in appearance it strongly suggests.

NOTES ON LIRIODENDRON LEAVES

BY EDWARD W. BERRY

(WITH PLATES I AND 2)

The accompanying plates represent leaves borne near flowering buds, either foliar flower-bud-scales or the next older leaf than the bud-scale on full grown trees. Those figured on plate 1 are one-fourth natural size, and those on plate 2 are two-thirds natural size. They all serve to confirm the view previously affirmed* that the diversion of sap for other purposes causes the abbreviated Liriophyllum-like leaf-form in this genus (*i. e.*, *Liriodendron*). The broadly-winged stipular appendages of the leaf-stalk are much commoner this year (1901) than I have ever before observed them and it is quite possible that this excessive stipular development may be a correlative of the long continuous wet weather which was such a remarkable feature of the past spring. Further support of this view is furnished by the ordinary stipules which seem to average much larger in size than usual.

In some of the specimens the stipules are merely adnate, and doubtless would, in a less wet season, become entirely separated, splitting away from the petiole when it straightened, as do the winged petiolar appendages in some species of *Magnolia*. Other of the specimens however show evidence of a true persistent union between petiole and stipule.

Of Figs. 3, 6, 7, 8, 11, and 12, the only one that need be especially mentioned is the leaf shown in Figs. 6 and 7. Fig. 6 shows the entire leaf with its winged petiole, and Fig. 7 the en-

* Bull. Torr. Club, 28. S. 1901.

larger detail, to which attention is especially directed, together with a cross section of the petiole showing the fibrous margin formed by the descending lowest primary vein. The lowermost vein divides as it approaches the midrib, the upper branch joining the latter, while the lower branch is directed downward and passes along the side of the petiole, remaining distinct as a tiny fibrous margin of the latter all the way to the point of insertion of the stipular wings.

Figs. 1, 2, and 4 show specimens in which the leaf-blade has only developed sufficiently to form very small, ovate leaves which, both in shape and venation, are very similar to *Liriodendron* cotyledons, or to what I consider the ancestral type of *Liriodendron* leaf to have been. Their summits are crowned with a longer or shorter length of the persistent awn-like tip of the midrib (in Fig. 1 the latter is 5 mm. in length).

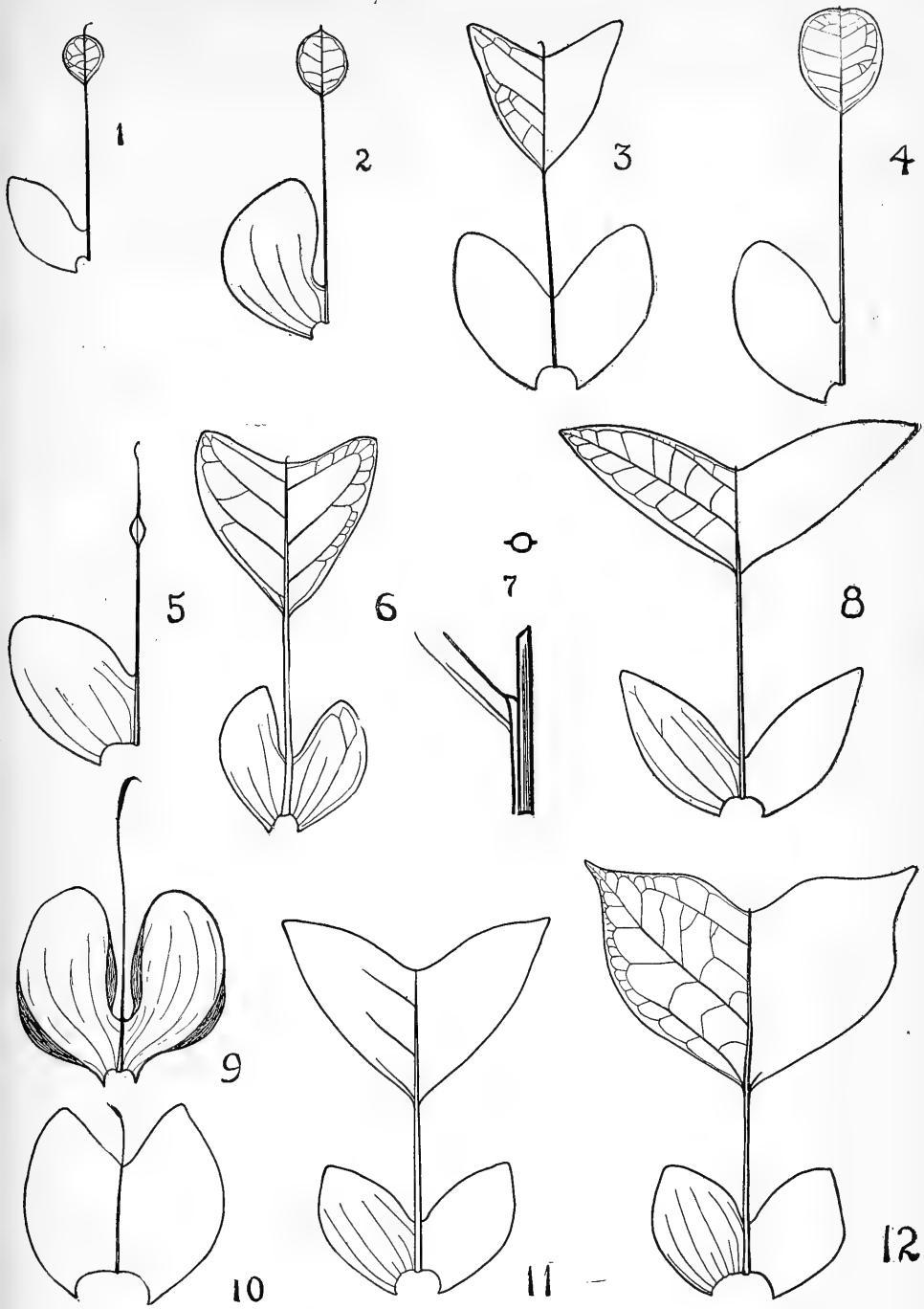
Figs. 5, 9, and 10 show what I considered after careful comparison and measurement to be anomalous flower bud-scales, before I found them in position on the tree. Afterward I found numerous specimens in position (Figs. 13 to 16).

The forms figured at 10, which are quite common, have the midrib developed for a considerable distance as a thread-like, fibrous bundle with no trace of green tissue. In those forms figured at 9, of which I have numerous specimens, the midrib is much more extensively developed, being the normal length of a true midrib, and bearing at its summit a thickened cylinder of green tissue, evidently an abortive leaf-blade.

In Fig. 5, this mass is expanded into a true leaf-blade, ovate-lanceolate in shape, and of tiny dimensions, bearing at its summit the extended midrib as an awn of 21.5 mm. in length.

Fig. 10 minus the extended midrib shows the ordinary form of the flower bud-scales which may be found in great numbers rolled up on the ground beneath the trees as soon as the buds have swollen sufficiently to cast them off.

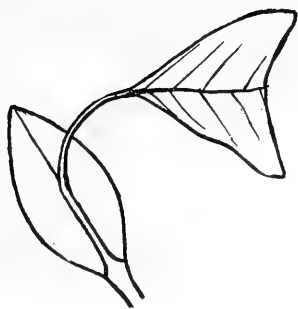
Figs. 5, 9, 10, 13, 14, 15, and 16 are especially interesting inasmuch as they are practically identical with the foliate bud-scales referred to in a previous paper (*l. c.*) as occurring in the related genus *Magnolia*.



E. W. B.

LIRIODENDRON LEAVES

¼ nat. size.



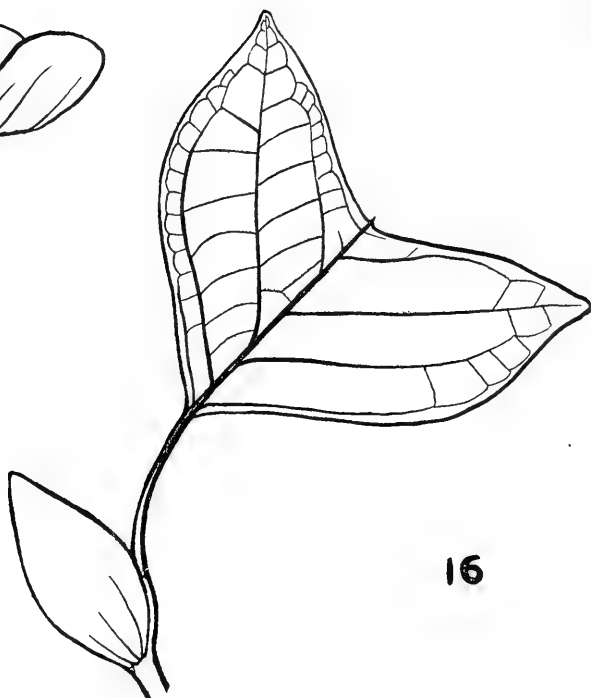
13



14



15



16

E. W. B.

LIRIODENDRON LEAVES

It has seemed best not to enter into a detailed discussion of the foregoing specimens at this time, but simply to publish them with the hope that observers who may run across similar specimens will kindly communicate with the writer, who intends publishing a more elaborate essay on *Liriodendron* in the near future.

EXPLANATION OF PLATES

Plate 1. Leaves of *Liriodendron Tulipifera* L., from mature trees at Passaic, N. J., all $\frac{1}{4}$ natural size except Fig. 7.

Figs. 1, 2, 4. Small, primitive-shaped leaves.

Figs. 3, 6, 11, 12. Leaves with winged petiole.

Figs. 5, 9, 10. Flower bud-scale.

Fig. 7. Enlarged detail of petiole and cross section.

Fig. 8. Acutely bilobate leaf with winged petiole.

Plate 2. Leaves of *Liriodendron Tulipifera* L., from mature trees at Passaic, N. J., all $\frac{2}{3}$ natural size.

Fig. 13. Posterior aspect of foliar flower-bud-scale.

Fig. 14. Lateral view of a similar somewhat older specimen.

Fig. 15. Posterior view of same specimen.

Fig. 16. Lateral view of a bud-scale bearing a large, more normally shaped blade and petiole.

PASSAIC, N. J.

TWO SPECIES OF CHAMAELIRIUM

BY JOHN K. SMALL

More than ten years ago Dr. Britton collected a fruiting plant of a *Chamaelirium* in the mountains of West Virginia. This specimen was seen to be characteristic, particularly on account of its large long-pedicelled capsules, but for some time nothing else in our collections appeared to correspond to it very closely. However, several years since, specimens from a number of localities have been obtained which have characters similar to those possessed by the West Virginia plant and which together with it doubtless represent an undescribed species. Therefore, the genus *Chamaelirium* becomes a genus of two species, instead of being monotypic as heretofore considered.

KEY TO THE SPECIES

Capsules oblong or ovoid-oblong, 7-10 mm. long.

1. *C. luteum*.

Capsules obovoid or oblong-obovoid, 12-14 mm. long.

2. *C. obovale*.

1. CHAMAELIRIUM LUTEUM (L.) A. Gray. Stems 2-12 dm. tall, those of staminate plants shorter than those of the pistillate,

simple: leaves mainly basal; blades spatulate or oblong-spatulate, 5–20 cm. long, tapering into broad petioles; stem-leaves usually oblanceolate to lanceolate or linear, few: racemes spike-like; staminate usually continuous, 5–20 cm. long, the tip nodding; pistillate stiff, interrupted, longer than the staminate; pedicels 1–5 mm. long: perianth (staminate) white; sepals and petals narrowly linear: capsules ovoid-oblong or oblong, 7–10 mm. long.

In open woods, Massachusetts to Ontario, Michigan, Florida and Arkansas. Spring and summer. I cite the following fruiting specimens:

NORTH CAROLINA: Roan Mountain, September 9, 1885, *Dr. and Mrs. Britton*.

TENNESSEE: Jackson, May, 1893, *Mr. S. M. Bain*, no. 173.

GEORGIA: Macon, *Dr. Boykin*.

FLORIDA: Apalachicola, *Dr. Chapman*.

2. **Chamaelirium obovale.** Stems 6–11 dm. tall, leafy at the base and to near the middle, somewhat zigzag: leaves various; basal with spatulate blades; cauline shorter, 4–15 cm. long, oblanceolate to lanceolate or linear, acute or acuminate, erect or ascending: flowers manifestly larger than those of *C. luteum*: capsules obovoid or oblong-obovoid, 12–14 mm. long, on stout club-shaped pedicels usually fully as long as the capsules or slightly shorter.

In open woods, New York to West Virginia, North Carolina and Alabama. Spring. I cite the following fruiting specimens:

NEW YORK: Apalachin, *Mr. F. E. Fenno*, no. 396.

NEW JERSEY: Sneden's Landing, on the Palisades, 1862, *Dr. Torrey*.

WEST VIRGINIA: White Sulphur Springs, August 19, 1890, *Dr. Britton* (type); Aurora, August and September, *Mr. and Mrs. E. E. Steele*.

ALABAMA: Auburn, August 11, 1897, *Messrs. Earle & Baker*.

Chamaelirium obovale seems to be rather characteristically an Alleghanian species and, as far as we know, approaches the sea coast only near New York City. On the other hand *C. luteum* is most common in the middle and low country of the southern states.

SHORTER NOTES

THE STORING OF SEEDS BY SQUIRRELS.—At Chilson Lake, Essex county, N. Y., on June 15th, I collected a mass of white pine seedlings from a hollow at the base of a pine tree, which convinced me that a "chipmunk" had stored them there for

winter use and forgotten them. Scattered through the woods among the paper-birches, I collected also clusters of seedlings which looked as if a whole catkin had germinated just as it fell. This also was probably the work of the squirrel for the seeds usually fall out and are blown away singly. These seedlings were brought home and some of them potted just as they were; the young plants have "*thinned themselves out*," and the few that remain in each pot, lean away from each other at precisely the angle which *clumps* of birches grow in. It seems probable that this will explain why the birches are frequently found growing in this way.—E. G. BRITTON.

NOTES ON ASTRAGALUS.—One of the most common failings of manual descriptions results in leaving the student without a vivid and definite impression of the plant as a whole, segregating it and its kind from all others; in other words, a *specific* impression. One is impressed by this more and more as he does larger amounts of field work and sees the plants at home and learns to know them equally well at all seasons. The best books become then "a weariness to the flesh" at times, because of their laboratory flavor. The illustrations in Britton and Brown help notably to overcome this failing, though they can give but one form where several may be found by the investigator in the field. Two species of *Astragalus*, with which it has been my good fortune to live, fail to find their proper description in any manuals that I have seen, viz., *A. Plattensis* Nutt. and *A. Hypoglottis* L. These are both caespitose in habit, from underground stems, forming beds a rod or more in extent, possibly and probably from several parent plants. *A. crassicaarpus* Nutt. and all the others with which these are botanically associated *branch from the crown* of a deep tap-root. The individual plants remain self-centered and isolated while the two of which I speak may be called gregarious. Now I wish to insist that this is the characteristic of these two species, so that with a slight knowledge in addition the collector may identify these species without waiting for fruit to mature, as otherwise he might have to do. Surely such marks as these, if known to the author, should never be omitted from any descriptions. Yet these are the very ones that are most likely to be omitted.—J. M. BATES.

NEWS ITEMS

The Macmillan Company announces the approaching publication of a "University Text-Book of Botany," by Professor Douglas Houghton Campbell.

Dr. N. L. Britton, in company with Prof. J. F. Cowell, Director of the Buffalo Botanic Garden, is spending a few weeks in St. Kitts, West Indies.

Mr. R. S. Williams left New York early in July for Bolivia, where he expects to be engaged for a year or more in botanical explorations.

Specimen pages of a catalogue of the "Pteridophyta and Spermatophyta of Southern California," by Mr. Samuel B. Parish have been issued. The volume is published by the Southern California Academy of Sciences.

"Plant Life of Alabama," a notable work by the late Dr. Charles Mohr, has appeared as Vol. VI. of the Contributions from the National Herbarium. It forms a large octavo volume of 921 pages. Dr. Mohr's death occurred on July 17th; his greatest botanical work was issued on July 31st.

Miss Olivia E. Phelps Stokes and her sister, Miss Caroline Phelps Stokes, have donated three thousand dollars to the New York Botanical Garden to be employed in special investigation into methods of protecting native plants from extermination.

The Summer School of Science for the Atlantic provinces of Canada, held at Lunenburg, Nova Scotia, has had this year an enrollment of over three hundred pupils. The botanical instruction was in charge of Mr. G. U. Hay, A.M., and Mr. J. Vroom.

Dr. Arthur Hollick, recently of the Department of Geology of Columbia University, has been appointed an assistant curator of the Museums of the New York Botanical Garden, where he will have special charge of the palaeobotanical collections.

Professor L. M. Underwood returned from Puerto Rico in the latter part of July, bringing valuable collections of living plants, seeds and dried specimens for the New York Botanical Garden. He has since been devoting several weeks to explorations in Colorado.

“*The American Botanist*, a monthly journal for the plant-lover,” edited and published by Mr. Willard N. Clute of Binghamton, N. Y., is one of the latest additions to the rapidly increasing list of American botanical periodicals. The first number was issued in July.

Mr. Percy Wilson, who accompanied the Todd eclipse expedition to the Dutch East Indies in the interests of the New York Botanical Garden, reached New York again on August 20th. Among his collections are interesting exhibits for the economic museum and numerous living orchids.

The New York Botanical Garden expedition to Nova Scotia and Newfoundland returned to New York on September 9th. About 12,000 dried specimens were secured, including 4,000 of marine algae. A considerable quantity of algal material preserved in fluids was also obtained.

The department of biology of Teachers College, Columbia University, will move into new and more spacious quarters before the opening of the university in October, a complete suite of large rooms having been remodelled for its accommodation. There will be two large laboratories facing north and east, stock rooms, photographic and physiological dark rooms, and aquarium room, besides the private offices of the instructors.

Dr. Theodore Greely White, of late an assistant in the department of physics of Columbia University, died in New York City on July 7th, aged twenty-nine years. Dr. White will be remembered as a contributor of articles of merit to the *Bulletin of the Torrey Botanical Club* and the *Asa Gray Bulletin*. His chief interests during the last four or five years were in the line of geology and physics, but he had remained a member of the Torrey Botanical Club up to the time of his death.

A “Society for the Protection of Native Plants” has been organized in Boston and vicinity, and leaflets are being published by it directing attention to plants which are in special danger of becoming extinct, at least locally. These leaflets are designed for distribution to teachers in the schools and to others in position to further the aims of the society. They may be obtained by addressing Miss Maria E. Carter, Curator of Herbarium, Boston Society of Natural History, Berkeley Street, Boston.

The first meeting of the International Association of Botanists was held at Geneva, Switzerland, August 6th, 7th and 8th, under the presidency of Professor Chodat, of the University of Geneva. Complete organization was effected and a set of statutes adopted. Provision was made for the management of a periodical for the reviewing of botanical literature. The further important item of business consisted in the purchase of the *Botanisches Centralblatt*. Professor K. Goebel, of Munich, was elected President for the ensuing session and Professor F. O. Bower, of the University of Glasgow, Vice-President.

During the recent meetings in Denver, the botanical interests of the country were well represented in the Forestry Association, the Society for the Promotion of Agricultural Science, the Botanical Club, Section G of the American Association, and the Botanical Society of America. Despite the long distance which most of the botanists in attendance had to travel, many representative botanists were present and programmes of the usual length and interest were presented. A number of botanists made short field excursions in various parts of Colorado at the close of the meetings. The next annual meeting of the American Association for the Advancement of Science and the affiliated Societies will be held in Pittsburg in the latter part of June, 1902; business sessions will be held in Chicago during convocation week at the beginning of the year. Dr. D. H. Campbell was elected Chairman, and Dr. H. von Schrenk, Secretary, of the Botanical Section of the Association; Dr. J. C. Arthur was elected President of the Botanical Society of America and Dr. D. T. MacDougal, Secretary. Among the important business coming up before the Botanical Society of America, it was formally resolved:

“That it is the present policy of the Society to accumulate invested funds until the annual income, interest and dues, is at least \$500, and then to use such income yearly, or at greater or less intervals, as circumstance may dictate, for the best advancement of botanical knowledge.”

A committee consisting of Drs. Trelease, Britton and Robinson was appointed by the Society, to investigate and report upon the condition of the National Herbarium.

TORREYA

October, 1901

A FOSSIL NUT PINE FROM IDAHO*

BY F. H. KNOWLTON

Some months ago I received from Mr. Waldemar Lindgren, of the U. S. Geological Survey, a fossil pine cone that had been obtained by one of his associates in the Snake River Valley, near Bernard's Ferry, Idaho. Unfortunately it was not found in posi-



FIG. 1. Lateral view, showing the scales.

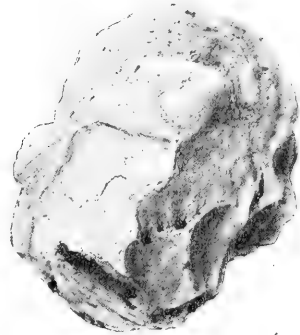


FIG. 2. Lateral view, showing scales with seed-cavities at their bases.

tion, having been picked up by a local ranch owner, but with little doubt it is from the Pliocene lake beds that are so abundantly exposed in that vicinity. It is silicified and in general so closely resembles material from the lake beds as to make it reasonably certain that it came from them.

* Published by permission of the Director of the U. S. Geological Survey.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. I, No. 9, comprising pages 101-112, was issued September 28, 1901.]

I propose for this species the name

Pinus Lindgrenii

Cone apparently ovoid or nearly globular in shape; fertile scales very thick, 2 cm. or more broad at apex; nut oblong or obovoid, full and rounded at both ends, about 1.5 cm. long, and 1 cm. or a little less in diameter.

This cone, which is fairly well shown in figures 1, 2 and 3, was, as nearly as can be made out, about 5.5 cm. in length and 4 cm. in diameter. It is irregularly broken through the fertile portion, thus well exposing the large seed-cavities at the base of



FIG. 3. Basal view, showing the large seed-cavities.

the scales. The remaining scales diminish rapidly in size, those at the apex being only 4 or 5 mm. in long diameter. In several of the seed-cavities fragments of the very thin and evidently brittle shell of the seed can still be observed, and in one cavity a brownish, carbonaceous mass appears to represent the seed itself.

So far as I am now aware, this is the first undoubted nut pine to be described in a fossil state from this country. In the compact, almost globular, shape of the cone, this pine seems most closely to resemble *Pinus edulis*, but the size and shape of the scales, and the larger seeds seem to bring it closer to *P. monophylla*. Although having a cone that was apparently little if any larger than the ordinary cones of *P. edulis*, the seeds are noticeably larger than those of either this species or *P. monophylla*. The present range of *P. edulis* covers the general locality where *P.*

Lindgrenii was found, while *P. monophylla* occurs more to the southward, yet the conditions during Pliocene times may have been very different, and it is perhaps reasonable to conjecture that this fossil species was the ancestor of *P. monophylla*.

SOME POPULAR PLANT-NAMES USED IN GEORGIA

BY ROLAND M. HARPER

The following plant-names are a few of those which I have picked up in Georgia during ten years of residence and two summers of travel in the State. Every one is in common use in some part of the State, though many of them have apparently never come to the notice of botanists. They are used by people who have no knowledge of botanical literature, and have never been influenced thereby as have so many of the inhabitants of the northeastern states.

As the customs and dialects of the people vary to a considerable extent in different parts of Georgia, I have thought best to give in connection with each common name the names of one or more counties in which it is in use, so that it may be connected with some definite locality.

It is not claimed that all the following common names are new to science, but most of them have never been reported from Georgia before.

A few words of explanation are given for those names which seem to need it.

Panicum digitarioides Carpenter. Maiden cane. Decatur.

Sporobolus Indicus (L.) R. Br. Swamp-grass. Mitchell.

This is a rather misleading name.

Campulosus aromaticus (Walt.) Trin. Wild ginger. Sumter.

Smilax laurifolia L. Bamboo-vine. Sumter.

Smilax Walteri Pursh. Sarsaparilla. Sumter, Coffee.

Myrica cerifera L. Sweet oak. Sumter.

Quercus digitata (Marsh.) Sudw. Red oak. Sumter, Bulloch.

Probably confounded with *Q. rubra*, which is unknown in these counties.

Eriogonum tomentosum Mx. Dog-tongue. Bulloch.

Nelumbo lutea (Willd.) Pers. Yankapin. Decatur.

I cannot vouch for the spelling of this name. I have written it as it sounded to me.

Rubus cuneifolius Pursh. Brier-berry. Bulloch.

So called to distinguish it from various species of *Vaccinium* and *Gaylussacia* with black fruit inhabiting the same region.

Crataegus aestivalis (Walt.) T. & G. May haw. Sumter, Mitchell.

This is the best-known species of the genus in southwest Georgia, on account of its fine fruit, and seems to be the only one which has received a distinctive name.

Cassia occidentalis L. Coffee-weed. Sumter, etc.

Cassia Tora L. Coffee-weed. Sumter, etc.

These two species are universally known by this name only, wherever they occur in Georgia.

Baptisia lanceolata (Walt.) Ell. Deer-grass. Bulloch.

Baptisia perfoliata (L.) R. Br. Gopher-weed. Bulloch.

Cracca Virginiana L. Devil's shoestring. Whitfield, Sumter, etc.

Glottidium vesicarium (Jacq.) Mohr. Devil-weed. Sumter.

Meibomia Michauxii Vail. Dollar-leaf. Whitfield.

Bradburya Virginiana (L.) Kuntze. Clabber-spoon. Sumter.

So called from the shape of the standard.

Dolicholus simplicifolius (Walt.) Vail. Dollar-weed. Coffee.

This species, like *Meibomia Michauxii*, takes its common name from the size and shape of its leaves or leaflets.

Ceratiola ericoides Mx. Rosemary. Bulloch, Emanuel.

Cyrilla racemiflora L. Titi. Sumter, Bulloch, Coffee.

Cliftonia monophylla (Lam.) Britton. Titi. Bulloch, Coffee.

In southeast Georgia, where these two species occur together, no distinction is made between them by the natives.

Ilex glabra (L.) Gray. Gallberry. Sumter, Bulloch, etc.

This seems to be the only name applied to this species in Georgia.

Berchemia scandens (Hill) Trel. Rattan-vine. Sumter.

Sida rhombifolia L. Tea-weed. Mitchell.

Aralia spinosa L. Prickly ash. Clarke, Walker, Sumter.
Chimaphila maculata (L.) Pursh. Rat's-bane. Whitfield.
Gaylussacia dumosa (Andr.) T. & G. Gopher-berry. Bulloch.
Vaccinium arboreum Marsh. Sparkleberry. Coffee.
Vaccinium stamineum L. Gooseberry. Sumter.
Galax aphylla L. Colt-foot. Whitfield.
Asclepias humistrata Walt. Wild cotton. Bulloch.
Tecoma radicans (L.) DC. Cow-itch. Sumter.

Reputed to be poisonous to the touch, probably on account of its similarity in habit to *Rhus radicans*.

Cephalanthus occidentalis L. Button-willow. Sumter.
Diodia teres Walt. Poverty-weed. Sumter. Poor-land weed.
 Coffee. Poor Joe. Spalding.
Pinckneya pubens Mx. Maiden's blushes. Bulloch.

Doubtless so called on account of the color of its enlarged calyx-segments.

Eupatorium compositifolium Walt. Dog-fennel. Bulloch.

This and *Anthemis Cotula*, the dog-fennel of north Georgia, are not usually found in the same vicinity, hence there is little if any confusion of names.

Trilisa odoratissima (Walt.) Cass. Deer-tongue. Sumter, etc.
Pterocaulon undulatum (Walt.) Mohr. Black-root. Coffee.

The roots are said to possess valuable medicinal properties.
Gnaphalium obtusifolium L. Rabbit-tobacco. Whitfield, etc.

Known universally by this name in Georgia. The dried leaves are smoked by boys.

NEW YORK CITY.

NOTES ON LYCOPODIUM TRISTACHYUM PURSH (L. CHAMAECYPARISSUS A. BR.)

BY B. D. GILBERT

Having gathered a considerable amount of this lycopod the past summer (1901), at the station near Alder Creek, N. Y., I noticed some features which may be of interest to collectors. The neighborhood of Alder Creek is a vast bed of sand, said to be in some places sixteen feet thick. The hills, as well as the plain, are

covered with sand, but this does not prevent a fine growth of trees. The hill west of the railroad station is a good example of this and it is here that the lycopods grow in great profusion. There are four species, viz.: *Lycopodium tristachyum*, *L. complanatum*, *L. annotinum* and *L. clavatum*, besides an occasional *L. obscurum*. The most common of all these is *L. complanatum*. *Lycopodium tristachyum* grows in the woods which are composed of deciduous trees, maple, beech, birch, etc. The soil is pure sand. When you come to an open spot this species is replaced by *L. complanatum*, which does not seem to be as fond of the shade as its congener. *L. tristachyum* does not fruit so freely as *L. complanatum* and there are many barren shoots. As has been noticed before, the running stems lie below the surface of the soil, but the habit of the plant is the same as that of this whole section. It throws up single stems at intervals which, at a distance of about 2 inches from the soil begin to branch and produce fan-shaped stems covered with leaves in 4 ranks, but not flat as in *L. complanatum*. These leafy stems are much longer and slenderer and more drooping than in *L. complanatum*. There are sometimes as many as 4 long fruit-peduncles produced from different parts of the main upright stem and not in the least connected with each other, but generally growing to the same height, so that there may be an inch or two of difference in their length. At the top, each of these bears 2 to 4 spikes about an inch long, preferably 4 of them. Here again there is a difference which cannot be detected in the pressed plants. In *L. complanatum* the short pedicels of the spikes make an elbow from which the spikes stand up erect, so that in case there are 4 spikes they form an exact square, or if 3 only, then an exact triangle, the spikes standing up like candles out of a candelabrum. In *L. tristachyum* the pedicels are more slender and rise directly from the spot where they branch, without the elbow but in an oblique direction. This difference is very noticeable in the growing plant, but not particularly so in the pressed specimens.

Prof. Charles H. Peck, our New York state botanist, informs me that he has gathered *L. tristachyum* in Essex Co., N. Y., and that his impression is that it grows there more plentifully than

L. complanatum. This accords with E. J. Hill's experience related in the July TORREYA. It is quite abundant at Alder Creek also, but not to the same extent as *L. complanatum*. The long slender fingers distinguish it easily from the latter species, the digits of which are short, flat and stout.

SHORTER NOTES

SPRING FOLIAGE IN OCTOBER.—The fall tent-caterpillar, tussock-moth, and other ravenous insects have been particularly abundant this year in the parks of New York City, and the trees in Union and Madison Squares, presented a desolate and denuded appearance at the end of August. But during September most of the trees have developed a new set of leaves, so that now, in the beginning of October, they have the fresh green beauty of May. There are exceptions here and there, however, for the elms, poplars, catalpas and the thorny locust still retain their old leaves and shabby aspect, while the maples, lindens, and button-balls make a strong contrast with their fresh green foliage. The English elms have not been eaten by insects, the catalpas only occasionally, and the poplars and thorny locusts suffered more from the excessive heat and dryness of June and July, which caused them to lose many of their first leaves. The leaves which have grown since, on the extremities of the branches, are larger and more vigorous and still remain, when all the rest are fallen.—E. G. BRITTON.

FIELD DAYS OF THE TORREY BOTANICAL CLUB.—During the summer months, weekly excursions have been made by members of the Torrey Botanical Club to interesting localities in the vicinity of New York City. In order to keep in closer touch with the Club, the Botanical Garden has aimed to send on each excursion a member of its staff or an aid, who collected for the local herbarium.

On the excursion of August 17th, to Grasmere, Staten Island, S. H. Burnham represented the Garden. The following interesting plants were found: *Blephariglottis ciliaris* (L.) Rydb., in moist smilax tangles, in full bloom; *Ptilimnium capillaceum* (Mx.) Raf.;

Koellia flexuosa (Walt.) MacM.; *Sanguisorba Canadensis* L.; *Polygala viridescens* L.; *P. verticillata* L.; *Rhexia Virginica* L.; *Dipsacus sylvestris* Huds.; *Baptisia tinctoria* (L.) R. Br., nearly out of flower; *Cuscuta arvensis* L.; *Spiraea salicifolia latifolia* Ait.; *Iva frutescens* L.; *Panicum virgatum* L.; *Rynchospora glomerata* (L.) Vahl and *Apios Apios* (L.) MacM.—S. H. B.

REVIEWS

THE "PEG" OR "HEEL" IN SEEDLINGS OF THE CUCURBITACEAE

For many years that curious adaptive structure known as the "peg" or "heel" which serves to open the seedcoat in seedlings of the cucurbits has been an object of study for many investigators. The extent to which this has been the case is indicated by the extraordinary number of papers which have been devoted to it, namely 531!

The last of these is from the laboratory of the Agricultural Academy at Bonn, by Professor F. Noll.* The very interesting and important results of the investigation are given below in the form of a partial translation:

As shown by Darwin, the structure in question is produced at the point of union of hypocotyl and root. Its lower half is therefore morphologically root, and the upper half stem. Qualitatively, the axis at this point is able to produce the peg on all sides. On the broad flanks of the axis, which in transverse section is elliptical, the peg develops more strongly than on the narrow flanks. Quantitatively, therefore, the axis differs in this regard in different regions of the sensitive zone.

The development of the peg, which is for the greater part confined to one side of the axis, occurs in response to two kinds of stimuli.

1. Its localized origin is on the one hand dependent on the stimulus of gravitation, and is formed on the under side. By reversing a sufficiently young seedling, a second peg may be called out on the opposite side.

* Zur Keimungs-Physiologie der Cucurbitaceen. Landwirtschaftliche Jahrbücher. 1901. 145-165. Ergänzungsband I.

If the axis is placed in a vertical position, the stimulus of gravitation is still effective in that it produces an outgrowth which completely surrounds the axis. When the latter is placed more than 6° out of the vertical, no peg is formed upon the upper side.

The formation of the peg is the result of a peculiar and until recently unrecognized method of geotropic reaction in that the stimulus sets up a growth at right angles to the normal direction of growth, the polarity of which is displaced through an angle of 90° . This change is accompanied in the peg-forming region by a substitution of periclinal for anticlinal divisions.

2. On the other hand the formation of the peg is conditioned by the bending of the axis, in such a manner that it occurs on the concave side of the curve. In other words, as in the analogous case of the formation of secondary roots on the convex side of the curve of a primary root, the stimulus is derived from the organism itself, and is connected with its form. By appropriate experiment it is possible to separate the two stimuli, and thus to cause two outgrowths to appear on opposite sides.

Pressure and friction of the axis on the testa do not act as stimuli.

Under natural conditions the two stimuli, thus recognizable experimentally, work together in complete harmony with the result that the seedling is successfully freed from the testa at the right time. This process is most successful when the broad faces of seed are placed at right angles to the vertical; and least successful when the micropylar end is directed downwards.

The final throwing off of the testa, which prevents independent nutrition, occurs usually after 10–14 days without the help of the peg. Climatic conditions naturally affect the results favorably or unfavorably. Continuous high temperature of the substratum prevents the effective working of the apparatus by inducing a too sudden and rapid lengthening of the hypocotyl.

In planting, therefore, the seeds of cucurbits should be placed with a broad face directed downward, and the temperature of the substratum should not be kept too high.

It may be added that the nature of the stimuli, which, as indi-

cated above, are related to the form of the organism, is very obscure.—FRANCIS E. LLOYD.

CORRESPONDENCE

EDITOR OF TORREYA.

Dear Sir: The attention of the Natural Science Committee of the Associate Alumnae of the Normal College has been called to the article which appeared in the August number of TORREYA, entitled "Vanishing Wild Flowers." In that article the work of the Committee is spoken of at considerable length, and inasmuch as it is mentioned in such reprehensible company that the mere statements without explanation might lead the reader to mistaken conclusions, the Committee respectfully requests that you will kindly publish the following in your next issue :

Could the school children have the opportunity "to learn to know the flowers by name and enjoy them" as the writer of "Vanishing Wild Flowers" suggests, there would be no need of our work at all. Unfortunately, the facts are that thousands of children never have that opportunity as the following statistics prove. Out of a class of fifty-five only one knew the clover; of a class of thirty-four three did not know the daisy, twelve the dandelion; of another class seven did not know the buttercup, and of a class of thirty-five not one knew a violet. From data carefully collected we found that forty per cent. of one entire school had never been to the country and twenty-five per cent. had never even visited Central Park. It is for these unfortunates that we hold our flower shows.

The commonest flowers are wonderful to them and we make special efforts to get these in quantity and also the flowers mentioned in the poems studied in school. It was for the latter reason that we were anxious to obtain the fringed gentians. We would like to state that those mentioned in the article in question were collected in the course of a long drive, were carefully cut, and only a few were taken from each locality.

Likewise, the pitcher plants referred to were gathered from a deserted cranberry bog at Plymouth, Mass., where the supply

was practically limitless ; the plants were not missed from the bog and brought pleasure untold to many a New York classroom where they were kept for months.

The holly referred to was sent from South Carolina, while all the club-mosses that the Committee has distributed have come from Canada and Lake George. The barrels and boxes of material that seem to have raised apprehension were quite innocent ; with the exception of one barrel filled with daisies, they contained cones, nuts, various dried fruits and shells.

The "twenty baskets a week sent to the vacation schools" were filled almost entirely with garden flowers, the common garden vegetables, showing manner of growth, and the commonest wild flowers. These were what were especially requested.

The Christmas ferns alluded to were merely the fronds, without roots, as might be concluded from the time of year when they were distributed (December). As to the twigs, they are small ones, not more than a foot or a foot and a half long ; the only large branches we have received have come from the authorities of Central Park, who have always taken the greatest interest in our work and contributed most generously whenever appealed to.

We have gathered many of the "woodland flowers" referred to, but, as they have been taken without roots and from various localities, we fail to see any diminution of either plants or flowers as a result, although the members of the Committee have had many of the stations under observation for over ten years.

As has been seen, a large part of the material we receive comes from a distance, and is, in most cases, sent by intelligent flower lovers to whom our work appeals. With very few exceptions, the collections made in the immediate vicinity of the city are made by the Committee and as judiciously as possible.

The Committee has carefully considered the question of the preservation of our rarer wild flowers, and one reason for omitting the annual botanical flower show at the Normal College last year was that the rarer plants would naturally be collected for that. We would also state that especial effort is made to educate the various field classes, held under the auspices of the Commit-

tee, to see the necessity of protecting our least common wild flowers, if any are to be left about the city.

It may be of interest to state that eight members of the Committee are members of the Torrey Club.

Respectfully yours,

MABEL H. TAYLOR,

Secretary of the Committee.

NORMAL COLLEGE, September 24, 1901.

NEWS ITEMS

Professor F. S. Earle, recently of the Alabama Polytechnic Institute, has entered upon his new duties as an Assistant Curator of the Museums of the New York Botanical Garden. Professor Earle will continue his special studies on the fungi.

The program for the autumn lectures to be delivered in the Museum Building of the New York Botanical Garden, Bronx Park, on Saturday afternoons at 4:30 o'clock, has been announced as follows :

October 12th, "Sunlight and Vegetation," by Dr. D. T. MacDougal.

October 19th, "Botany of the West Indies," by Dr. N. L. Britton.

October 26th, "Habits and Characteristics of Some of the Larger Marine Plants," by Dr. M. A. Howe.

November 2d, "Ancestral History of Some Living Trees," by Dr. C. A. Hollick.

November 9th, "Production of Cinchona Bark and Quinine in the East Indies," by Dr. H. H. Rusby.

November 16th, "Botanical Features of the Mountains of Colorado," by Dr. L. M. Underwood.

The lectures will be illustrated by lantern slides and otherwise. They will close in time for auditors to take the 5:38 train from Bronx Park railway station, arriving at Grand Central Station at 6:04.

TORREYA

November, 1901

DUPLICATION OF CONTRIBUTIONS ON PHYSIOLOGY OF TENDRILS

BY D. T. MACDOUGAL

The author of this note spent some time in making observations and experiments upon the tendrils of *Entada scandens*, the West Indian filbert, in the Botanic Gardens at Bath and Castleton, Jamaica, in the summer of 1897, and some additional anatomical work was carried out in the laboratory later in the year. A brief note containing the chief results of the experiments was read before the Indiana Academy of Science, December 30, 1897, and a detailed account of the entire investigation was published in the Bulletin of the Torrey Botanical Club in 1898 (25: 65-72. f. A-F), under the title of "Contribution to the Physiology of Tendrils."

By reference to the accompanying figures, which were omitted from the original paper it may be seen that the tendrils of *Entada* are the transformed terminal leaflets of the large bipinnate leaves. The tendrils are extremely sensitive over their entire surfaces, and curve to the most delicate touch, and the efficiency of this pair of grasping organs is far greater than that of any single tendril, due in part to their rapid action and to their combined mechanical superiority. The detail of the structure and action of these organs is given in the article cited.

Dr. Haberlandt has recently published in pamphlet form a lengthy treatment of tendrils and other sensitive organs under

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. I, No. 10, comprising pages 113-124, was issued October 26, 1901.]

the title of "Sinnesorgane im Pflanzenreich zur Perception mechanischer Reize (Leipsic, 1901), in which a historical résumé of the researches upon the included subjects is attempted. The larger portion of the work is devoted to "Special investigations" upon the sensory organs of various plants.



FIG. 1. Leaf of *Entada scandens* with terminal tendrils.

In this section Dr. Haberlandt describes briefly the results of his own work upon *Entada scandens* and seems wholly unaware of my own more detailed work published three years previously as noted above, to which he has not added a single fact, or generalization of any importance. He has been equally unconscious of the facts in regard to the sensory cells and perceptive organs of other tendrils described by myself still earlier in the *Annals of Botany* (39: 394. 1896). If Dr. Haberlandt's remissness consisted solely in a disregard of my published results the fault might be easily condoned, but a glance at the other sections of the treatise shows that a description of the similar omissions in regard to other work would fill a complete number of this journal.

It is truly lamentable that with such opportunity for exactness and completeness Dr. Haberlandt has written a paper historically

inadequate, and speciously misleading as to the value and priority of his own work. The bibliography of the entire subject is most easily accessible in any well-arranged botanical library. The lack of consideration to published researches is most marked with respect to articles in English and American journals, and while it may not be wilful neglect, yet it is constructive ignorance and speaks most clearly of a careless and unscientific habit of inves-

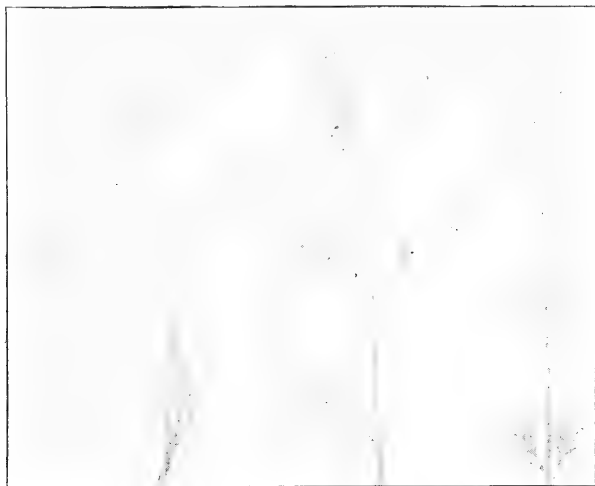


FIG. 2. Various positions assumed by tendrils of *Entada scandens*.

tigation, entirely inexcusable in an author of such extensive experience. Furthermore, it is indicative of a form of narrow provincialism to which the writer has had occasion to call attention more than once. (See *Transmission of Impulses in Biophytum* Bot. Centralb. 77: 297. 1899.) In the present instance it renders Dr. Haberlandt's work untrustworthy to quite a degree.

CRYPTOGAMIC AND PHYSIOLOGICAL BOTANY AT COLD SPRING HARBOR IN 1901

BY EDWIN BINGHAM COPELAND

The Flora.—The field work in cryptogamic botany, carried on in major part by Mr. A. F. Blakeslee, has resulted in a large

addition to the known local flora. Among Myxomycetes, which were submitted to Professor Macbride for final determination, and among Fungi, the reported flora of Long Island has been found most incomplete. The following representative genera, from the list of this season's collections, will show how remarkably rich Cold Spring Harbor is in the types usually chosen for laboratory study, and what advantages it therefore offers both for local work and for the collection of material for class use elsewhere :

Anabaena, *Lyngbya*, the Oscillarias or Oscillatorias of laboratory guides, and of course bacteria ; numerous Peridineae and diatoms ; all the chief genera of Myxomycetes except *Trichia* ; *Volvox*, "Proctococcus," *Ulva* and *Monostroma*, *Spirogyra*, desmids including very large *Closterium*, *Bryopsis*, *Vaucheria*, *Cladophora*, *Bulbochacte*, *Nitella* (introduced by Dr. Johnson, now common), *Ectocarpus*, *Fucus* and *Ascophyllum*, *Nemalion*, *Agardhiella*, *Poly-siphonia* ; *Albugo* and *Peronospora*, *Saprolegnia*, *Sporodinia*, *Mucor* of course, and *Penicillium*, *Taphrina*, *Microsphaera*, *Peziza*, *Cordyceps*, *Ustilago*, *Puccinia*, *Uredo* and *Aecidium*, *Exobasidium*, *Stereum*, *Hydnum*, *Polyporus*, *Strobilomyces* (splendid material for the study of basidia and spores), *Coprinus*, *Amanita*, *Scleroderma*, *Crucibulum*, *Dictyophora* ; *Riccia*, *Marchantia*, *Conocephalum*, *Cephalozia*, *Notothylas*, *Funaria*, *Dicranum*, *Georgia*, *Polytrichum* ; *Botrychium*, *Osmunda*, *Adiantum*, *Pteridium*, abundant undetermined prothallia, *Equisetum*, *Lycopodium* and *Selaginella*. *Marsilea* is reported, but was not collected this year. Fully 80 per cent. of these grow within a quarter of a mile of the laboratory.

Geotropism of Fungus Stipes.—Work in physiological botany has been attempted at Cold Spring Harbor this season for the first time, and the wealth of unworked material has coaxed attention in various directions. The geotropism of the stipe of the Boleti and agarics—*Amanita* is excellent material—is essentially the same as that of phanerogams. All parts of the stipe are irritable, and there is no evidence that the stimulus is transmitted. But if the horizontal stipe is fastened at the pileus end, the base being free, it may curve as much as 180° ; the zone of most rapid growth, and therefore of most rapid curving, moves toward the pileus, carrying the fixedly bent basal part beyond the perpen-

dicular. An egg of *Simblum* "aimed" horizontal shortly before its rupture gave rise to a horizontal mature fructification. The absence of geotropism seems to substantiate the view that the elongation of the stipe of the Phalloidei is an essentially different process from ordinary growth.

Extrusion of the Gametes of Fucus.—As is well known, the gametes of *Fucus* are extruded from the conceptacles during low tide, while the plants are out of water. It has been suggested that the cause of their exit might be the removal of the pressure of the water. But this pressure, even at high tide, is insignificant. In reality, the *Fucus* plants shrink very appreciably during low tide. As they begin to dry, the outer layers lose some of the great amount of water which they hold by imbibition, and their consequent contraction compresses the inner layers. The pressure thus exerted against the conceptacles forces out a part of their water content, carrying along the gametes, usually before they separate from one another. Pinching a fruiting tip between the fingers has the same result. As Strasburger suggests (Praktikum, 296, 2d ed.), active gametes may be obtained for study at a distance from the coast, and are extruded when plants are removed from their vessel of sea water and allowed to dry for a few hours. Instead of having sea water shipped, I have made it for use at West Virginia University; it need not be at all accurately made. The development of the conceptacles and fruiting organs of *Ascophyllum* seems to be hastened by keeping the plants constantly submerged in standing water.

Adaptations of Spartina polystachya to Environment.—*Spartina polystachya* Willd. is the characteristic plant of the lowest tide-water zone inside the bar of Cold Spring Harbor. The lowest scattered plants grow where the tide leaves them from 3 to 3.5 hours. The lowest patches are left for about 4 hours. The best development, both in density and height comes where the ground is above water nearly half of the time. Near high tide mark the plant disappears again. Young plants then spend from one-quarter to three-quarters of their time submerged, and it may therefore be assumed that immersion for some hours does

not interfere with their photosynthesis. But the cuticle is strongly developed, and intercellular spaces are very inconspicuous in the leaf. As the plants grow taller the leaves are more of the time above water, and are stiff enough so that many of them stand erect above the surface, but when too great a length is exposed they float. Free movement of gases, when the leaves float or are submerged, is insured by the position of the stomata. These occur only on the upper surface of the leaves, where they are confined to the sides of deep and narrow clefts. The walls of these clefts are beset with papillæ, which further narrow them and increase their surface until it is practically impossible that the air in them should be driven out by water. The stomata being protected against plugging by water, the plants continue to take up carbon dioxide though entirely under water (*Cf.* Pfeffer, *Pflanzenphysiologie*, I: 161, 2d ed.). As must be expected, especially from Stange's work (*Bot. Zeit.* 1892), the plant meets the concentration of the sea water with an over-regulation of its turgor. In the mesophyll, in a leaf reaching above high tide, I have found plasmolysis just beginning in 7.5 per cent. KNO₃; in the cortex of the roots, in 7 per cent. KNO₃. I could find no root hairs.

SHORTER NOTES

WEeping TOMATOES.—Some days after clearing off a plot of ground in tomatoes for the past season it was observed that the places where the plants had stood were moist while all the other area was covered with the dry, finely raked earth. Upon examination it was found that this moisture was due to water that flowed from the roots of the tomato plants that had broken off and remained in the soil in the process of pulling. Further inspection showed that when a broken end of one of the larger roots chanced to extend above the soil its exposed fraction was wet and dripped water so that it glistened in the late October sun. From some roots that arched over with the broken end pointed downward the water fell in drops to the soil which was literally muddy below the live spigot.

Having other plots to clear, many of the tomato plants were

cut at the surface of the soil, and the root system in each left undisturbed in the soil. The location of all such roots could be easily seen by the wet place around them for a week after the removal of the vines. In some instances the otherwise dry soil was moist for a foot or more from the stump and decidedly muddy near the center of the wet circle.

Up to the time when the vines were removed there had been no hard frosts and the plants, still in flower, were loaded with fruit and therefore the breaking of the roots was at a time when they were active in taking up water. However, the flow was so copious that the fact is mentioned with the thought that some vegetable physiologist may find in the tomato a fruitful subject for the study of the obscure phenomenon of "bleeding" in plants.—BRYON D. HALSTED.

THE GENERATIVE DIVISIONS IN GYMNOSPERMS.*—In February, 1900, while examining a number of my slides made from the ovules of *Pinus rigida*, it was my good fortune to discover that interesting division in the pollen tube which botanists had been so eagerly seeking in conifers since the discovery of blepharoplasts in *Gingko*, *Cycas*, and *Zamia*. Careful examination of several slides, however, failed to bring to light the "reduced blepharoplasts" which had been predicted and further search for them was abandoned; but I was impressed with the peculiar fibrous appearance of the cytoplasm and the position of the spindle in the antheridial cell. These impressions gained considerably in force when, a few weeks later, I discovered and worked out in detail the method of division in the formation of the ventral canal-cell in *Tsuga Canadensis*; † for I found these two so-called generative divisions to be at once unique and strikingly similar.

* * * * *

In brief, the two divisions occur approximately at the same time, are both unequal, and the spindles are the same in origin, development and type. In both cases the force initiating division originates below the nucleus in cytoplasm afterwards belong-

* An abstract from an address on Fertilization in Gymnosperms delivered at the Fifth International Zoölogical Congress, Berlin, August 15, 1901.

† The Development of the Archegonium and Fertilization in the Hemlock Spruce. *Annals of Botany*, 14 : 583-607. D. 1900.

ing to the persisting functional cell ; in both cases two cells are formed, one capable of taking active part in fertilization, while the other is ultimately a total loss involving only a small part of the cytoplasm of the parent cell but half of its chromatic contents. In the hundreds of cases of fertilization among gymnosperms which I have studied, the mature functional sexual cells have invariably developed from the lower larger daughter cells produced by the unequal generative divisions.—W. A. MURRILL.

CUPANIA ON PINE KEY, FLORIDA.—A specimen, labelled *Paullinia*, showing foliage and flower-buds of a tree collected many years ago by Mr. Blodgett on Pine Key, Florida, has hitherto remained undetermined in the Columbia University herbarium, Dr. Small's studies not having as yet reached Sapindaceae, and Dr. Robinson, noticing the specimen while preparing the manuscript of this family for "Synoptical Flora" disposed of it with the annotation "some other genus?"—a pertinent suggestion. I think there can be no doubt that it represents a species of *Cupania*, probably *C. glabra* Sw., which is thus to be added to the arboreous flora of the United States. Mr. Blodgett's label records that it grew on hammocks and flowered in September.—N. L. BRITTON.

FIELD DAYS OF THE TORREY BOTANICAL CLUB.—On the excursion of August 24th, along the Palisades, New Jersey, the Misses Clarke and Esterly represented the New York Botanical Garden. The following are some of the interesting plants found: *Gyrostachys gracilis* (Bigel.) Kuntze; *Silene stellata* (L.) Ait.; *Actaea alba* (L.) Mill. in fruit; *Aralia racemosa* L.; *Clethra alnifolia* L.; *Eupatorium purpureum falcatum* (Mx.) Britton; *Aster Schreberi* Nees; *Helianthus divaricatus* L., and *H. decapetalus* L.

The Club went to Mt. Vernon, August 31st, Dr. P. A. Rydberg acting as the Garden's representative. The following plants were found: *Lobelia siphilitica* L.; *Rhoxia Virginica* L.; *Decodon verticillatus* (L.) Ell.; *Dioscorea villosa* L. in fruit; *Prunus serotina* Ehrh. in fruit; *Meibomia Canadensis* (L.) Kuntze; and a decumbent fruiting plant of *Rubus nigrobaccus* Bailey. Dr. Rydberg also found an interesting form of *Impatiens biflora* Walt., with pink, spotted flowers, growing with the common form which has orange-yellow, mottled flowers.

REVIEWS

Britton's Manual of the Flora of the Northern States and Canada

The most widely useful and influential books are those which summarize in convenient form for students the results of a period of notable scientific activity. Such a book we have in Dr. Britton's Manual.*

When Britton and Brown's Illustrated Flora appeared, in 1896-1898, botanists had a new and indispensable treatise on our northeastern flora, but it was bulky and expensive. The three royal octavo volumes of that work, which contained nearly 1900 pages, weighed $12\frac{1}{2}$ pounds, and cost nine dollars, are now digested and compressed into a single small volume of less than 1100 pages, which weighs not quite two pounds. The pages of the new work, including the margins, are $7\frac{3}{4}$ by 5 inches, and the whole book, including the flexible linen covers, is $1\frac{3}{8}$ inches thick. The paper is thin and the sewing is not too tight. The book stays open. These mechanical features suggest at once how usable the book will be in the field.

Compared with the Illustrated Flora in its subject matter, the Manual has shorter descriptions, omits synonymy and citations, omits figures but includes references to them, and abbreviates geographic names. The English system of measurements is replaced throughout in the Manual by the metric system. Many new species are added, based particularly on the critical work of Bicknell, Fernald, Greene, Nash, Rydberg, Scribner, and Small, besides the work of Dr. Britton himself. The Manual contains, for example, seven species of *Antennaria*, nine species of *Sisyrinchium*, and thirteen violets not figured in the Illustrated Flora.

The principal fault in the makeup of the book is the use of two indexes instead of a single index, which causes annoyance by accidental reference to the wrong one, and wastes time unnecessarily. The lack of a species index to some of the large genera will also cause annoyance, notably in the case of *Carex*,

* Britton, N. L. Manual of the Flora of the Northern States and Canada. 8vo. Pp. x + 1080. 1901. New York: Henry Holt and Company. Price, \$2.25.

which includes 205 species and covers 40 pages. One typographical abnormality of the Illustrated Flora has disappeared, namely, the use of *AEsculus* for *Aesculus*. The use of the capital E was both ugly and incorrect and has been dispensed with in the Manual.

The Engler and Prantl sequence, and the many new species and new names will give to some a feeling of strangeness. He who was brought up to look for the Ranunculaceae on page 1 of his botany and now at last locates them near the middle of the book, not very far from the vile Chenopodiaceae; who must learn to discriminate ten species of *Antennaria* where the early botanists taught him there was only one; and who used to think that *Acer saccharinum* meant the sugar maple, when now it means the silver maple—he who has a feeling that unnecessary duties are thrust upon him by these new features must remember that they appear because they are right, and that the old features have been discarded because they were wrong.

Every botanist from Labrador to the Cimarron must have a copy of "Britton's Manual." He will find it a comfortable book to hold in his hand and a satisfactory book with which to name any plant from adder's tongue to blessed thistle.—FREDERICK V. COVILLE.

A popular Work on Ferns*

Mr. Clute has given us a carefully prepared and readable book on the ferns of the Northeastern States, for the subtitle, which reads "A Guide to all the native Species" has a local rather than a national significance and for that reason is misleading. The work includes a combination of ancient folk-lore about ferns, poetical allusions to ferns, mingled with an untechnical statement of their characters, habits, and haunts, not badly written, and provided with a series of accurate structural illustrations. To these are added a considerable number of full-page illustrations, some of them colored. From the artistic standpoint these full-page illustrations may be correct but as a means of illustrating the habits and especially the habitats of our ferns they are far from success-

* CLUTE, W. N. Our Ferns in their Haunts, a Guide to all the native Species. 12mo., pp. xii, 322. Illustrated. New York. Frederick A. Stokes Company.

ful. River scenes and other miscellaneous rural landscapes with a fern of some sort placed in one corner apparently as an after-thought or adaptation of the artist do not bring out the true relations of the ferns to their surroundings as might easily have been accomplished with a camera.

It is of course natural to bring this book into contrast with others of its class and particularly with Mrs. Parsons' *How to Know the Ferns*. It contains more folk-lore, gives evidence of more research into the old literature of ferns, presents more proof of an accurate familiarity with ferns in the field, contains less personal narrative, and its structural illustrations are a decided improvement. As a piece of book-making and artistic illustration it is also superior when that feature is considered from an artistic instead of a scientific standpoint. But as a means of knowing our ferns which is professedly one of its reasons for being, it lacks some features of arrangement that have rendered Mrs. Parsons' effort very successful.

For an untechnical book, the matter of nomenclature figures too prominently and the author may well feel the uncertainty he cannot conceal that the nomenclature he uses is either correct or final. To the majority of the class of people to whom the book will appeal it matters little what names they find so long as they have a Latin sound, for those who study ferns for more than a passing amusement will find in standard manuals the prevailing and proper nomenclature. It shows poor taste for a professed "conservative" to propose such a combination as "*Matteuccia Struthiopteris Pennsylvanica*" in advance of a proven necessity and contrary to his profession of belief. It betokens weakness of position and insincere principles, and besides could not be used since the earliest name of the American form if distinct from the European is not *Pennsylvanica*. From a botanical standpoint changes in nomenclature in a work professedly untechnical are inexcusable anyway.—L. M. UNDERWOOD.

COLUMBIA UNIVERSITY, 6 Nov. 1901.

NEWS ITEMS

Dr. Walter R. Shaw has resigned his position in Pomona College, Claremont, California, and is now botanist and entomologist of the Oklahoma Agricultural Experiment Station, at Stillwater.

Mr. F. H. Blodgett has recently been appointed assistant vegetable pathologist of the Maryland Agricultural Experiment Station.

The following statement, printed on a postal card, was received last month by members of the Linnaean Fern Chapter of the Agassiz Association. The appeal is self-explanatory, and as *TORREYA* is not "in politics" just at present, we republish without comment:

Fellow Members:

Vote for Mr. Gilbert. There is no comparison between the two candidates for the presidency. Mr. Gilbert is a scientist, has a wide acquaintance with the members, and the duties of the office. He lives near the center of fern lore. I am only a collector, have never attended a meeting and I am a worldly business man. I have a daily newspaper to attend, and I am a politician. In truth, I am one of the possibilities for the Presidency of the United States upon the Populist ticket in 1904 against Theodore Roosevelt. It will give me all I can do to get the nomination for the office. I am much pleased for the honor so far and would be greatly pleased to make the Joliet park the headquarters of the American fern, but the association should be continued along its present prosperous lines and its affairs should be considered far above the pleasure of any one individual. If possible I will attend the next meeting and if you like my looks I will stand for the race some other time. If any have already voted for me write quickly and have the vote changed.

JAS. H. FERRISS,

Joliet, Ill.

October 17, 1901.

TORREYA

December, 1901

ON THE RELATION OF REDWOODS AND FOG TO THE GENERAL PRECIPITATION IN THE REDWOOD BELT OF CALIFORNIA

BY W. A. CANNON

It is well known to all dwellers in regions which are frequently covered by fog that fog acts to conserve, as well as to increase, the general amount of moisture, and while, so far as I know, no data have been compiled touching either of these effects, they undoubtedly play an important part in the plant life of the region. This is well illustrated by the inland distribution of the redwood on the west coast of the United States. As is well known, the redwoods occur in the fog-belt of the northern half of California, and are confined in a markedly restricted manner to those portions of the coast mountain ranges, such as ravines, which, on account of favoring topographical conditions, the fog may reach. The restriction of the distribution to so narrow a zone is, perhaps, not due so much to the negative factor, the conservation of moisture already present, as to the positive one, the actual precipitation of water from the fog. While this, without question, is an important factor in the total precipitation in any region subject to fog, it becomes very much more marked, I am convinced, in that region where the redwood forests are found. The reason for this lies in the character of the foliage of the redwood. Because the leaves of the redwood are small and closely set together on the twigs, and because both twigs and leaves are relatively delicate, the boughs which they help to form are fern-like in general appearance and constitute a very effective filter, by which

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. I, No. II, comprising pages 125-136, was issued November 25, 1901.]

water may be "combed" out from the fog. In the effectiveness of this filtering process, which is said to be a good method for removing water from the fog, lies, I believe, an important reason why the redwood loves the zone subject to fogs. And it will be readily seen that this factor not only increases the general amount of moisture in the region, but it supplies the redwood itself with a proper amount of water at a time when there is the least rainfall, that is, in the late summer and early autumn, when the fogs are especially abundant.

So far as I know, there is no method in use for determining the amount of fog precipitation. The amount of water in a fog which extends vertically 1000 feet may be equal to 0.1 inch rainfall.* But, of course, only a small portion of this is precipitated. This amount, however, can be greatly increased if the fog is passed through such a filter as is formed by a redwood forest, and under such conditions the amount of water taken out of the fog by the trees is considerable. Two or three illustrations will show this at least approximately. I have been told by a gentleman who owned a large ranch in the redwood belt, and whose observation was quite trustworthy, that whenever there was a fog, especially if accompanied by a wind, the soil beneath the trees appeared as if drenched by a heavy rain; and that, further, in cases of fires in his forest, if a fog came up accompanied by wind, the fires could be brought under control. To any person who has seen the force and destructiveness of a forest fire this observation will appear very significant. The relation of the redwood to fog precipitation is shown in another way, which, although sufficiently *bizarre* in itself, is vouched for, and may lend a hint to a possible manner of estimating the amount of water precipitated in this manner. On the "hog-back" of the Santa Moreno mountains lives a woodchopper, in a place once heavily covered by a redwood forest, but where there is left only an occasional large tree. Like other mountaineers, he must use water for culinary purposes at least, and in lieu of a convenient spring or well he has devised a unique "tree-well." The chopper has fashioned

* Alexander McAdie, Fog Studies on Mt. Tamalpais. *Pop. Sci. Monthly*, 59: 535. O. 1901.

the ground beneath a large redwood into the form of a trough at the lower end of which he has placed a barrel, and I have it on good authority that in this primitive manner he obtains sufficient water for his needs. However picturesque a "tree-well" may appear, I believe, as does also Prof. W. R. Dudley, of Stanford University, who has studied these conditions for several years, that a receptacle for the water which the tree "combs" out from the fog might be so placed that it would catch nearly all of the water thus retained, in a manner analogous to that employed by the chopper, and from data thus obtained some estimate of the total fog precipitation in a redwood forest might be had. It is hardly necessary to say that in any such calculation the density of the fog, the rate of the wind, as well as the character of the forest, and other factors would have to be considered, all of which could be worked out for each time of calculation.

A comparative study of the amount of water which different species of forest trees are able to take from fog could not fail to be of interest, and may be found to be of great moment in the life processes of the denizens of the region. And may it not be that the increased amount of the total precipitation brought about especially by the redwoods as just described, and its more uniform distribution throughout the year, will prove to be an important and possibly a determining factor in reforesting a denuded redwood area?

ARE THE LEAVES OF "SIMPLE-LEAVED AMPELOPSIS" SIMPLE?

BY BYRON D. HALSTED

A vine of *Ampelopsis cordata* Michx., growing upon my house piazza has interested me during the autumn days by the reluctant way in which it drops its leaves. It keeps them green for weeks after the leaflets of the American ivy [*Parthenocissus quinquefolia* (L.)] have taken on a blaze of colors and gone. The last-named vine, as is well known, has its leaves compounded of five leaflets and accommodates their departure by providing each leaflet with a "letter of dismissal" that is composed through the season's

growth. In other words, a line of separation is made at the base of the leaflet so that in its going it may not disturb the others that are situated close by and all at the upper extremity of the petiole. There is no disputing the convenience of this in the plant economy to the lame and lazy, for the injured and indolent may sever their connection and drift down the hedge-row, while their fellows, still green perhaps, stay longer for the finishing touches, and until the vital fluids may be withdrawn under cover of gorgeous decay.

Turning again to the "simple-leaved ampelopsis," with which we started, it is found that the same arrangement is made for the fall of the foliage. The joint is formed at the base of the blade and when the latter falls there remain the stiff petioles for some time to come. Why this double provision for the release of the leaf—first a well-formed suture at the base of the blade and another at the union of petiole with the branch? In other words, why does not this leaf, in form like a linden, observe the method of the linden, or the maple, or the oak? Shall we find an answer in a study of kinship? Because its sister, the "pepper-vine" [*Ampelopsis arborea* (L.)], of the South has compound (bipinnate) leaves and sheds them piece-meal, is that any reason why my *A. cordata* should do the same so far as it can? Its half-sister, the American ivy, we have seen, does likewise, although its leaves are compounded upon a different pattern from those of the "pepper-vine." When we come to look at the Japanese ivy [*Parthenocissus tricuspidata* (Sieb. & Zucc.)] with its leaf-blades only three-lobed usually, but sometimes three-divided, it is found that the same method obtains, and my neighbor's outside chimney has at first a leaf-shingled surface of green, then is splashed with purple, followed by a showing of stiff upturned "straws" and the bricks beneath. It is a little family trait and whether there be one or many leaflets to the blade, the parting with the mother parent is the same.

If the several species were once all in one it is possible that that one had compound leaves and defoliated by means, natural to such leaves. Then in the passing of the years the "simple-leaved ampelopsis" has acquired the present form by enlarging

one leaflet at the expense of the others so that it serves for the whole. In doing this it has not, as yet, taken on the ordinary ways of simple leaves when the time comes to loose its hold upon the vine. We might say that the leaf was still compound, with a single leaflet, or "unifoliolate" as is the term used with the lemon and orange of the ordinary sorts, but not of *Citrus trifoliata*, which is evidently compound.

If we were to go far into phylogeny—perhaps beyond our depths—it might be stated that the subject of our note had early left the simple form of leaf, still adhered to by the grapes proper, became fully compound, as are now its nearest to kin, and then underwent a "degeneration," if this word is the one, and assumed a type of foliage that might easily put it in the genus *Vitis*. The stiff defoliated petioles, however, uphold its place with the compound-leaved group—a position fully maintained by other characteristics of the species.

THE SPREADING OF SOLIDAGO SPECIOSA IN THE VICINITY OF YONKERS, N. Y.

BY MRS. JOHN I. NORTHPROP

Previous to 1898, the only station known to me in this locality for the above plant was on the crest of the hill south of Mt. Hope Cemetery. This handsome goldenrod was always abundant there in several old fields. In the fall of 1898, I noticed that it was spreading towards the southwest in the direction of the Hudson, as a number of plants were seen on a hillside about a mile south of Hastings village. By the next year it had reached Warburton Avenue on the river bank and a few plants were noticed just across the Yonkers line. Under the date of October 3, 1900, my note-book reads: "*S. speciosa* has spread very rapidly since last year and now solidly covers the slope on the edge of the woods near the trolley terminus. It is still spreading south. It is only two years since I have seen it here at all." The same year I found that it had taken possession of a field on the western slope of the Sawmill River valley, a mile or more to the east. Here, too, only a few plants had been noticed the year before.

This year, 1901, I find it is still spreading to the south and east as a few plants were found for the first time along a roadside in the valley, perhaps a quarter of a mile away from the last-mentioned locality. It has also gained a foothold in some fields on the other side of a patch of woods still further south. The most easterly station I have found for it is the southern slope of the ridge west of Grassy Sprain Lake while the most southerly is about half a mile north of Lincoln Park on the main line of the New York Central and Putnam road. If it continues its triumphant march to the south, it will soon cross the New York City line and approach its old possessions, as there was once a station for it, I believe, on Manhattan Island.

In the two cases especially noted above it has taken *Solidago speciosa* but three years to take complete possession of new territory and the goldenrods and asters that formerly flourished there have almost disappeared. It is not only that many new plants seem to spring up but the older ones increase in size very rapidly, one transplanted to my garden more than doubling its size the second year. Many of the old plants sent up seven or eight flower-stalks this year five feet or more in height.

YONKERS, N. Y., November 15, 1901.

HESPERASTER, A GENUS OF LOASACEAE

BY T. D. A. COCKERELL

Hesperaster (Western Star); *Bartonia* Sims, Bot. Mag. 36: pl. 1487. 1812. (Not *Bartonia* Muhl., a valid genus of *Gentianaceae* published in 1801.) Biennials or perennials; petals 10 or fewer, narrow and pointed, conspicuous; stamens very numerous, up to 300; leaves pinnatifid with pointed lobes; trichomes barbed; seeds numerous, mostly winged. Type **Hesperaster decapetalus** (*Bartonia decapetala* Sims, l. c.). The genus includes, among others, the following species:

1. **HESPERASTER DECAPETALUS** (Sims). In New Mexico I have found this only at Raton. The flowers open at sunset, and are visited by the larger *Sphingidae*. Just as they open they are visited also by *Bombus*, which can get into them when they are

opening, the petals affording some purchase; but after they are fully open the radiating stamens form an efficient barrier.

✓ 2. **Hesperaster nudus** (*Bartonia nuda* Pursh, Fl. Am. Sept. 328. 1814). Vespertine.

✓ 3. **Hesperaster laevicaulis** (*Bartonia laevicaulis* Dougl.; Hook. Fl. Bor.-Am. 1: 221. 1833). Diurnal.

✓ 4. **Hesperaster Rusbyi** (*Mentzelia Rusbyi* Wooton, Bull. Torr. Club, 25: 261. 1898). Vespertine. Its distribution in New Mexico is peculiar; I have found it in the Sacramento Mountains and around Las Vegas, where there is no *H. multiflorus*. The latter occurs at Santa Fé, Raton and in the Mesilla Valley, to the exclusion of *H. Rusbyi*.

✓ 5. **Hesperaster multiflorus** (*Bartonia multiflora* Nutt. Journ. Acad. Phila. II. 1: 180. 1848). Diurnal. The flowers are erroneously stated by Coulter to be deep yellow. They are in reality little darker than those of *H. decapetalus*. They are freely visited by bees, especially *Perdita*.

✓ 6. **Hesperaster perennis** (*Mentzelia perennis* Wooton, Bull. Torr. Club, 25: 260. 1898). Diurnal (?)

7. **Hesperaster pumilus** (*Mentzelia pumila* T. & G. Fl. N. Am. 1: 535). Vespertine, according to Miss Eastwood, Proc. Cal. Ac. Sci. II. 6: 291.

8. **Hesperaster chrysanthus** (*Mentzelia chrysantha* Engelm.; Brandegee, Fl. S. W. Col. 237). Diurnal (?)

9. **Hesperaster densus** (*Mentzelia densa* Greene, Pittonia, 3: 99. 1896).

✓ *H. perennis* (Wooton), and *H. densus* (Greene) are perennials; the others apparently all biennials. The latter is a Colorado species and has probably been confused with *H. multiflorus*. I have been greatly indebted to Dr. Rydberg for advice when preparing these notes.

EAST LAS VEGAS, NEW MEXICO.

SHORTER NOTES

EXPLOSIVE FRUITS.—During the present year a portion of our experiment grounds has been in Polemoniaceae, including spe-

cies in the following genera : *Phlox*, *Gilia*, *Polemonium* and *Cobaea*, the first-named having the greatest space and the largest representation of species, including wild and cultivated representatives. The *Phlox Drummondii*, an annual of the gardens, has been in blossom for many months and has demonstrated its right to a place in the ornamental grounds, because of its ease of culture, profusion of blooms and not least for its intrinsic beauty.

Now as the freezing weather comes the end is near, but the lighter frosts of earlier nights had no disturbing effect. While the particolored blooms are still numerous, they are not sufficient to obscure the clusters of small dry stars that cover the stems, and below them the ground is covered all around with the young seedlings ready for the coming year.

It is to these "stars" that the reader's attention is called, for they are nothing other than the calyces of the phlox flowers standing open and empty upon their short stiff stems. They are like so many miniature nests from which the eggs have hatched and the fledglings have flown. This is not so figurative a statement as it first seems for each "nest" has three as the normal number of seeds, which are of large size, as seeds go, and represent the offspring as do the eggs. Here we must note a material change in the method of dispersion, for eggs take to themselves wings by hatching and the wings bear away the young. Our smooth and shiny phlox capsule as it matures separates quickly along three lines and with such force are the parts disturbed that the three seeds within are thrown out for some distance. At the same time there is a distinct sound that can be heard for several feet and as one works among the phlox plants, carrying pollen to a tiny stigma or adjusting a bag to a castrated blossom, he may feel the seeds as they are hurled against his face or rattle upon the straw of his broad-brimmed hat. When mature pods are placed three or more feet from a wall the seeds may be thrown across the intervening space. The wonder is that so small a body can possess so much explosive and expulsive power. After the vegetable mortar is fired there remains only the calyx as a sort of gun-carriage which takes on in drying the "star" above described.—BYRON D. HALSTED.

NEW METHODS OF DRYING PLANTS.—In a recent number of *Flora** certain improved methods of drying plants are described which, according to a note appended by Professor Goebel to the article, are highly successful.

The first method consists of using, instead of the ordinary drying paper, sheets of cotton batting. The batting is cut to regular size and then inclosed in covers of tissue paper glued along the margins. The plants are placed between layers of these sheets and then put in an open-work press. Without further changing, except in the case of very fleshy plants, the specimens are dried in two or three days. Especially delicate plants liable to be easily torn should be placed first between sheets of tissue paper alone and then laid on the driers.

The second method † is more complicated but is very rapid and is recommended especially for climates which are moist. Half an hour to an hour, or in the case of unusually fleshy plants, somewhat longer, is sufficient to dry the specimens thoroughly. The principle consists simply of this. A cylinder of tin or rus-sia iron, say 50 cm. high by 35 cm. in diameter, and, punctured with holes like a colander, is supported over a kerosene lamp or Bunsen flame, the plants being strapped on the outside. The latter process is the one which is more or less complicated. First the cylinder is permanently covered with linen or some kind of cloth. Then a second removable cover is made, which will barely meet around the cylinder; on its edges are strips of wood provided with metal screws which can be used to draw the cloth tight. ‡ Thus prepared the cover is laid on the table and the plants enclosed in several layers of filter paper placed on it. The cylinder on its side is then laid on top of the whole and the cloth with the specimens is wrapped carefully around it. The screws are then tightened, binding the whole mass to the cylinder, which is set up on end on a tripod over the flame. The drying proceeds rapidly but care must be taken not to burn the specimens. As they dry the cover loosens and must be tightened from time

* Prof. S. Rostowzew, *Laboratorium Notizen. Ueber einige Methoden des Trocknens der Pflanzen für das Herbarium.* *Flora*, 88: 473. 1901.

† First employed by Herr Jegorow of Moscow.

‡ It is possible that the adjustable catches such as are used on "arctics" could be used for this.

to time. The plants will be slightly curved when dried but may be readily straightened out by placing them for a short time under moderate pressure. By this method it is said that the natural colors of the plants are admirably preserved.—H. M. R.

BROMELIACEAE IN COSTA RICA.—The monograph of the Bromeliaceae by Dr. C. Mez, the great specialist, gives the number of known species in Costa Rica as 56 (in 1896). Yet the real number of species in that small country is about 300. All the genera with superior ovary are epiphytes in Costa Rica, as are also, among those with inferior ovary, the two genera *Aechmea* and *Billbergia* and a few of the genus *Hepetis*. The chief reasons why such a small percentage of the species is recognized are to be sought in the great similarity of many species and the dissimilarity of individuals of the same species at different ages and under different conditions. There are many species with a number of varieties and finally there is a complete confusion of natural hybrids among the superb large *Conostachides* of the high frost-region. For these reasons, there are few botanists and collectors who venture to take up the Bromeliaceae seriously in Costa Rica. Only after living for years in the Bromeliaceae region does one become able to recognize the types. Dr. Mez states that the same confusion exists among the smaller species of *Tillandsia* in Argentina, etc., where they have become entirely mixed by natural crossing. Another reason for the present neglect of this exceedingly interesting family is the difficulty in drying most species, especially in the wet season. Again many species have a very local distribution or are very scarce.—C. WERCKLÉ.

A TEXAN CHERRY—*Prunus eximia*. A tree becoming 26 m. tall, with wide-spreading branches and glabrous twigs. Leaf-blades relatively thin, mainly ovate, varying to oblong, oblong-lanceolate or oval, 3–8 cm. long, obtuse, or slightly acuminate, but blunt, glabrous, delicately reticulated, serrate with appressed teeth, bright green above, pale green beneath, slender-petioled: racemes drooping, 5–7 cm. long, glabrous: pedicels 4–8 mm. long, thickened upward: sepals deltoid, slightly broader than long, acute: corolla white, 10–12 mm. broad: petals orbicular-ovate: drupe globular, 8–10 mm. in diameter, purple, sweet.

In river valleys, south-central Texas. Type, *Heller*, Pl. So. Tex., no. 1592.

Related to *Prunus serotina*, from which it is distinguished by the deltoid acute sepals and by the delicately reticulated and differently shaped leaf-blades. Mr. Howard Lacy, a resident of the region where *P. eximia* grows, informs me that the fruit of the tree is sweet and much eaten by the children. He says also that it has a great attraction for bears and hogs.—J. K. SMALL.

FIELD DAYS OF THE TORREY BOTANICAL CLUB.—David S. George acted as the representative of the New York Botanical Garden on the excursion to Rockaway Park, Long Island, September 7th. A few interesting coast plants were collected, among which were *Cakile edentula* (Bigel.) Hook.; *Salsola Kali* L.; *Teucrium littorale* Bicknell, one of the recent segregates of *T. Canadense* L.; *Lechea maritima* Leggett; *Ammophila arenaria* (L.) Link, which is abundant here; *Chaetochloa glauca* (L.) Scribn. and the pretty pink-flowered *Sabbatia stellaris* Pursh.

Between Monachie and Woodridge, Bergen Co., N. J., September 21st, Mr. G. V. Nash collected *Eupatorium album* L.; *Gentiana Saponaria* L.; *Parnassia Caroliniana* Michx.; *Spartina polystachya* (Michx.) Ell.; *Cinna arundinacea* L., with purplish panicles; *Zizania aquatica* L. and *Woodwardia areolata* (L.) Moore.—S. H. BURNHAM.

A NEW COMMON NAME.—It seems that *Micrampelis lobata* (Michx.) Greene, the wild balsam-apple, mock apple, or wild cucumber, commonly cultivated and escaped in this vicinity, shares with *Bicuculla Cucullaria* (L.) Millsp. the euphonious appellation of "Dutchman's Breeches." The allusion is to the inner fibrous-netted part of the fruit, which encloses the seeds and bears a striking resemblance to a pair of wide pantaloons.

New Jersey is a good old Dutch colony and the name may be local as I never seen that it is used elsewhere. However, the plant is commonly so-called in Passaic.—EDWARD W. BERRY, Passaic, N. J.

NEWS ITEMS

Professor Appleton P. Lyon, a member of the Torrey Botanical Club, died suddenly at Mt. Vernon, N. Y., on November 27.

The death of Mr. Thomas Meehan, the well-known editor

and botanist, occurred at Germantown, Pa., on November 19, at the age of seventy-five years.

Dr. John K. Small and Mr. George V. Nash spent the larger part of November in southern Florida, making collections for the New York Botanical Garden.

The newspapers announce the appointment of Professor F. Lamson-Scribner, agrostologist of the Department of Agriculture, as Chief of the Insular Bureau of Agriculture in the Philippines.

Mr. Howard J. Banker, who was a graduate student in botany at Columbia University in 1898-1900, is now teaching in the Southwestern State Normal School at California, Pa.

The Society for the Protection of Native Plants has recently issued Nos. 2 and 3 of its series of leaflets for public distribution. No. 2 is a general statement of the aims of the Society, by Professor George Lincoln Goodale, and No. 3 is "A Plea for the Preservation of Our Ferns," by Mr. George E. Davenport.

The fifth annual meeting of the Society for Plant Morphology and Physiology will be held at Columbia University on Tuesday and Wednesday, December 31 and January 1. The American Society of Naturalists with which this Society usually meets holds its sessions this year at Chicago. Reports of the Society's committees on the *Botanisches Centralblatt* and upon the Standard College Entrance Option in Botany will be among the special features of the Columbia meeting.

ERRATA

Page 5, 7th line, *for* D. K. Gilbert, *read* B. D. Gilbert.

Page 26, 7th line from below, *for* varitable, *read* veritable.

Page 79, 12th line from below, *for* era, *read* are.

Page 81, 5th line from below, *for* Corallarhiza, *read* Coral-lorhiza.

Page 82, 9th line from above, *for* hygrophylous *read* hygrophilous.

Page 100, 13th line from below, *for* is, *read* are.

Page 132, 19th and 20th lines from above, *for* KNO, *read* KNO₃.

INDEX TO VOLUME I.

New names and the names of new genera and species are printed in **boldface type**.

- Achillea argentea*, 82
Actaea alba, 132
 Adams, G. E., personal, 72
Adiantum, 128
Aechmea, 146
Aecidium, 128
Agardhiella, 128
Albugo, 128
 Alleghanian *Rudbeckia*, An, 67
 Allen, T. F., personal, 24
 Alpine Botanical Garden, An, 81
Amanita, 128
 America, Botanical Society of, 112
 American Association for the Advancement of Science, 112
 American Botanist, The, 111
Ammophila arenaria, 147
Ampelopsis, "Simple-leaved," Are the Leaves of, simple?, 139; arborea, 140; cordata, 139, 140
Amphoridium Lapponicum, 9
Amsonia Amsonia in New Jersey, 75
Anabaena, 128
 Anderson, A. P., personal, 84
Anemone, 65
Anomobryum concinatum, 9
Anonymos capitat., 33, 34; *tinctori.*, 33, 34
Antennaria plantaginifolia, 75
Apios Apios, 120
Apodanthes Thurberi, 56
Aralia racemosa, 132; *spinosa*, 117
Arceuthobium, 69
 Are the Leaves of "Simple-leaved *Ampelopsis*" simple, 141
Arisaema, Seedlings of, 2; *triphyllum*, 2, 4; *Dracontium*, 2, 3, 4
Arnica from Oregon, A new, 42; **aurantiaca**, 42; *crocea*, 42, 43; **crocina**, 42
 Arnold, A. F., "The Sea-Beach at Ebb-Tide," 72
Artemisia, 22; *Pedemontana*, 82
 Arthur, J. C., personal, 112
Arum maculatum, 3, 4
 Ascent of Sap, The Mignonette as Class Illustration for, 56
Asclepias humistrata, 117
Ascophyllum, 128, 129
Asplenium Bradleyi, 7; *viride*, 93
 Association for Advancement of Science, American, 112
 Association of Botanists, International, 112
Aster Schreberi, 132
Astragalus, Notes on, 109; *crassicarpus*, 109; *Hypoglottis*, 109; *Plattensis*, 109
 Atkinson's "Studies of American Fungi," 45
Azalea, 88

 Bailey, W. W., personal, 72
 Banker, H. J., personal, 148
Baptisia lanceolata, 116; *perfoliata*, 116; *tinctoria*, 120
 Barnes, C. R., "A simple Dynamometer," 47, 70
Bartonia, 142; *decapetala*, 142, *laevicaulis*, 143; *multiflora*, 143; *nuda*, 143
Bartramia Oederiana, 84
 Bashbish Falls, The rare Mosses of, 9
 Bates, J. M., Notes on *Astragalus*, 109
Batodendron arboreum, 8
 Beal, W. J., A new *Panicularia*, 43
 Beardslee, H. C., Notes on the *Boleti* of West Virginia, 37
Berchemia scandens, 116
 Berry, E. W., Notes on *Liriodendron Leaves*, 105; A new common Name, 147; personal, 71
 Bicknell, E. P., A new Horse Gentian (*Triosteum*) common in the Eastern States, 25; On *Scirpus robustus* Pursh and certain of its near Allies, 94; Two new Bush Clovers (*Lespedeza*), 102
Bicuculla Cucullaria, 147
Billbergia, 146
 Bird, H. A., personal, 23
 Bladder Kelp, *Nereocystis Lütkeana*, A Note on, 49
 British Museum, Report of Committee on Botanical Work and Collections at, 60

- Blephariglottis ciliaris*, 119
 Blodgett, F. H., The *Lygodium* at Home, 19; Transpiration of rust-infested *Rubus*, 34; A Tulip with a Runner, 78; personal, 71, 136
Bolelia, 70
Boleti of West Virginia, Notes on the, 37
Boletus affinis, 39; *alutarius*, 38; *aureo-flammeus*, 37; *bicolor*, 39; *chromapes*, 39; *cyanescens*, 38; *edulis*, 39; *eximius*, 38; *gracilis*, 38; *nigrellus*, 38; *Ravenelii*, 38; *separans*, 38
 Botanical Garden, An alpine, 81; New York, 24, 36, 60, 72, 124, 148
 Botanical Society of America, 112
 Botany at Cold Spring Harbor in 1901, Cryptogamic and physiological, 127
Botrychium, 128
 Bower, F. O., personal, 112
Bradburya Virginiana, 116
 Brainerd, Jones, and Eggleston's "Flora of Vermont," 10
 Britton, E. G., The rare Mosses of Bash-bish Falls, 9; Mosses of the Catskill Mountains, N. Y., 84; Vanishing Wild Flowers, 85; The Storing of Seeds by Squirrels, 108; Spring Foliage in October, 119
 Britton, N. L., Notes on *Rudbeckia hirta*, 1; A new *Senecio* from Pennsylvania, 21; A new Hawkweed from Florida, 41; A new *Crataegus* from Washington, 55; *Nocca* and *Cracca*, 83; *Cupania* on Pine Key, Florida, 132; personal, 110, 112, 124
 Britton's "Manual of the Flora of the Northern States and Canada," 133
 Bromeliaceae in Costa Rica, 146
Bryopsis, 128
Bryum capillare, 84; *proliferum*, 9; *proligerum*, 84
Buda, 69
 Burgin, see Dallas
Bulbochaete, 128
 Burtlehaus, F. H., *Circaea* Fruit devoid of hooked Bristles, 56
Burmanna and *Gyrotheca*, Synonymy of, 33; *capitata*, 33, 34
 Burnham, S. H., Heterophyly in *Hepatica acuta*, 65; Field Days of the Torrey Botanical Club, 119, 132, 147
 Bush Clovers (*Lespedeza*), Two new, 102
Buxbaumia aphylla, 84

Cakile edentula, 147
Campanula Canisia, 81
 Campbell, D. H., personal, 112
 Campbell's "University Text-Book of Botany," 110

Camptosorus, 89
Campulosus aromaticus, 115
 Cannon, W. A., Note on the Bladder Kelp, *Nereocystis Lütkeana*, 49; On the Relation of Redwoods and Fog to the general Precipitation in the Redwood Belt of California, 137; personal, 59
Capriola Dactylon, 32
Capsella, 70
 Card, F. W., personal, 72
 Carss, E., The Value of Forestry in a Course of Nature Study, 13
Cassia occidentalis, 116; *Tora*, 116
Castanea dentata, 7
Castilleia alpina, 83; *luteovirens*, 84; *pallida*, 83
Cephalanthus occidentalis, 117
Cephalozia, 128
Ceratiola ericoides, 116
Chaetochloa glauca, 147
Chamaelirium, Two Species of, 107; *luteum*, 107, 108; *obovale*, 107, 108
 Chamberlain, see Coulter
 Cherry, A Texan, 146
Chimaphila maculata, 117
Chrysanthemum Leucanthemum, 75
Cinna arundinacea, 147
Circaea Fruit devoid of hooked Bristles, 55; *intermedia*, 55; *Lutetiana*, 55, 56
Citrus trifoliata, 141
Cladophora, 128
Clethra alnifolia, 132
Cliftonia monophylla, 116
Closterium, 128
 Clute's "Our Ferns in their Haunts," 134
Cobaea, 144
 Cockerell, T. D. A., Varietal and specific Names, 79; Nomenclatural Note, 83; **Hesperaster**, Genus of Loasaceae, 142
 Cold Spring Harbor, Cryptogamic and physiological Botany at, in 1901, 127
 Common Name, A new, 147
Conocephalum, 128
Conopholis Americana, 91
Conostachys, 146
 Copeland, E. B., Cryptogamic and physiological Botany at Cold Spring Harbor in 1901, 127
Coprinus, 128
Corallorhiza, 81
Cordyceps, 128
Corema Conradii, 92
 Corn, Diembryony in, 68
 Cornel, A Kentucky, 54
Cornus asperifolia, 54; *microcarpa*, 54, 55; **Priceae**, 54
Cracca, *Nocca* and, 83; *Virginiana*, 83, 116

- Crataegus* from Washington, A new, 55 ;
 A weeping, 96 ; aestivalis, 116 ; **lacri-**
mata, 97 ; lepida, 97 ; **Piperi**, 55
Crepis pygmaea, 81
Crucibulum, 128
 Costa Rica, Bromeliaceae in, 146
 Coulter and Chamberlain's "Morphology
 of Spermatophytes," 98
 Coville, F. V., Britton's "Manual of the
 Flora of the Northern States and Can-
 ada," 133
 Cowell, J. F., personal, 110
 Cryptogamic and physiological Botany at
 Cold Spring Harbor in 1901, 127
Cupania on Pine Key, Florida, 132 ;
glabra, 132
Cuscuta, 56 ; *arvensis*, 120
Cycas, 131
Cypripedium Calceolus, 93
Cyrtilla racemiflora, 116

Dalea Emoryi, 56 ; *formosa*, 56
 Dallas and Burgin's "Among the Mush-
 rooms," 44
 Davis, B. M., personal, 36
Decodon verticillatus, 132
Dentaria, 81
Dicentra, 70
Dicksonia, 11 ; *arborescens*, 11
Dicranella heteromalla, 9
Dicranum, 128 ; *fuscescens*, 84 ; *longi-*
folium, 84 ; *viride*, 84
Dictyophora, 128
Didymodon rubellus, 9
 Diembryony in Corn, 68
Dilatris tinctoria, 34
Diodia teres, 117
Dioscorea villosa, 132
Diospyros, 8
Dipsacus sylvestris, 120
 Distribution of *Pterospora*, 101
Dolicholus simplicifolius, 116
Downingia, 70
 Drying Plants, New Methods of, 145
 Dunn, L. B., Coulter and Chamberlain's
 "Morphology of Spermatophytes," 98 ;
 personal, 71
 Duplication of Contributions on Physi-
 ology of Tendrils, 125
 Dynamometer, A Simple, 8, 47, 48, 70

 Earle, F. S., personal, 124
 Eaton, A. A., personal, 36
Echinocystis, 70
 Economy in Nature, 10
Ectocarpus, 128
 Eggert, H., A rare Plant from western
 Texas, 56
 Eggleston, see Brainerd
Entada scandens, 125, 126, 127

Epigaea repens, 91
Equisetum, 128
Eriogonum tomentosum, 116
Erythronium, 78, 79
Eupatorium album, 147 ; *compositifolium*,
 117 ; *purpureum falcatum*, 132
Exobasidium, 128
 Explosive Fruits, 144
 Extrusion of the Gametes of *Fucus*, 129

 Ferguson's "Crotons of the United
 States," 35
 Ferriss, J. H., personal, 136
 Field Days of the Torrey Botanical Club,
 119, 132, 147
 Flora of King's Mountain and Crowder's
 Mountain, North Carolina, 7
 Florida, A new Hawkweed from, 41
 Flowers, Vanishing Wild, 85, 122
 Fog, see Redwoods
 Forestry in a Course of Nature Study,
 The Value of, 13
Forsströmia trichomitria, 9
Fragaria Virginiana, 75
 Fretz, C. D., *Tulipa sylvestris* in the
 Flora of the United States, 82
 Fruits, Explosive, 144
Fucus, 128, 129 ; Extrusion of the
 Gametes of, 129
Funaria, 39, 40, 41, 128 ; *Funaria hy-*
grometrica in botanical Teaching, Re-
 marks on the Use of, 39
 Fungus Stipes, Geotropism of, 128

Galax, 88 ; *aphylla*, 8, 117
 Gamophyllous, The, 23
 Ganong, W. F., personal, 12 ; "Sugges-
 tions for an Attempt to secure a stand-
 ard College Entrance Option in Bot-
 any," 59
Gaylussacia dumosa, 117 ; *frondosa*, 8 ;
resinosa, 8 ; *ursina*, 67
Gentiana Saponaria, 147
 Georgia, 128
 Georgia, Some popular Plant-names used
 in, 115
 Geotropism of Fungus Stipes, 128
Gerbera, 43
Geum reptans, 81
 Gilbert, B. D., Notes on *Lycopodium*
tristachyum Pursh (*L. Chamaecyparis-*
sus A. Br.), 117 ; personal, 36
Gilia, 144
Gingko, 131
Glottidium vesicarium, 116
Glyceria, 69
Gnaphalium obtusifolium, 117
 Goebel, K., personal, 112
Goodyera, 81
 Graves, H. S., personal, 35

- Gray Bulletin, Asa, 12
 Greene, E. L., A new *Arnica* from Oregon, 42
 Griffiths, D., Thriving under Difficulties, 30; personal, 23
 Grout's "Mosses with a Hand Lens," 24
Gymnoconia interstitialis, 34
 Gymnosperms, The generative Divisions in, 131
Gymnostomum rupestre, 9
Gyrostachys gracilis, 132
Gyrotheca, Synonymy of *Burmanna* and, 33; *capitata*, 33, 34; *tinctoria*, 34
Habenaria fimbriata, 91
 Haberlandt's "Sinnesorgane im Pflanzenreich zur Perception mechanischer Reise," 126
 Halsted, B. D., The Mignonette as Class Illustration for Ascent of Sap, 56; *Diembryony* in Corn, 68; Weeping Tomatoes, 130; Are the Leaves of "Simple-leaved *Ampelopsis*" simple?, 139; Explosive Fruits, 143; personal, 72
 Harper, R. M., Synonymy of *Burmanna* and *Gyrotheca*, 33; Some popular Plant-names used in Georgia, 115; personal, 59
 Harshberger's "Ecological Study of the New Jersey Strand Flora," 23
 Hawkweed from Florida, A new, 41
 Hay, G. U., personal, 110
 Hazen, T. E., personal, 71
Heldreichia, 81
Helianthus decapetalus, 132; *divaricatus*, 132
Hepatica acuta, Heterophylly in, 65; *Hepatica*, 65
Hepetis, 146
Hesperaster, a Genus of Loasaceae, 142; *chrysanthus*, 143; *decapetalus*, 142; *densus*, 143; *laevicaulis*, 143; *multiflorus*, 143; *nudus*, 143; *perennis*, 143; *pumilus*, 143; *Rusbyi*, 143
 Heterophylly in *Hepatica acuta*, 65
Hieracium Floridanum, 42; *Marianum*, 42
 Hill, E. J., *Lycopodium tristachyum*, 76
 Hitchcock, A. S., personal, 35
 Hollick, A., personal, 110, 124
Homalia gracilis, 84; *Jamesii*, 9
 Horse Gentian (*Triosteum*) common in the Eastern States, A new, 25
 Horticultural Society of New York, Annual meeting of, 60
 Howe, C. D., personal, 84
 Howe, M. A., Brainerd, Jones, and Eggleston's "Flora of Vermont," 10; Remarks on the Use of *Funaria hygrometrica* in botanical teaching, 39; Jepson's "Flora of Western Middle California," 69; personal, 84, 124
Hydnum, 128
 Hygrometer suitable for testing Action of Stomata, A new, 16
Hylocomium brevirostre, 9; *Pyrenaicum*, 84; *umbratum*, 84
 Idaho, A fossil Nut Pine from, 113
Ilex glabra, 116; *opaca*, 8
Impatiens biflora, 132
 International Association of Botanists, 112
Iva frutescens, 120
 Jepson's "Flora of Western Middle California," 69
 Jones, see Brainerd
 Jordan's "The Determination of the Type in Composite Genera of Animals and Plants," 59
 Journals: The American Botanist, 111; Asa Gray Bulletin, 12; *Gamophyllous*, 23; Plant World, 12
Juncooides in the Southeastern States, 73; *bulbosum*, 73, 74; *campestre*, 73, 74; *echinatum*, 73, 74; *pilosum*, 73, 74
Kalmia, 88; *latifolia*, 8, 91
 Kentucky Cornel, A, 54
 King's Mountain and Crowder's Mountain, North Carolina, The Summit Flora of, 7
 Kirkwood, J. E., personal, 24
 Knowlton, F. H., A fossil Nut Pine from Idaho, 113
Koellia, 69; *flexuosa*, 120
Lachnanthes tinctoria, 34
Lacinaria Regimontis, 7
Laminaria, 49
 Lang, W., personal, 84
 Lawson, A. A., personal, 36
 Lechea, 26; *maritima*, 147
Lespedeza Brittonii, 103; *capitata*, 103; *Nuttallii*, 104; *procumbens*, 104; *velutina*, 102, 103
 Linnaea, 52; *Americana*, 53, 54; *bo-realis*, 52, 53, 54; *longiflora*, 52, 53, 54
 Liriodendron Leaves, Notes on, 105
Listera, 81
 Lloyd, F. E., Notes on the Genus *Lycopodium*, 5; The Genus *Lycopodium*—A Criticism, 56; The "Peg" or "Heel" in Seedlings of Cucurbitaceae, 120; personal, 12

- Lloyd and Bigelow's "Outline of Course in Biology," 24
- Loasaceae, **Hesperaster**, a Genus of, 142
- Lobelia syphilitica, 132
- Lonicera, 81
- Lupinus perennis, 75
- Luzula campestris, 74; Carolinae, 74
- Lycopodium, 81, 128; Notes on the Genus, 5; adpressum, 6; alopecuroides, 6; alpinum, 57, 58; annotinum, 57, 118; Carolinianum, 5; Chamaecyparissus, 5, 11, 58, 76, 117; clavatum, 57, 118; complanatum, 5, 11, 58, 76, 77, 118, 119; Fawcettii, 57, 58, 59; inundatum, 6; obscurum, 118; pinatum, 5, 6; sabinaefolium, 57, 58; Sitchense, 57, 58; tristachyum, 58, 76, 77, 117, 118; Wightianum, 57
- Lycopodium tristachyum Pursh, Notes on, 117
- Lygodium at Home, The, 19; palmatum, 19
- L yngbya, 128
- Lyon, A. P., death of, 147
- MacDougal, D. T., Seedlings of Arisaema, 2; A new Hygrometer suitable for testing Action of Stomata, 16; Distribution of Pterospora, 101; Duplication of Contributions on Physiology of Tendrils, 125, personal, 12, 71, 112, 124
- MacDougal's "A practical Text-Book of Plant Physiology," 24, 99
- MacRae, L. G., personal, 36
- Macrocystis, 49
- Magnolia, 105, 106
- Marchantia, 128
- Marshall's "The Mushroom Book," 36, 45
- Marsilea, 128
- Maxon, W. R., personal, 36
- McIlvaine's "One thousand American Fungi," 44
- Meehan, T., death of, 147
- Meibomia Canadensis, 132; Michauxii, 116
- Mentzelia chrysantha, 143; densa, 143; perennis, 143; pumila, 143; Rusbyi, 143
- Methods of drying Plants, New, 145
- Michael's "Führer für Pilzfreunde," 46
- Micrampelis lobata, 147
- Microsphaera, 128
- Mignonette as Class Illustration for Ascent of Sap, The, 56
- Miller, B. S., Amsonia Amsonia in New Jersey, 75
- Mimulus, 82
- Mohr, C., death of, 110
- Mohr's "Plant Life of Alabama," 110
- Monostroma, 128
- Moore, G. T., personal, 36
- Mosses of Bashbish Falls, The rare, 9
- Murrill, W. A., The generative Divisions in Gymnosperms, 131; personal, 12
- Mycophagy and its Literature, 43
- Myrica cerifera, 115
- Myurella Careyana, 9
- Name, A new common, 147
- Names, Varietal and specific, 79
- Narcissi, Naturalized or adventive, 43
- Narcissus poeticus, 43; Pseudo-Narcissus, 43
- Nash, G. V., personal, 36, 60, 148
- Naturalized or adventive Narcissi, 43
- Nature Study, The Value of Forestry in a Course of, 13
- Nelumbo lutea, 116
- Nemalion, 128
- Nereocystis Lütkeana, A Note on the Bladder Kelp, 49
- New common Name, A, 147
- New Jersey, Amsonia Amsonia in, 75
- New Methods of drying Plants, 145
- New York Botanical Garden, 24, 36, 60, 72, 110, 111, 124, 148
- Nitella, 128
- Nocca and Cracca, 83
- Noll's "Zur Keimungs-Physiologie der Cucurbitaceen." 120
- Nomenclatural Note, 83
- North American Twinflowers, The, 52
- North Carolina, The Summit Flora of King's Mountain and Crowder's Mountain, 7
- Northrop, Mrs. J. I., The Spreading of Solidago speciosa in the Vicinity of Yonkers, N. Y., 141
- Notes on the Boleti of West Virginia, 37
- Notes on the Genus Lycopodium, 5
- Notes on Liriodendron Leaves, 105
- Notes on Lycopodium tristachyum (L. Chamaecyparissus A. Br.), 117
- Notes on Rudbeckia hirta L., 1
- Notothylas, 128
- Nut Pine from Idaho, A fossil, 113
- Nuttallia, 69
- Nyssa sylvatica, 8
- Osmaronia, 69
- Osmunda, 128; regalis, 93
- Oxydendrum, 8
- Paleobotany, 72
- Panicularia, 69; A new, 43; **Holmii**, 43; pallida, 43
- Panicum digitarioides, 115; virgatum, 120

- Parish's "Pteridophyta and Spermatophyta of Southern California," 110
- Parnassia Caroliniana, 147
- Paronychia argyrocoma, 8
- Parthenocissus quinquefolia, 139; tricuspidata, 140
- Paullinia, 132
- Peck, C. H., Annual Report, 60
- Pedicularis, 81
- "Peg" or "Heel" in Seedlings of Cucurbitaceae, The, 120
- Penhallow, D. P., personal, 12
- Penicillium, 128
- Pennsylvania, A new Senecio from, 21
- Peronospora, 128
- Peziza, 128
- Philibert, H., death of, 72
- Phlox, 144; Drummondii, 144
- Physiology of Tendrils, Duplication of Contributions on, 125
- Pickeringia, 69
- Pilostyles Thurberi, 56
- Pinchot, J. W., personal, 35
- Pinckneya pubens, 117
- Pinus edulis, 114; Lindgrenii, 114, 115; monophylla, 114, 115; rigida, 131; Virginiana, 8
- Plagiothecium Müllerianum, 84; striatellum, 84
- Plant from Western Texas, A rare, 56
- Plant-names used in Georgia, Some popular, 115
- Plant World, 12
- Poa minor, 81
- Pogonatum alpinum, 9
- Pogonia verticillata, 91
- Polemonium, 144
- Polycodium stamineum, 8
- Polygala verticillata, 120; viridescens, 120
- Polyporus, 128
- Polysiphonia, 128
- Polytrichum, 128
- Porotrichum Allegheniense, 9
- Porter, T. C., death of, 60
- Postelsia, 49, 51, 52
- Potentilla argentea, 75
- Precipitation in the Redwood Belt of California, On the Relation of Redwoods and Fog to the general, 137
- Prenanthes, 81
- Prinos, 88
- Pritzels "Lycopodiaceae," 56
- Protection of Native Plants, Society for, 111, 148
- Prunus eximia, 146, 147; serotina, 132, 147
- Pteridium, 128; aquilinum, 76
- Pterocaulon undulatum, 117
- Pterospora, Distribution of, 101; Andromeda, 101
- Ptilimnium capillaceum, 119
- Ptiloria, 70
- Puccinia, 128
- Pycnanthemum, 69
- Quercus digitata, 115; nana, 8; Prinus, 8; rubra, 115
- Raphidostegium Jamesii, 84; laxapetalum, 84
- Razoumofskya, 69
- Redwoods and Fog, On the Relation of, to the general Precipitation in the Redwood Belt of California, 137
- Respiration Apparatus, A modified Form of, 28
- Reviews: Atkinson's "Studies of American Fungi," 45; Brainerd, Jones, and Eggleston's "Flora of Vermont," 10; Britton's "Manual of the Flora of the Northern States and Canada," 133; Clute's "Our Ferns in their Haunts," 134; Coulter and Chamberlain's "Morphology of Spermatophytes," 98; Dallas and Burgin's "Among the Mushrooms," 44; Jepson's "Flora of Western Middle California," 69; MacDougal's "Practical Text-Book of Plant Physiology," 99; Marshall's "The Mushroom Book," 45; McIlvaine's "One thousand American Fungi," 44; Michael's "Führer für Pilzfreunde," 46; Noll's "Zur Keimungs-Physiologie der Cucurbitaceen," 120; Pritzel's "Lycopodiaceae," 56
- Rhexia Virginica, 120, 132
- Rhododendron, 82, 88; Catawbiense, 8
- Ribes, 81
- Riccia, 128
- Richards, H. M., A simple Dynamometer, 8; A modified Form of Respiration Apparatus, 28; "A simple Dynamometer," 48, 71; MacDougal's Practical Text-Book of Plant Physiology, 99; New Methods of drying Plants, 145; personal, 71
- Riley, W. A., Rosellinia ovalis (Ell.) Sacc., 22
- Robinson, B. L., personal, 72, 112
- Rosellinia ovalis (Ell.) Sacc., 22; pulveracea, 22, 23
- Rubus, 81; Canadensis, 75; cuneifolius, 116; nigrobaccus, 132; Transpiration of rust-infested, 34
- Rudbeckia, An Alleghanian, 67; hirta, 1, 67; monticola, 67
- Rudbeckia hirta, Notes on, 1
- Runner, A Tulip with a, 78

- Rusby, H. H., personal, 124
 Rydberg, P. A., Economy in Nature, 10; The North American Twinflowers, 52; "When in Rome do as the Romans do," 61; personal, 71
 Rynchospora glomerata, 120
- Sabbatia, 88; stellaris, 147
 Salsola Kali, 147
 Salvia, 23
 Sanguisorba Canadensis, 120
 Saprolegnia, 128
 Sassafras, 8
 Salix, 43
 Sap, The Mignonette as Class Illustration for Ascent of, 56
 Saxifraga, 81
 Schrenk, H. von, personal, 112
 Scirpus robustus Pursh and certain of its near Allies, 94; campestris, 95; **Fernaldi**, 96; maritimus, 94; paludosus, 94, 95, 96
 Scleroderma, 128
 Scolopendrium vulgare, 93
 Scribner, F. Lamson-, personal, 148
 Seedlings of Arisaema, 2
 Seedlings of Cucurbitaceae, The "Peg" or "Heel" in, 120
 Seeds, Storing of by Squirrels, 108
 Selaginella, 81, 128
 Senecio from Pennsylvania, A new, 21; Balsamitae, 21; **Crawfordii**, 21; Robbinsii, 21
 Seymour, A. B., personal, 72
 Shaw, C. H., personal, 36
 Shaw, W. R., personal, 136
 Sida rhombifolia, 116
 Silene stellata, 132
 Simblum, 128
 Slosson, M., personal, 36
 Small, J. K., The Summit Flora of King's Mountain and Crowder's Mountain, North Carolina, 7; A Kentucky Cornel, 54; A weeping Crataegus, 96; Two Species of Chamaelirium, 107; A Texan Cherry, 146; personal, 148
 Smilax laurifolia, 115; Walteri, 115
 Smith, E. F., personal, 12
 Smith, J. G., personal, 59
 Society, Botanical, of America, 112
 Society for the Protection of Native Plants, 111, 148
 Society for Plant Morphology and Physiology, Annual Meeting of, 148
 Solidago speciosa, 141, 142; The Spreading of, in the Vicinity of Yonkers, N. Y., 141; monticola, 67
 Spartina polystachya, 147; Adaptations of, to Environment, 129
 Species of Chamaelirium, Two, 107
- Sphaeria ovalis, 22
 Spiraea salicifolia latifolia, 120
 Spirogyra, 128
 Sporobolus Indicus, 115
 Sporodinia, 128
 Spreading of Solidago speciosa in the Vicinity of Yonkers, N. Y., 141
 Spring Foliage in October, 119
 Stephanomeria, 70
 Stereum, 128
 Stipa, 17
 Stokes, C. Phelps, personal, 110
 Stokes, O. E. Phelps, personal, 110
 Storing of Seeds by Squirrels, The, 108
 Strobilomyces, 128
 Summit Flora of King's Mountain and Crowder's Mountain, North Carolina, The, 7
 Synonymy of Burmannia and Gyrotheca, 33
- Taphrina, 128
 Taylor, M. H., "Vanishing Wild Flowers," 122
 Tecoma radicans, 117
 Tendrils, Duplication of Contributions on Physiology of, 125
 Tephrosia, 83
 Tetricium Canadense, 147; littorale, 147
 Texan Cherry, A, 146
 Texas, A rare Plant from Western, 56
 Thriving under Difficulties, 30
 Tillandsia, 146
 Tissa, 69
 Tomatoes, Weeping, 130
 Torreya, 69
 Torrey Botanical Club, Field Days of, 119, 132, 147
 Toumey, J. W., personal, 35
 Transpiration of rust-infested Rubus, 34
 Trelease, W., personal, 112
 Trichostomum tenuirostre, 84
 Trifolium heterodon, 84; Fendleri, 84; involucreatum, 84; pratense, 75
 Trilisa odoratissima, 117
 Triosteum, 25; **aurantiacum**, 26, 27, 28; perfoliatum, 25, 26, 27, 28
 Tripterella capitata, 33, 34
 True, R. H., personal, 36
 Tsuga Canadensis, 131
 Tulipa, 79
 Tulipa sylvestris in the Flora of the United States, 82
 Tulip with a Runner, A., 78
 Twinflowers, The North American, 52
- Underwood, L. M., Mycophagy and its Literature, 43; Lycopodium tristachyum, 58 (footnote); A popular work on Ferns, 134; personal, 56, 72, 73, 110, 124

Uredo, 128
 Ustilago, 128

Vaccinium arboreum, 117; Canadense,
 77; pallidum, 67; Pennsylvanicum,
 77; stamineum, 117; vacillans, 8

Vail, A. M., An alpine botanical Gar-
 den, 81

Valeriana Celtica, 82

Vanishing Wild Flowers, 85, 122

Varietal and specific Names, 79

Vaucheria, 128

Vicia Faba, 9

Viola Cenisia, 81

Vitis, 141

Vogelia capitata, 33, 34

Volvox, 128

Vroom, J., personal, 110

Washington, A new Crataegus from, 55

Weeping Tomatoes, 130

Wercklé, C., Bromeliaceae in Costa
 Rica, 146

West Virginia, Notes on the Boleti of, 37
 "When in Rome do as the Romans do,"
 61

White, T. G., death of, 111

Williams, R. S., personal, 110

Wilson, P., personal, 35, 111

Woodwardia areolata, 147

Xylothermia, 69

Yonkers, N. Y., The Spreading of
 Solidago speciosa in the Vicinity of,
 141

Zamia, 131

Zizania aquatica, 147

Zygodon viridissimus, 84

TORREYA

A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE



JOHN TORREY, 1796-1873

CONTENTS

Notes on <i>Rudbeckia hirta</i> L.: N. L. BRITTON.....	1
Seedlings of <i>Arisaema</i> : D. T. MACDOUGAL.....	2
Notes on the Genus <i>Lycopodium</i> : F. E. LLOYD ..	5
The Summit Flora of King's Mountain and Crowder's Mountain, North Carolina: J. K. SMALL	7
A Simple Dynamometer: H. M. RICHARDS.....	8
The Rare Mosses of Bashbish Falls: E. G. BRITTON.....	9
Economy in Nature: P. A. RYDBERG.....	10
Review.....	10
News Items.....	12

PUBLISHED FOR THE CLUB

AT 41 NORTH QUEEN STREET, LANCASTER, PA.

BY THE NEW ERA PRINTING COMPANY

THE TORREY BOTANICAL CLUB

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CONTENTS

The Value of Forestry in a Course of Nature Study: ELIZABETH CARSS.....	13
A new Hygrometer suitable for testing Action of Stomata: D. T. MACDOUGAL.....	16
The Lygodium at Home: FREDERICK H. BLODGETT.....	19
A new Senecio from Pennsylvania: N. L. BRITTON.....	21
Rosellinia ovalis (Ell.) Sacc.: WILLIAM A. RILEY.....	22
News Items.....	23

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CONTENTS

A new Horse Gentian (<i>Triosteum</i>) common in the Eastern States: EUGENE P. BICKNELL.....	25
A modified Form of Respiration Apparatus: H. M. RICHARDS	28
Thriving under Difficulties: DAVID GRIFFITHS	30
Synonymy of <i>Burmanna</i> and <i>Gyrotheca</i> : ROLAND M. HARPER	33
Transpiration of rust-infested <i>Rubus</i> : FREDERICK H. BLODGETT	34
News Items.....	35

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TORREYA

A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE



JOHN TORREY, 1796-1873

CONTENTS

Notes on the Boleti of West Virginia: HENRY C. BEARDSLEE.....	37
Remarks on the Use of <i>Funaria hygrometrica</i> in botanical Teaching: MARSHALL A. HOWE.....	39
Shorter Notes	
A new Hawkweed from Florida: N. L. BRITTON.....	41
A new Arnica from Oregon: E. L. GREENE.....	42
A new Panicularia: W. J. BEAL.....	43
Naturalized or adventive Narcissi: C. L. GRUBER.....	43
Reviews	
Mycophagy and its Literature: LUCIEN M. UNDERWOOD.....	43
Correspondence	
"A simple Dynamometer": C. R. BARNES.....	47
"A simple Dynamometer": HERBERT M. RICHARDS.....	48

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CONTENTS

A Note on the Bladder Kelp, <i>Nereocystis Lütkeana</i> : W. A. CANNON.....	49
The North American Twinflowers: P. A. RYDBERG	52
Shorter Notes	
A Kentucky Cornel: JOHN K. SMALL.....	54
A new <i>Crataegus</i> from Washington: N. L. BRITTON.....	55
<i>Circaea</i> Fruit devoid of hooked Bristles: F. H. BURGLEHAUS	55
The Mignonette as Class Illustration for Ascent of Sap:	
BYRON D. HALSTED	56
A rare Plant from western Texas: HENRY EGGERT.....	56
Reviews:	
The Genus <i>Lycopodium</i> —A Criticism: FRANCIS E. LLOYD.....	56
News Items	59

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CONTENTS

"When in Rome do as the Romans do": P. A. RYDBERG	61
Heterophylly in <i>Hepatica acuta</i> : S. H. BURNHAM	65
An Alleghanian <i>Rudbeckia</i> : JOHN K. SMALL	67
Diembryony in Corn: BYRON D. HALSTED	68
Reviews	
Flora of Western Middle California	69
Correspondence	
"A Simple Dynamometer."	70
News Items	71

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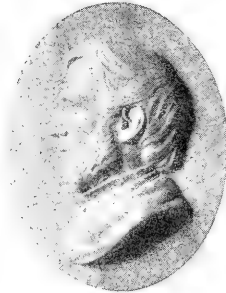
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CONTENTS

Juncoides in the Southeastern States: JOHN K. SMALL.....	73
Amsonia Amsonia in New Jersey: B. S. MILLER.....	75
Lycopodium tristachyum: E. J. HILL.....	76
A Tulip with a Runner: FREDERICK H. BLODGETT.....	78
Varietal and Specific Names: T. D. A. COCKERELL.....	79
An Alpine Botanical Garden.....	81
Shorter Notes	
Tulipa sylvestris in the Flora of the United States: C. D. FRETZ.....	82
Nocca and Cracca: N. L. BRITTON.....	83
Nomenclatural Note: T. D. A. COCKERELL.....	83
Mosses of the Catskill Mountains: E. G. BRITTON.....	84
News Items.....	84

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CONTENTS

Vanishing Wild Flowers: ELIZABETH G. BRITTON.....	85
On <i>Scirpus robustus</i> Pursh and certain of its near Allies: EUGENE P. BICKNELL	94
A Weeping <i>Cratægus</i> : JOHN K. SMALL.....	96
Reviews	
Seed Plants.....	98
Practical Text-Book of Plant Physiology.....	99

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CONTENTS

Distribution of Pterospora: D. T. MACDOUGAL	101
Two new Bush Clovers (Lespedeza): EUGENE P. BICKNELL.....	102
Notes on Liriodendron Leaves: EDWARD W. BERRY.....	105
Two Species of Chamaelirium; JOHN K. SMALL.....	107
Shorter Notes:	
The Storing of Seeds by Squirrels: E. G. BRITTON.....	108
Notes on Astragalus: J. M. BATES.....	109
News Items.....	110

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CONTENTS

A fossil Nut Pine from Idaho: F. H. KNOWLTON.....	113
Some popular Plant-names used in Georgia: ROLAND M. HARPER.....	115
Notes on <i>Lycopodium tristachyum</i> Pursh (<i>L. Chamaecyparissus</i> A. Br.):	
B. D. GILBERT.....	117
Shorter Notes	
Spring Foliage in October: E. G. BRITTON.....	119
Field Days of the Torrey Botanical Club.....	119
Reviews	
The "Peg" or "Heel" in Seedlings of the Cucurbitaceae: FRANCIS	
E. LLOYD.....	120
Correspondence	
"Vanishing Wild Flowers": MABEL H. TAYLOR.....	122
News Items.....	124

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THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE



JOHN TORREY, 1796-1873

CONTENTS

Duplication of Contributions on Physiology of Tendrils: D. T. MACDOUGAL	125
Cryptogamic and physiological Botany at Cold Spring Harbor in 1901: EDWIN BINGHAM COPELAND.....	127
Shorter Notes	
Weeping Tomatoes: BYRON D. HALSTED.....	130
The generative Divisions in Gymnosperms: W. A. MURRILL.....	131
Cupania on Pine Key, Florida: N. L. BRITTON.....	132
Field Days of the Torrey Botanical Club: S. H. BURNHAM.....	132
Reviews	
Britton's Manual of the Flora of the Northern States and Canada: FREDERICK V. COVILLE.....	133
A popular Work on Ferns: L. M. UNDERWOOD.....	134
News Items.....	136

PUBLISHED FOR THE CLUB
AT NORTH QUEEN STREET, LANCASTER, PA.
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CONTENTS

On the Relation of Redwoods and Fog to the general Precipitation in the Redwood Belt of California : W. A. CANNON	137
Are the Leaves of "Simple-leaved Ampelopsis" simple? BYRON D. HALSTED	139
The Spreading of <i>Solidago speciosa</i> in the Vicinity of Yonkers, N. Y.: MRS. JOHN I. NORTHROP	141
Hesperaster, a Genus of Loasaceae : T. D. A. COCKERELL	142
Shorter Notes	
Explosive Fruits : BYRON D. HALSTED	143
New Methods of drying Plants : H. M. RICHARDS	145
Bromeliaceae in Costa Rica : C. WERCKLÉ	146
A Texan Cherry : J. K. SMALL	146
Field Days of the Torrey Botanical Club : S. H. BURNHAM	147
A new common Name : EDWARD W. BERRY	147
News Items.....	147
Index to Volume I.	149

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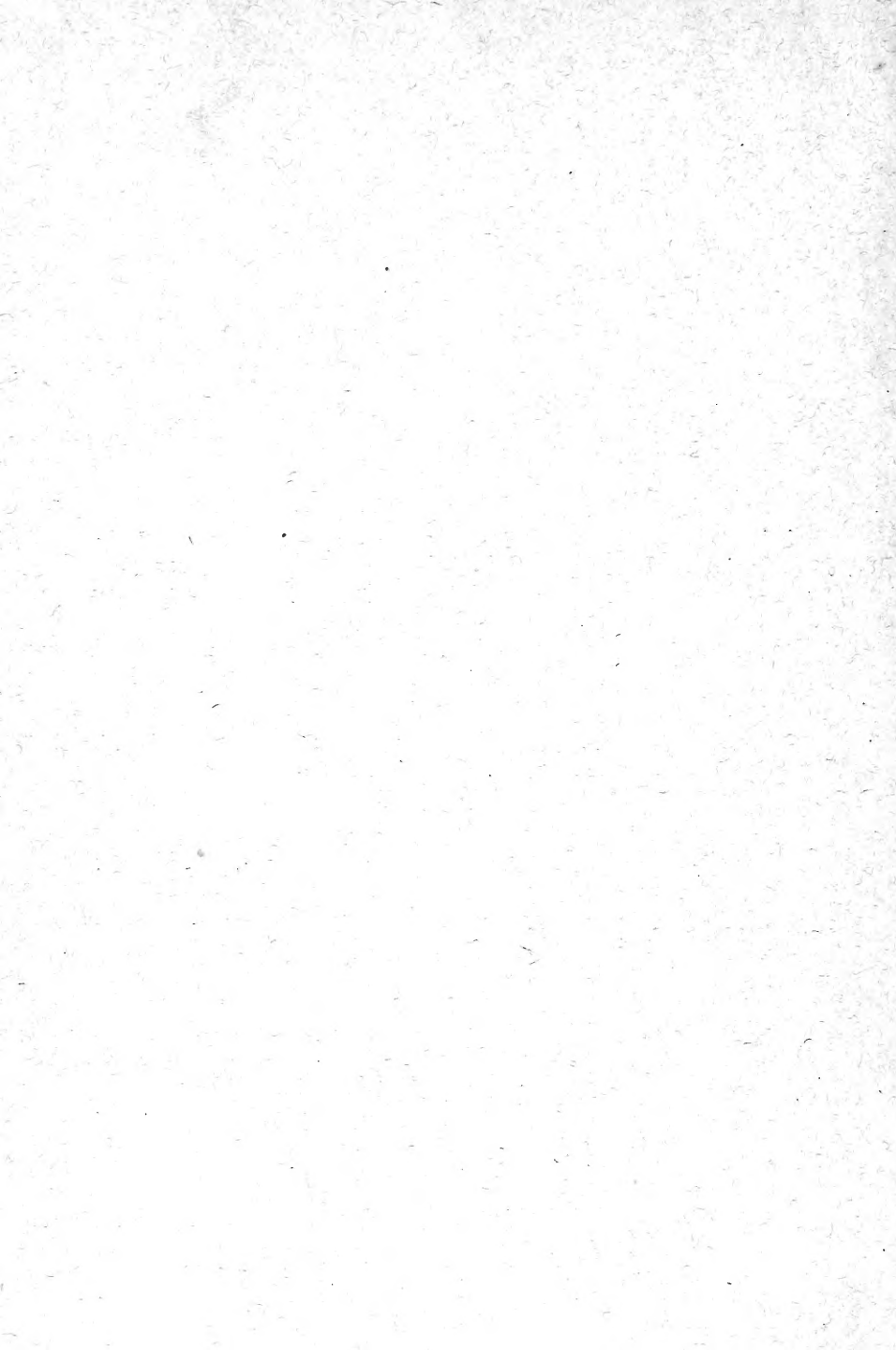
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