TORREYA

A Monthly Journal of Botanical Notes and News

JOHN TORREY, 1796–1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

Volume X

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ERRATA, VOLUME 10

Page 5, 10th and 21st lines, *insert* period *after* Marsh.

Page 5, 10th and 18th lines, for *prinus*, read *Prinus.*

Page 5, 11th line, *insert* period *after* Wang.

Page 5, 14th and 21st lines, *insert* period *after* Mill.

Page 6, 11th line, *insert* period *after* Marsh.

Page 7, 3rd line from bottom, *insert* period *after* Benth.

Page 8, 5th line from bottom, for *moscheutos*, read *Moscheutos.*

Page 8, 4th line from bottom, *insert* period *after* Mill.

Page 9, 11th line, *insert* period *after* Marsh.

Page 9, 12th line, *insert* period *after* Wang.

Page 9, 14th and 18th lines, *insert* period *after* Mill.

Page 9, 17th line, for *prinus*, read *Prinus.*

Page 33, 8th line from bottom, for *Pinus*, read *Prinus.*

Page 33, 15th line, for *virginensis*, read *virginiensis.*

Page 34, 21st line, for *virginia*, read *virginiana.*

Page 36, 8th line, *insert* comma *after* who.

Page 38, 13th line, for *insignia*, read *insignis.*

Page 39, 10th line, *for* ony, *read* any.

Page 59, 3rd line from bottom, after clavatum, *read* § *for* ‡.

Page 59, 1st line of footnote, *for* highe, *read* higher.

Page 63, 4th line from bottom, after *officinalis*, read †, footnote * on page 64.

Page 69, 11th line, *for* Hermann, *read* Herrman.

Page 81, 13th line from bottom, for *Balticus*, read *balticus.*

Page 83, 9th line, *for Clorosperma*, read *Chrosperma.*

Page 87, last line, *insert* comma *after* bees.

Page 91, 18th line, *omit* comma *after* L.

Page 112, third line, *insert* comma at end of line.

Page 124, 14th line, *for* ' read " .

Page 124, 16th line, *for* Pierce, *read* Peirce.

Page 126, 13th line, for *newtoni*, read *Newtoni.*

Page 145, 14th line, for *Philadelphicim*, read *philadelphicum.*

Page 149, at ends of 15th and 17th lines, *transpose* hyphen *and* period.

Page 189, 18th line, *insert* of *before* Penicillus.

Page 192, 7th line, *insert* comma *after* Tennessee.

Page 194, 5th line, for *glaucaphylla*, read *glaucophylla.*

Page 214, 10th line, *for* employe, *read* employé.

Page 219, 8th line from bottom, for *Noveboracensis*, read *noveboracensis.*

Page 226, 9th line, *for* (March), *read* (Marsh.).

Page 230, 1st line, *for* **Caesariense,** *read* **caesariense.**

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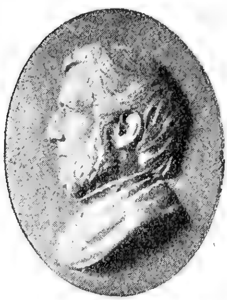

JOHN TORREY, 1796–1873

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TORREYA

January, 1910

Vol. 10 No. 1

THE VEGETATION OF THE NAVESINK HIGHLANDS *

By John W. Harshberger

The Highlands of Navesink, or, as they are sometimes called, the Atlantic Highlands, occur in the northeastern part of coastal New Jersey and are found as a projecting peninsula between Sandy Hook Bay on the north and Navesink River on the south. The deposits which constitute the highlands are mostly of Cretaceous age and some of the strata are fossil bearing. The strata consist of quartz sand, green sand, marls, and ferruginous red sand, the latter nearly one hundred feet in thickness. Some of the more typic layers belong to the Marl Series (Navesink Marl) of the New Jersey geologists. This series of deposits is, on the whole, more resistant than the beds below, and has been less deeply eroded. One result of its greater resistance to erosion is that its northern edge is marked by a steep, often scarp-like face (Fig. 1). The lowermost division of the marl series, the Lower Marl, is more easily eroded than the Red Sand immediately above it, both being represented in the Navesink Highlands. The red sand is the most important factor in forming the obtrusive range of high hills extending southwest from the Navesink Highlands.†

The front of the bluff is protected from the full force of the ocean waves by the projecting sand peninsula, which terminates

* Illustrated with the aid of the Catherine McManes fund.

† The difficult interpretation of the stratigraphy of the Cretaceous formations in New Jersey will be found in Annual Report of the State Geologist for 1886: 154–184; Salisbury, Rollin D.: The Physical Geography of New Jersey 1898: 115–128; Weller, Stuart: A Report on the Cretaceous Paleontology of New Jersey, Geol. Surv. of N. J., Paleontologic Series IV: 11–26; Geologic Atlas of the United States, Philadelphia Folio No. 162, also Trenton Folio No. 167.

[No. 12, Vol. 9, of Torreya, comprising pages 241–284, was issued December 31, 1909.]

in Sandy Hook; and the Navesink River joined by the Shrewsbury River enters Sandy Hook Bay by flowing past the projecting bluff. However, on consulting the map * of 1737 and the one drawn from the surveys made in 1769 (by order of the commis-

FIG. 1. Map of the Navesink Highlands, New Jersey

sioners appointed to settle the partition line between the provinces of New York and New Jersey) by Bernard Ratzer, lieutenant in the Sixtieth regiment and in 1777 of the northern parts by Gerard

* See the map of 1737 in article by G. R. Putnam entitled Hidden Perils of the Deep. National Geographic Magazine, XX, p. 825, Sept., 1909. The later map was engraved and published by Wm. Faden, Charing Cross, December 1, 1777, and a facsimile published by the N. J. Geol. Survey in 1877.

Banker, it will be found that at those dates the cliff was open to the full force of the ocean and that Sandy Hook was attached as a projecting spit of sand to the highland shore. Since that time, according to Lewis M. Haupt,* the drift from the bluffs to the southward (as at Monmouth) has gradually overlapped the foot of the Highlands and closed the mouth of the Shrewsbury and Navesink rivers,† thus serving as an effectual cover and protection for the highlands, which are no longer attacked by the ocean waves, while Plum Island (Fig. 1) represents a remnant of the ancient Sandy Hook. The undisturbed, forest-covered portion of the Navesink peninsula (the highland proper) is three and a quarter miles long and one and a half miles wide, the highest elevations (triangulation points) beginning at the west end being 239 feet, 245 feet, 260 feet, 269 feet, 235 feet, and 248 feet; while the elevations at the eastern end (see map, Fig. 1) toward the Atlantic are 240 feet and 259 feet; the hill on which the Navesink lighthouses are situated being 237 feet high. On the north and east sides, the bluffs are rather precipitous, as indicated by the closeness of the contour intervals, while on the south and more protected sides, the slope is a more gradual one. The differences in these slopes is probably accounted for by the action of the ocean and tidal currents in wearing away the material, so as to undermine the bluff and produce steep contours. From a distance, the crest of the Atlantic Highlands (Fig. 2) seems to be a fairly uniform one and a closer inspection shows that there are no streams of any importance which cut its slopes. The largest brook runs south into Clay Pit Creek flowing in a northwest direction which marks a valley which separates the highlands proper from the hills to the westward.

Vegetation

The forest, found on the summit and slopes of these highlands, belongs to what I have denominated the deciduous forest forma-

* *Haupt, Lewis M.* Changes along the New Jersey Coast. Annual Report of the State Geologist, 1905: 44–45.

† *Harshberger, John W.* The Vegetation of the Salt Marshes, Salt and Freshwater Ponds of northern Coastal N. J. Proc. Acad. Nat. Sci. Phila., 1909: 373–400, with 6 text figures.

tion. This is the type of forest which covers the valleys, hills, and lower mountain slopes of northern New Jersey. It is not a typic mesophytic forest, such as we find in the valleys and on the hills with rich, moist soil fed by numerous springs and drained by actively flowing creeks and rivers. The soil is a stiff one, and rather dry than otherwise, for the absence of springs and rapid streams indicates rather dry conditions. Besides the forest

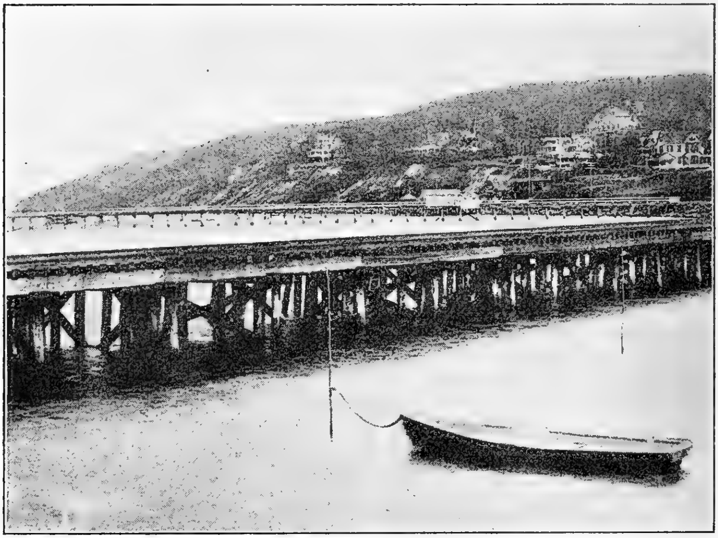

FIG. 2. Navesink Highlands looking southeast from steamship pier at Atlantic Highlands.

is exposed to the full force of winds which blow from the north, east, and southeast and is more or less exposed to south winds which blow across the half-mile-wide Navesink River. A reference to a portion of the map represented in figure 1 will show the relative shape of the peninsula and its exposure to the cardinal points. The original forest is being rapidly encroached upon by the growth of such towns as Highlands, Water Witch Park, and Atlantic Highlands (Fig. 2), while as summer camping sites should be mentioned Shady Side, Hilton Park, and the shore along Sandy Hook Bay.

Deciduous Forest Formation

The forest consists of dominant forest trees whose crown is close enough to shade the secondary layers beneath. If one consults the forest map issued by the Geological Survey of New Jersey in 1900, it will be seen that on the Navesink Highlands there are 80 to 100 acres of forest to 100 acres of upland. The trees which form the facies are most of them mature and already show evidences of decay. The facies varies somewhat on different portions of the bluff, but in the main, it consists of *Castanea dentata* (Marsh) Borkh., *Quercus prinus* L., *Q. velutina* Lam., *Q. alba* L., *Q. coccinea* Wang, *Q. rubra* L., mentioned in the order of their relative abundance, so that it may be called the chestnut-oak facies. Mixed with these trees and reaching a size equal to the dominant trees occurs *Hicoria* (*Carya*) *glabra* (Mill) Britt., while of rare occurrence are *Fagus americana* Sweet, and *Liriodendron Tulipifera* L. The almost entire absence of these two trees seems to indicate that the climax forest of *Castanea dentata* and *Quercus prinus*, etc. has not reached the most typic mesophytic conditions where the beech and the tulip poplar are among the most important elements of the facies. Other trees, occasionally found, are *Pinus rigida* Mill, *Betula populifolia* Marsh, *B. lenta* L., *Populus tremuloides* Michx., and *Liquidambar Styraciflua* L.

The prominence of the black oak, *Quercus velutina*, in the chestnut-oak facies suggests an association described by Jennings * on Presque Isle in Lake Erie, where the black oak constitutes usually 85 to 95 per cent. of the primary layer of the forest. At Cedar Point, Sandusky, Ohio, the peninsula is an almost exact counterpart of the *Quercus velutina* habitat on Presque Isle. In the North Haven sand plains of Connecticut the black oak, although scattering, is yet the dominant tree, and at Ypsilanti, Michigan, the arid slopes of a sandy bluff are characterized as a black oak society by Brown. Cowles finds near Chicago *Quercus velutina* predominating on the south slopes of the established sand dunes and on the higher sandy ridges and beaches of glacial origin. From this and other evi-

* *Jennings, Otto E.* A Botanical Survey of Presque Isle, Erie County, Pennsylvania. Annals of the Carnegie Museum V : 325.

dence it would seem that the black oak shows a pronounced xerophytic habit under certain edaphic conditions, and with its associates previously mentioned is adapted to the rather stiff, dry, surface soil of the Navesink Highlands.

The secondary layer of the forest is composed of small trees of the dominant species together with smaller trees and shrubs which never lift their crowns to the same level as the taller trees, but are always found growing beneath them. Such are in the order of their greatest abundance *Cornus florida* L., *Acer rubrum* L., *Prunus serotina* Ehrh., *Sassafras Sassafras* (L.) Karst., *Quercus marylandica* Muench., *Q. prinoides* Willd., *Q. nana* (Marsh) Sarg. (the three latter common in the dry pine barrens of the state), *Amelanchier canadensis* (L.) Medic., and occasionally *Juniperus virginiana* L. In some places, notably in the western part of the region noted in this reconnaissance, the smaller trees are reduced to a few specimens ; in other places they become more abundant, especially in the center of the highland forest where the original conditions have been preserved. Where the growth of the dominant species is an open one, the third layer cf shrubs may be wanting, as well as the associated lianes, but such an open forest probably indicates that the original growth has been disturbed by man. The vines, or lianes, which are supported in their growth toward the light by the smaller and larger trees comprise, according to my notes made in 1908 and 1909, the following : *Parthenocissus quinquefolia* (L.) Planch., *Smilax rotundifolia* L., *Rhus radicans* L., and *Vitis labrusca* L., with *Celastrus scandens* L. in the denser woods with more humus and soil moisture.

The composition of the third layer, or that of the shrubby growth, is quite dependent upon the edaphic conditions of the soil. In the dry soil, we find the constituent elements of this layer composed of shrubs which occur in dry woods throughout northern New Jersey, such as *Kalmia latifolia* L., *Gaylussacia frondosa* (L.) T. & G., *Myrica carolinensis* Mill., *Rhus glabra* L., *R. hirta* (L.) Sudw., *Azalea nudiflora* L., and *Clethra alnifolia* L. With a damper soil and generally more humus in the valleys and on the shaded hill slopes, the same shrubs as are found in the dry woods also occur, but in addition, we find as indicative of moister soil: *Hamamelis virginiana* L., *Viburnum dentatum* L., *V. accrifolium* L., *Leucothoë racemosa* (L.) A. Gray, and *Celastrus scandens* L. In both types, the wet and the dry, the third layer also includes specimens of the dominant and secondary forest trees which have reached the level of the shrubs in their upward growth beneath the prevailing crown of the deciduous trees. This natural reproduction of the forest by the trees which form the facies indicates that the permanent and established succession of the natural highland woods is that which we have termed the chestnut-oak succession, or climax forest. If the natural conditions are preserved by the establishment of a state forest on these picturesque hills of the Navesink Highlands, there is every reason to believe that the climax forest will perpetuate itself.

The fourth layer consists of the low shrubs which fill up the ground space beneath the taller shrubs. The low shrubs of these dry woods are *Gaylussacia frondosa* (L.) T. & G., *G. resinosa*, *Vaccinium pennsylvanicum* Lam., *Comptonia peregrina* (L.) Coult., and *Myrica carolinensis* Mill. These are propagated largely by underground parts, so that they form extensive clumps (families of Clements) to the exclusion of all other plants. In the pine barrens of New Jersey these species also occur, except *Myrica carolinensis* which becomes there edaphically suited to the moist soil of cedar swamp margins. We are hardly in a position to say that these low shrubs have entered the dry deciduous woods from a pine barren source of supply, but they occur in the pine barrens and in the dry chestnut-oak woods, because they can thrive in a dry soil. Similarity of edaphic conditions here as elsewhere encourages the same kind of vegetation.

The herbaceous or fifth layer which sometimes replaces the fourth layer, as it is in turn by a close growth of the low shrubs prevents the growth of woodland herbs, consists of such species as *Pteridium aquilinum* (L.) Kuhn, *Aralia nudicaulis* L., *Melampyrum lineare* Lam., *Sericocarpus asteroides* (L.) B. S. P., *Vagnera racemosa* (L.) Morong, *Prunella vulgaris* L. (introduced), and *Anaphalis margaritacea* (L.) Benth & Hook. In midsummer the total lack of bright color due to summer flowers is noteworthy in describing the vegetation in general at that season of the year.

As a ground layer, or sixth layer, the forest of the Navesink Highlands has a forest floor consisting of litter and leaf mould, the brownish gray monotony of which is relieved by green cushions of *Polytrichum* sp., trailing mats of *Epigaea repens* L., and isolated plants of *Cypripedium acaule* Ait.

Vegetation on the Hill Slopes

The forest on the slopes of the Navesink Highlands (Fig. 3) comes down to a narrow sand-gravel beach, or it comes in contact with small areas of salt marsh.* The immediate shore line

Fig. 3. Wooded slope, Navesink Highlands, showing deciduous forest on north slopes and the shore-line protected by loose rocks.

of the beaches is characterized by salt water plants, but on the upper beach grows an association of species including *Baccharis halimifolia* L., *Rhus copallina* L., *Sambucus canadensis* L., *Solidago sempervirens* L., *Hibiscus moscheutos* L., *Xanthium canadense* Mill, *Convolvulus sepium* L., and *Eupatorium perfoliatum* L., which tend to mingle with trees of the bluff face, such as *Celtis occidentalis* L., *Juniperus virginiana* L., *Vitis Labrusca* L., and *Rhus radicans* L.

* *Harshberger, John W. l. c.*

Barren Plant Formation

On the level summit of the Navesink Highlands at a point overlooking Sandy Hook Bay occurs a plant formation which is entirely distinct from the surrounding deciduous tree formation previously described. The whole formation is an open one and has not reached a climax condition. Here the edaphic conditions control, because the trees which enter this formation are all more or less dwarfed with their lower branches close to the ground and separated from each other by wide intervals, so that the sunlight can reach the ground all around the base of the trees. The chestnut, *Castanea dentata* (Marsh) Borkh.; the red oak, *Quercus rubra* L.; the scarlet oak, *Q. coccinea* Wang; the aspen poplar, *Populus tremuloides* Michx.; the red maple, *Acer rubrum;* the pignut hickory, *Hicoria glabra* (Mill) Britt.; the cherry birch, *Betula lenta* L.; the wild cherry, *Prunus serotina* Ehrh.; the tulip poplar, *Liriodendron Tulipifera* L.; the red cedar, *Juniperus virginiana* L.; the chesnut oak, *Quercus prinus* L., and the pitch pine, *Pinus rigida* Mill, are components of this unusual formation. Each species is represented in general by a single specimen which is more or less dwarfed in habit, assuming a rounded form. Associated with these trees and growing in the dry soil, which is bare at intervals, are found such shrubs as *Myrica carolinensis* Mill, *Rhus glabra* L., *Comptonia peregrina* (L.) Coult., and the following herbaceous plants noted in their summer (August) aspect: *Hudsonia tomentosa* Nutt., *Panicum virgatum* L., *Chrysopsis falcata* (Pursh) Ell., *Eupatorium album* L., and *Sericocarpus asteroides* (L.) B. S. P. Such lianes as *Parthenocissus quinquefolia* (L.) Planch. and *Rhus radicans* L. occur in a straggling growth by taking avail of the dwarf trees previously described. The presence of this formation is probably to be explained by the existence of some undenuded remnant of an impervious overlying stratum, such as the indurated green earth which stratigraphically is above the characteristic red sand.

The forest covering of the Navesink Highlands is, therefore, one of great uniformity. Practically, although minor differences are noticeable owing to a difference of exposure and edaphic conditions, the chestnut-oak facies represents the climax succession.

Consequently in describing the facies there is put upon permanent record the conditions as they existed during the summers of 1908 and 1909 before the despoilation of this valuable tract of woodland made a phytogeographic survey impossible.

University of Pennsylvania

FLORAL PERFUMES*

By Margaret Tucker

"Floral Perfumes: The Land and the Laboratory" is the title of the chapter in R. K. Duncan's recent book "The Chemistry of Commerce" which deals with the commerce in perfumery.

In the production of perfumes, Professor Duncan tells us, three distinct industries are involved: First, the extraction from the plant of its odoriferous principles in pure and concentrated form; second, the artificial synthesis of these principles or their successful simulation; third, the utilization of these products in the art of manufacturing perfumes.

The center of the first industry, the extraction of the natural essences of the flowers, is at Grasse, a quaint little town in the south of France, where from May till November the people are busy gathering the flowers in their season: violets, jonquils, roses, orange-flowers, thyme, rosemary, myrtle, tuberoses, jasmine, aspic, lavender from the higher Alps, and red geranium. These approximate a total weight of from ten to twelve billion pounds annually, which means a quite inconceivable number of flowers — five billion jasmine flowers alone — all picked by hand.

There are four methods for the extraction of the perfume from these flowers: (1) Distillation by steam, which results in extracted oil, and a water distillate saturated with the valuable essence which in the case of many flowers is sold as "distilled waters" known as rose-water, jasmine-water, etc. (2) Cold *enfleurage*, used for the more delicate flowers: jasmine, tuberose, and jonquil. This is a process in which every day new flowers are laid on sheets of cold pure lard, until it becomes a saturated "pomade" of essence. The solution of perfume is then extracted by

*This review was written for the teachers' department, but it is so readable that, with this explanation, it has been placed in the main part of the magazine.

cold alcohol, the alcohol is evaporated, and the product is the "quintessence" of the flowers. (3) Hot maceration, a method employing hot melted lard in which the flowers are continually paddled about until exhausted. The lard is then freed from the flowers by filtration and pressure. This process gives "quintessence" of roses, orange-flowers, and violets. (4) The fourth and most modern method — applicable to all flowers alike — is that employing light petroleum spirit to dissolve the essences, which, after the evaporation of the spirit in a vacuum, are left in solid form.

With any one flower the quantity and quality of the essence varies greatly according to the method used — a pound of violet essence, for instance, being worth $163 when extracted by distillation through steam, while a pound extracted through lard is worth $1,363. With most flowers extraction through lard gives the most perfume. It is an interesting fact that flowers continue to produce perfume after death — probably through the catalytic action of certain enzymes within the flower which results in setting free perfumes previously held in inodorous compounds. In all such technical questions as this this the Grassois are interested. Not resting content with leading the world in the purity and volume of their products, nor with the $6,000,000 that yearly rewards their toil, they are continually looking deeper into the science of each detail of their process. This is due largely to natural progressiveness and love of their work, but more and more of late due, too, to a desire to arm themselves to meet the onset of commercial chemistry and the second industry concerned with odorous materials. There is a struggle between the land and the laboratory. Let us consider briefly what the laboratory has accomplished.

In competing with the land, the laboratory has recourse to three expedients: (1) The synthetic production of the actual natural substance; (2) the successful *imitation* of the product of the land; (3) the production of entirely *new* substances with *new properties*.

By the first process, the pure essence is reproduced simply by making the ingredients of the natural oil and mixing them in the proper proportions as determined by analysis. In this way have been manufactured natural oil of bitter almonds and of winter-green; coumarin — the basis of the perfume called "new-mown hay", originally procured from the leaves of the "deer-tongue", an herb of Virginia, Florida, and Carolina — and vanillin — the chief odorous principle of the vanilla-pod, the fruit of a Mexican orchid. Any one of the ingredients of an essential oil may perhaps occur in a dozen different places in nature. The commercial chemist's problem is to procure each from the least expensive source. Thus vanillin which was first made artificially from coniferin, which occurs in the cambium layer of many woods, and sold at $55 a pound, is now obtained chiefly by the oxidation of eugenol, the chief ingredient of oil of cloves, and brings but one seventh of its original price.

By laboratory *imitation* of the product of the land is meant the synthetical production of a substance wholly different in chemical composition but possessed of *similar specific properties.* There are for example artificial musk, which has no known chemical relation to the secretion of the musk-deer; oil of mirbane, a substitute for oil of bitter almonds, in the scenting of soap; amyl-valerate, as essence of apple, etc.

Beside the production of the natural product or an imitation of its properties the laboratory has succeeded in creating synthetically substances with *properties often entirely new* and very valuable. Such a product is heliotropin which gives a new note in the scale of odors. It was first made from piperine extracted from pepper, but is now prepared commercially by the oxidation of saffrol from the essential oil of sassafras and from oil of camphor. Similar new synthetic products are used in making substitutes for the natural oils of violets, carnations, hyacinths, acacia, orange-flowers, roses, jasmine, and others.

But considerable as has been the progress of synthetic chemistry, it is significant to note that in no single case has the coming of a synthetic product injured the market of the natural perfume. The reason for this appears to be threefold. First, the Grassois have met science with scientific methods; second, the very finest perfumes are still the natural products and they are as much in demand as ever among those who can afford them; third, the chemical products, being produced at a far lower cost, have enabled the perfumer, the confectioner, the soap-maker, to reach an entirely new clientele — the poor. There is one further point of interest — the laboratory's ultimate dependence on the land in the matter of perfumes — for in the majority of cases it is from plant substances, not coal tar, that the synthetic products are made.

Lastly comes the art of perfumery proper, for which these various products, natural and synthetic, furnish the raw materials — an art in which the Frenchman excels. The perfumer is a musician who from many notes (rose, violet, orange-blossom, etc.) strikes a harmonious chord of scent — for a scent is obtained only by the most artful combination of odors, each of which must be absolutely pure, the slightest impurity striking a jarring note to the trained nostril. The composition of the perfume of violet, for instance, is as follows: essence of violet, natural vanilla, tincture of orris-root, a touch of vetiver, essence of violet leaves, and artificial ionine.

One striking fact remains — that the enterprising American people, with their almost unbounded natural advantages and their protective tariff, have never entered into rivalry with the people of Grasse. To-day the total production of essential oils in the United States (150,000 pounds of peppermint oil, and small quantities of oil of wormwood, wintergreen, witchhazel, and spruce oil) does not exceed $500,000, about one twelfth of that produced by the one little town in France.

A PECULIAR HABITAT FOR CAMPTOSORUS *

By Ralph Curtiss Benedict

The following note and photograph shown in the figure were recently sent to Dr. Britton, and he has turned them over to me to record.

". . . Arthur Leeds of Phila. and I found two gum trees in the Blackwater River, Virginia, near Waverley, adorned with large colonies of Camptosorus. These trees were standing closer than ten feet; and the closest search subsequently failed to

* Illustrated with the aid of the Catherine McManes fund.

The walking fern as epiphyte.

reveal other colonies on the whole six day canoe trip. Thinking this location and the fact just mentioned somewhat unusual, we thought thee would be interested to have a specimen, and the excellent photograph contributed by my friend E. S. Cary. . . ."

Alfred S. Haines, Westtown, Pa.

The habitat is indeed interesting, showing as it does the walking fern in the unusual role of an epiphyte. One ordinarily associates this species with rocky situations, and it probably reaches its best development in such regions ; but even there it is not a rock lover in the same sense as *Asplenium Trichomanes* or the genera *Pellaea* and *Woodsia*. Scattered plants often do grow along the ledges but the best growths are down below where some old moss-covered log or rock furnishes root-protection and opportunity for the leaf tips to develop new plants. The gum tree in the picture with its covering of moss or liverwort seems to have furnished the required conditions, but the origin of the colony — how it got there and whence it came — is not so easy to explain.

New York Botanical Garden

REVIEWS

Clute's Laboratory Botany*

In this manual the author has arranged a course to cover a year's work in botany for the high school. Part I deals with the structure and life processes of angiosperms ; part II, with the structure and evolution of the plant kingdom. A list of physiological experiments is appended at the end of the book.

While the order in which the studies are arranged conforms to the plan adopted in the usual botanical text-books, the manual allows considerable flexibility in the treatment of topics as regards time of year, subject matter, and local conditions. For example, instead of beginning with the usual topics, cells or seeds, the study of trees may be taken up and provision is made by incorporating in the manual a handy key to the common broad-leaved and evergreen trees ; parts I and II may be transposed ; the physiological experiments may be performed apart from the work on morphology or they may be considered in connection with it.

* Clute, Willard N. Laboratory Botany. Pp. 172. 1909. Ginn and Co.

There is much to commend the manual to teachers. The various chapters are prefaced with useful hints on presentation, preparation, and source of materials. The choice of subjects is excellent. The questions are clear, definite, and logical, and they are designed, apparently, to give the pupil training in self-help. It is evident that the author has succeeded in preparing a valuable manual because, in large measure, he has succeeded in omitting non-essentials.

EMMELINE MOORE

NORMAL SCHOOL AT TRENTON, NEW JERSEY

Jepson's "A Flora of California" *

The beginnings of an ambitious and important work under the above title have recently appeared from the hand of Dr. Willis Linn Jepson, assistant professor of dendrology in the University of California. The sixty-four pages now published are neither the beginning nor the end of the completed volume or volumes, but are the pages that are concerned with the families that contain most of the Californian trees, the group to which, of late, Professor Jepson has devoted especial attention. It may be assumed that the preceding and intervening pages are in an advanced stage of preparation, otherwise the continuity of pagination might easily meet with serious difficulties. As to the scope of the work, one can at the date of writing simply draw inferences, but the limitation of what is yet to appear in front of the Gymnosperms to thirty-two pages suggests the probability of the inclusion of extended keys to the families and the improbability that a detailed treatment of the Pteridophyta will be attempted. The families of the Gymnosperms that find a place in the pages already published are the Pinaceae, with the genera *Pinus* (17 sp.), *Tsuga* (2 sp.), *Picea* (2 sp.), *Pseudotsuga* (2 sp.), and *Abies* (5 sp.); Taxodiaceae, with the genus *Sequoia* (2 sp.); Cupressaceae, with the genera *Libocedrus* (1 sp.), *Thuja* (1 sp.), *Chamæcyparis* (1 sp.), *Cupressus* (5 sp.), and *Juniperus* (4 sp.); and Taxaceae, with the genera *Taxus* (1 sp.) and *Torreya* (1 sp.). The

* Jepson, Willis Linn. A Flora of California. Pp. 33–64. *f. 1–13;* 337–368. *f. 61–65.* 4 N 1909. Cunningham, Curtiss & Welsh, San Francisco. Price 90 cts. for pp. 33–64; 80 cts. for pp. 337–368.

Gymnosperms, as is well known, have a remarkable development in California both as to number of species and as to the dimensions of individual trees. The botanical traveler on the Pacific Coast is soon impressed by the fact that the Sequoias are not the only "big trees." Professor Jepson gives the maximum height of the redwood (*Sequoia sempervirens*) as 340 feet; the "big tree" (*Sequoia gigantea*), 325 feet; the lowland fir (*Abies grandis*), 275 feet; the sugar pine (*Pinus Lambertiana*), 250 feet; the yellow pine (*Pinus ponderosa*), 225 feet; the noble fir (*Abies nobilis*), 250 feet; the red fir (*Abies magnifica*) and the white fir (*A. concolor*), 200 feet; the Douglas spruce (*Pseudotsuga taxifolia*), 200 feet; the tideland spruce (*Picea sitchensis*), 190 feet; the arbor-vitae (*Thuja plicata*), 190 feet; the coast hemlock (*Tsuga heterophylla*), 180 feet; the Lawson cypress (*Chamaecyparis Lawsoniana*), 175 feet; and the incense cedar (*Libocedrus decurrens*), 150 feet.

The families treated on pages 337–368 of the second part of Professor Jepson's work are the Salicaceae, with the genera *Salix* (17 sp.) and *Populus* (3 sp.); Betulaceae, with the genera *Alnus* (4 sp.) and *Betula* (2 sp.); Corylaceae, with the single genus *Corylus* (1 sp.); Fagaceae, with the genera *Quercus* (14 sp.), *Pasania* (1 sp.), and *Castanopsis* (2 sp.); Juglandaceae, with the single genus *Juglans* (1 sp.); Myricaceae with the single genus *Myrica* (2 sp.); and Urticaceae, with the genera *Urtica* (3 sp.), *Hesperocnide* (1 sp.) and *Parietaria* (unfinished).

The work includes good half-tones illustrating the general form and habit of selected species of trees and there are also drawings showing some of their less conspicuous diagnostic characters. Keys to genera and species accompany the descriptions. The nomenclature seems to be that of the Vienna Rules. The press-work is excellent, but one notes several small errors in writing or editing. Née appears uniformly and persistently with the accent over the wrong "e"; Endlicher is endowed with a prenomen that is the Latin ablative form of his name as it appears on the title-page of his Synopsis Coniferarum; *Thuja* is spelled with a "j" in the key and the bibliographical references but with a "y" in its main position; *Podocarpus* is made to end in "um";

but these and their kind are minor flaws that cannot interfere seriously with the large and helpful part that Professor Jepson's new Flora is bound to play in the study of Californian plants.

MARSHALL A. HOWE

PROCEEDINGS OF THE CLUB

NOVEMBER 24, 1909

The meeting was held at the New York Botanical Garden and was called to order by Dr. E. B. Southwick. Owing to the inclemency of the weather, there were only a few members present.

Dr. W. A. Murrill exhibited and described a phalloid found by him near Cinchona, Jamaica, in January, 1909, which is allied to the anomalous genus, *Phallogaster*, described by A. P. Morgan in 1892. A description of this new phalloid was published in *Mycologia* for January. Dr. Murrill prefaced his remarks with a brief account of the most common phalloids in the vicinity of New York and the species known to occur in the island of Jamaica.

Dr. J. K. Small spoke on "Some Recently Naturalized Plants from Southern Florida." This paper will appear in a forthcoming issue of the Bulletin.

Adjourned.

PERCY WILSON,
Secretary

DECEMBER 14, 1909

The meeting was called to order at the American Museum of Natural History, with President Rusby in the chair. Forty-four persons were present. After the reading and approval of the minutes of the meeting for November 24, the resignation of Dr. J. A. Allen, dated November 17, 1909, was presented and accepted.

The announced paper of the evening on "The Reclamation of the Desert in the San Bernardino Valley" was then presented by Dr. Rusby and illustrated by some seventy lantern-slides. The following abstract was prepared by the speaker.

The distinctions between desert and arid regions were explained and that under discussion was defined as being arid rather than desert, for the most part, although the production of cultivated crops without irrigation was impossible. The first settlement established was a Moravian mission near the present western boundary of Redlands. This was afterwards purchased by the Mormons, who instituted local irrigation. The first extensive irrigation operations were employed by the town of San Bernardino, the present water supply of which is about 1,200,000 gallons, obtained by the deflection of Lytle Creek, besides a large amount from deeply driven wells. This water supplies not only the requirements of the city, but those of a large cultivated area.

San Bernardino is near the western mouth of the large, somewhat horseshoe-shaped valley, from the mountains about which all the water of the valley must come, except that which falls during the rainy season, and which varies from six to twelve inches in the different parts of the valley, the larger amounts falling successively nearer the mountains. The moisture brought by the Pacific winds is precipitated in crossing these mountains during the winter season only. At the greater elevations, 10,000 to 12,000 feet, it is deposited as snow; lower, in the form of copious rains, and in the valley itself in a more or less scanty rainfall. During this period, moisture is not carried to the great interior plain of Nevada, Utah, Colorado, New Mexico, and Arizona, where a dry season then prevails. In the summer, conditions are exactly reversed, no rain whatever falling west of the mountains. It thus happens that the San Bernardino valley gets its natural water supply at a time when cultivation can derive the least benefit from it and the problem is presented of preserving the winter supply and distributing it during the summer. The highly successful operations in the western part of the valley demonstrated the existence of a most fertile soil of great depth, and showed that the sole requirement for a rich agricultural region was an abundant water supply. It was recognized that a town located at the eastern end or top of the valley would be nearer the mountain supply and that its subterranean streams would be nearer the surface. The town of Redlands was therefore plotted, about twenty-two years ago, in an absolutely arid region. These calculations turned out to be perfect and the town of Redlands is now one of the most beautiful in the world, and surrounded by one of the most fertile of regions. Series of pictures illustrated the arid conditions which antedated irrigation, and were contrasted with others showing the rich orchards, vineyards, and other cultivated tracts of the present day. Land which was absolutely worthless now yields rich dividends on a valuation of from one thousand to two thousand dollars per acre. Other pictures illustrated the snow-capped summits of winter, the humid, forest-clad slopes and the gradually changing flora of the descent to the plain. The Coniferae of these mountains are of exceptional interest, because of their rarity or limited distribution. The very peculiar branch-system of *Pinus Sabiniana,* unlike that of any other pine, was well illustrated by several slides. It was remarked that two fine characteristic specimens of this species exist in the Pinetum of the New York Botanical Garden. Other Coniferae illustrated, besides many other forest species, were *Pinus Coulteri, Heyderia decurrens, Abies concolor,* and *Pseudotsuga macrocarpa.*

The peculiar problems affecting the conduct of the water to the plains and its distribution to the consumer, arising from the tendency to loss through seepage and phenomenal evaporation, the legal questions arising in regard to water rights, the necessity of governmental regulation of water supplies, the methods of estimating the requirements of various crops, under different conditions, and the methods of measurement and sale of the water were discussed.

A large number of illustrations were presented showing the methods of applying water to the orchards and vineyards. Others illustrated typical fruit trees, in flower and fruit, fruit gathering, drying, and packing. Many slides of very great beauty represented the street planting of trees and other methods employed to beautify the cities and their suburbs.

Adjourned.

Percy Wilson,
Secretary

OF INTEREST TO TEACHERS

Forestry in the High School

Mr. E. A. Sanders of Dayton, Ohio, gave last May, in the *Nature Study Review*, an outline of the forestry work done in the Steele High School under his direction. The aim was to make the work practical, and to acquaint the boys with a new and uncrowded profession. To quote from the author the results "fully justified the experiment and demonstrated the value of the work.

"The class included boys from both city and country, the studious type and the careless athletic-loving type, all of whom with one exception were deeply interested and thoro-going in their work. Two of the boys are definitely looking forward to forestry as a profession and all have shown an awakened interest in the conservation of our forests and waterways.

"The work usually consisted of two lectures, two field trips and one written or oral test per week. Laboratory work on wood structure and physical properties was introduced after Christmas and symposium reports on assigned topics occupied some attention. Lecture, laboratory and test periods were of 45 minutes each and field trips after school of two to three hours. The greatest defects were, lack of complete organization of the course and inability of all students to be present at all field trips."

The syllabus which is reprinted below seems very comprehensive for high school work. Many normal and college students do not learn to know seventy trees. The number of government circulars and bulletins used as references is suggestive. The Forest Service has for sale a large number of photographs illustrating various phases of forestry.

Syllabus of Forestry Course

A. Identification of trees (70 species) .... 4 weeks
Field and lecture work. Leaf keys and collections.
References. — Kellerman, Apgar, Hough.

B. Identification of woody vines and shrubs .... 1 week
A study of undergrowth and forest cover.
References. — Schaffner, Keeler.

C. Forest Ecology .... 4 weeks
A study of collections of trees. Effect of environment on forest types. Type maps, Plant societies.

References. — Graves, Schimfer, Schenk.

D. History of Forestry..1 week

Lectures on European and American forestry.

References. — Graves, Cir. 140, Forest Service U. S. A.

E. Silviculture..3 weeks

Establishment and care of forests. Tree planting and regeneration; enemies of forests. Working plans.

References. — Schenk.

F. Mensuration...3 weeks

Calculation of stands and values. Pacing, mapping, surveying, estimating. Field work. Maps.

References. — Bulletins 20 and 36. Forest Service, U. S. A.

G. Lumbering..2 weeks

History and present supplies. Conservation, forestry methods. Visits to mills. Identification of woods. Bulletin 34.

H. Laboratory Work..2 weeks

Microscopic structure and physical properties. Bulletin 10.

(Each student presents a thoro investigation of one tree as a thesis.)

Many teachers of botany will be interested in the new rules of the Carnegie Foundation for the Advancement of Teaching which make instructors (as well as professors) in accepted institutions eligible for the generous pensions provided by that fund.

In *Conservation* for December are several articles of interest to botanists. The two longest ones, which are fully illustrated, deal with forestry in Japan and the relation of the South to conservation in the conservation projects in the Appalachian Mountains.

The last Forest Service report states that the states leading in the production of last year's lumber supply of over $500,000,000 are (in the order named): Washington, Louisiana, Mississippi, Arkansas, Wisconsin, Texas, Michigan, Oregon, Minnesota, and Pennsylvania. The rank of Louisiana and Texas may be somewhat surprising. Yellow pine from the southern states leads the list, over 33 per cent. of all lumber cut; Douglas fir of the northwestern states was second; and white pine, third.

Articles of interest in the November issue of the *Popular Science Monthly* are the World of Life as Visualized and Interpreted by Darwinism, an abstract of a lecture delivered by Alfred Russel

Wallace; Desert Scenes in Zacatecas, an illustrated paper by Professor J. E. Kirkwood describing the 400,000 square miles of country south of the Rio Grande; and a continued paper on The Argument for Organic Evolution before "The Origin of Species," by Professor Arthur O. Lovejoy.

Mention has not been previously made of the description of a simple chemical device illustrating Mendelian inheritance, which was printed in the *Plant World* for July, 1909. A litmus solution, sodium hydroxide or aqua ammonia, and hydrochloric acid are used to illustrate: "the more common type of Mendelian inheritance, that in which presence is dominant over absence"; "the dominance of absence over presence"; and "the equivalence of reciprocal crosses, regardless of the fact that egg and sperm differ much in size."

The September *Popular Science Monthly* includes a short article by Luther Burbank on Another Mode of Species Formation. In this article Mr. Burbank calls attention to the fact that those who formerly practised crossing to secure a mongrel which might or might not surpass its parents did not realize that "*crossing was only the first step* and *that selection from the numerous variations secured in the second and a few succeeding generations was the real work* of the new plant creation" work. Mr. Burbank gives an interesting list of hybrids, some formed under cultivation, and some found in a wild state, which come true to seed.

A gigantic irrigation scheme is being planned for the rehabilitation of Mesopotamia upon such a scale that 3,000,000 acres of the best land in that country will be provided with water. The plans consist of providing a means of escape for the flood waters of the Euphrates; and the Tigris, the Euphrates, and the Akkar Kuf Lake will form part of a controlled system of canals whereby the pernicious silt is to be separated, floods are to be prevented, and wheat-bearing land is to be supplied with water. It is estimated that the cultivated area will be doubled, the crop of wheat along the Euphrates being trebbled. The scheme would also mean a vast increase in the yield of cotton.

The *Outlook* for December 4 contains an article by Gifford Pinchot entitled "The A, B, C of Conservation" in which he answers six questions asked by the *Outlook:* What does Conservation stand for? What has Conservation to do with the welfare of the average man to-day? What is the danger to the Conservation policies in the coming session of Congress? Why is it important to protect the water powers? How must it be done? Does the same principle apply to navigable streams as to non-navigable?

The first answer includes such telling phrases as "to make this country the best place to live in, both for us and our descendants"; "equal opportunity for every American citizen to get his fair share of benefit from these resources, both now and hereafter"; "the same kind of practical common-sense management" that "every business man stands for in the management of his own business." To the second, Mr. Pinchot answers, "Conservation holds that it is about as important to see that the people in general get the benefit of our natural resources as to see that there shall be natural resources left." The danger suggested in the third is that "Congress must decide at this session whether the great coal-fields still in public ownership shall remain so, in order that their use may be controlled with due regard to the interest of the consumer, or whether they shall pass into private ownership and be controlled in the monopolistic interest of a few.

Congress must decide also whether immensely valuable rights to the use of water power shall be given away to special interests in perpetuity and without compensation, instead of being held and controlled by the public."

In the answer to the fourth, we find "the greatest source of power we know is falling water. Furthermore, it is the only great unfailing source of power. Our coal, the experts say, is likely to be exhausted during the next century, our natural gas and oil in this. Our rivers, if the forests on the watersheds are properly handled, will never cease to deliver power."

Two measures are advocated in answer to the fifth question. "First, the granting of water powers forever, either on non-navigable or navigable streams, must absolutely stop. It is perfectly clear that one hundred, fifty, or even twenty-five years ago our present industrial conditions and industrial needs were completely beyond the imagination of the wisest of our proceedings. It is just as true that we cannot imagine or foresee the industrial conditions and needs of the future." Water powers "must and should be developed mainly by private capital, and they must be developed under conditions which make investment in them profitable and safe. But neither profit nor safety require perpetual rights."

Second, "the men to whom the people grant the right to use water power should pay for what they get."

To the sixth Mr. Pinchot answers by showing that the power to be gained from navigable streams differs only in that it is secured from a larger volume of water dropping a shorter distance, and that since "every stream is a unit from its source to its mouth it is just as essential that the people should "retain and exercise control of water power monopoly on navigable as on non-navigable streams."

These answers show that Mr. Pinchot advocates a policy "thoroughly democratic in its essence and tendencies," and emphasizes his feeling that the people have the right and the duty, the duty no less than the right, to protect themselves against the uncontrolled monopoly of the sources which yield the necessaries of life.

NEWS ITEMS

At the University of Maine, Professor H. G. Bell, of the Iowa State College, has been elected professor of agronomy.

Following the resignation of Professor Henry S. Graves, Professor J. W. Toumey has been appointed acting director of the Yale Forestry School.

Mr. Darius Ogden Mills, of New York City, died recently in California; among his public bequests is a gift of fifty thousand dollars to the New York Botanical Garden.

Wellesley has bought as a memorial the entire collection of lichens which was made by the late Professor Clara E. Cummings, Hunnewell professor of cryptogamic botany at Wellesley.

Mr. F. A. Woods, chief of the Bureau of Plant Industry of the United States Department of Agriculture, has been appointed dean of the agricultural department of the University of Minnesota.

The establishment of an agricultural college at Mayaguez, Porto Rico, has been authorized by the territorial legislature and I. W. Hart, of the School of Agriculture, São Paulo, Brazil, has been elected president.

Dr. Marshall A. Howe and Mr. Norman Taylor, of the New York Botanical Garden, have just returned from trips in the tropics. Dr. and Mrs. Howe were collecting in the Panama region and Mr. and Mrs. Taylor in eastern Santo Domingo.

Yale University has just received from Mrs. Russell Sage $650,000 to complete the purchase of Sachem's Woods, a large tract of land which will furnish a new campus and give building sites for new buildings, among them a biological laboratory.

The subjects for the Walker prizes of 1911 have been announced. Those of interest to botanists are: A study of the structure, development, and biology of some peat bog; a comparative investigation of the Gnetales; the relation of Mendelism to natural selection; and a monograph of some genus or group of fungi.

Secretary Wilson, at a recent conference of the bureau chiefs of the Department of Agriculture, appointed a committee to report upon the amount of outside work which may be conducted by government employes; the Secretary feels that the hundreds now so employed should produce results for the government before devoting part of their talents to outside interests.

Mr. Gifford Pinchot, chief forester of the United States, has resigned his position, and Professor Henry S. Graves of the Yale Forestry School has been appointed in his place. As forester, Mr. Pinchot has rendered invaluable services to his country, and it is unfortunate that administrative difficulties have made such a change necessary. Fortunately, the present indications are that Mr. Pinchot's interest and influence will be still felt in the forest preservation legislation under discussion.

Applications for a scholarship at the Zoölogical Station at Naples, which affords opportunity for research in zoölogy, botany, and physiology (with all the materials, apparatus, and assistance, free of cost) should be sent to the secretary (Mrs. A. D. Mead, 283 Wayland Ave., Providence, R. I.), on or before March 1, 1910. Attention is also called to the $1,000 prize, which has been offered periodically by the Association for the best thesis written by a woman, on a scientific subject, embodying new observations and new conclusions based on an independent laboratory research in biological, chemical, or physical science, and which will be awarded in April, 1911. Circulars giving the conditions of the award of the prize will be furnished by the secretary.

The Boston meeting of the American Association for the Advancement of Science was attended by more than thirteen hundred members and more than a thousand papers were presented. The botanical papers offered by the botanical section of the Association, Section G, and by the Botanical Society of America, the Society of American Bacteriologists, the American Phytopathological Society, the Sullivant Moss Society, and the American Society of Naturalists number over one hundred and sixty. These included Professor Ganong's address (as retiring president of the Botanical Society of America) on the teaching of botany and Professor Richard's address (as retiring vice-president of Section G) on the nature of response to chemical stimulation. There was a symposium on botanical gardens, one on nuclear phenomena of sexual reproduction in thallophytes and spermatophytes, and another on plant responses. Other papers of interest to botanists and to teachers of botany were given by the following scientific bodies: the Association of Horticultural Inspectors, the American Nature Study Society, the American Association of Economic Entomologists, the Association of American Geographers, and by several divisions of the American Chemical Society: the Division of Agricultural and Food Chemistry, the Division of Fertilizer Chemistry, the Biological Chemistry Section, the India Rubber Chemistry Section, and the American Society of Biological Chemists.

In a recent message Governor Hughes announced a gift of Mrs. E. H. Harriman which adds to the park along the Hudson some ten thousand acres of land. The Palisade Interstate Park, established by the joint action of New York and New Jersey, extends from Fort Lee north on the western side of the Hudson nearly to Haverstraw. A smaller strip farther north, from Stony Point to Cornwall, is known as the Hudson Forest Reserve. The Harriman gift is a very wide, irregular piece of land between the two. Besides the land a million dollars was given for the purchase of adjacent property. Other wealthy people have given conditionally over $1,500,000 for the extension of this park: John D. Rockefeller and J. Pierpont Morgan, a half million dollars each; Mrs. Russell Sage, William K. Vanderbilt, George F. Baker, James Stillman, John D. Archbold, William Rockefeller, Frank A. Munsey, Henry Phipps, E. T. Stotesbury, E. H. Gary, and George W. Perkins, fifty thousand dollars each; Helen Miller Gould, twenty-five thousand dollars; Ellen F. James and Arthur Curtiss James, jointly, twenty-five thousand dollars; and V. Everit Macy, twenty-five thousand dollars. The conditions under which these subscriptions were made stipulate that this park be put under the jurisdiction of the already existing Palisade Park Commission; that the State of New York appropriate two and a half million dollars toward the support of the park; and that a proportionate contribution be made by New Jersey. One side of the Hudson will therefore be fully guarded. The Palisade Park Commission has already given evidence of its efficiency and public spirit, having established the existing park without compensation and at the small cost (for personal expenses) of less than five hundred dollars, and this guardianship is a fitting tribute to its services.

THE TORREY BOTANICAL CLUB

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Torreya. Monthly, established 1901. Price $1.00 per year.

All business correspondence relating to the above publications should be addressed to William Mansfield, Treasurer, College of Pharmacy, 115 W. 68th St., New York City.

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BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

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TORREYA

February, 1910

Vol. 10 No. 2

THE VEGETATION ON LOOKINGGLASS MOUNTAIN *

By Homer Doliver House

1. Location and Geology

Lookingglass Mountain or rock is located in the northern part of Transylvania County, North Carolina, on the estate of George W. Vanderbilt; the extreme northern corner of the county being occupied by that curious valley, the "Pink Beds." Lookingglass Mountain is about three miles southeast of Pisgah Ridge which forms the northwestern boundary of the county with altitudes of 4,500 feet (Pigeon Gap) to 6,040 feet (Chestnut Bald), and situated between two streams, Rockhouse Creek and Lookingglass Creek, both emptying into Davidson River below the mountain, at an altitude of about 2,300 feet. The summit of Lookingglass is 4,000 feet altitude and three sides of the mountain are granite cliffs, in places several hundred feet high, the top being a table-like summit sloping southwestward toward Davidson River, on which side the cliffs are few or in places none. The greatest abruptness of slope is on the northern and eastern sides. Viewed from the northeast (Fig. 1) the mountain appears like a gigantic dome rising in the middle of a valley, all the mountains surrounding it possessing equal or greater altitudes except the narrow valley of Davidson River.

The geological structure is Whiteside granite, the peculiar shape said to be due to spheroidal weathering of the granite which is supposed to be of an intrusive origin and younger than the surrounding formations, perhaps as late as the Carboniferous Age.

The soil on the summit is nowhere deep and in many places

* Illustrated with the aid of the Catherine McManes fund.

[No. 1, Vol. 10, of Torreya, comprising pages 1–28, was issued January 29, 1910.]

entirely absent. Chiefly it is a yellowish clay strewn with fine sand and, where vegetation is persistent, the admixture of humus produces a fairly fertile soil which is however, from the nature of its composition, origin, and position, subjected to extremes of moisture and dryness. Numerous tiny springs rise here and there and, escaping down the smooth surfaces of the granite, furnish periodical moisture for extensive lithophytic societies, chiefly lichens. Most of the springs cease with periods of drought.

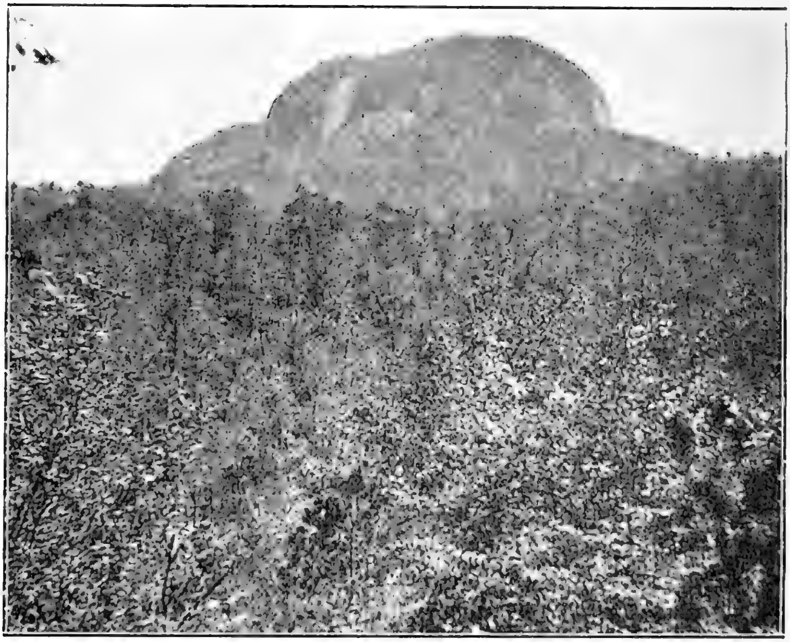

FIGURE I. Lookingglass Mountain from the northeast.

2. VEGETATION

The northern and western exposures of granite are in particular, covered with a more or less dense growth of lichens. In crevices and more secure places, mosses and *Selaginella* occur ; the latter, however, is much more abundant on the exposed rocks of Roan and Carolina gneiss, which make up the adjacent Pisgah Ridge.

The arborescent flora possesses many features of peculiar interest. Deformities due to exposure to severe winds are abundant.

The coniferous species are most conspicuous from a distance but do not comprise the largest number of individuals. There are four species. *Tsuga caroliniana* is abundant all over the northern and western brow of the mountain (Fig. 2). *Pinus pungens* is as conspicuous and more generally distributed down the backbone of the mountain (Fig. 3), as well as occurring as twisted and deformed individuals in crevices and on ledges on the upper slopes of the cliffs. *Juniperus virginiana* is scattered along exposed places and is always dwarfed or grotesque in shape.

FIGURE 2. Hemlocks on the northern and western brow.

Pinus rigida is found chiefly along and down the backbone of the mountain, the forest of which partakes more of the character of that of the adjacent dry ridges. Of these four conifers, the last only is common throughout the adjacent region, *Juniperus* being very rare and *Tsuga caroliniana* being represented by but one mature individual in the Pink Beds, and none so far as known on Pisgah Ridge. *Pinus pungens* occurs in scattered colonies along the exposed slopes of Pisgah Ridge, and rarely in the Pink Beds valley, which is underlaid by Whiteside granite, sometimes exposed.

The broadleaf arborescent species do not show the same degree of localization as shown by the coniferous species. The most important species are *Castanea dentata*, *Quercus Prinus*, *Q. coccinea*, *Q. rubra*, *Q. alba*, *Acer rubrum*, *Hicoria glabra*, and *Cornus florida*. Dwarfed or shrub-like specimens of several smaller trees are common, especially on the exposed brow of the cliff, the principal species being *Amelanchier canadensis*, *Castanea pumila*, *Chionanthus virginica*, *Symplocos tinctoria*, *Hamamelis*

FIGURE 3. Pines on Lookingglass Mountain.

virginiana, and *Sassafras variifolium*. Perhaps the most interesting broadleaf found here was *Populus grandidentata*, represented by a few young trees.

Among the shrubs, *Kalmia latifolia* and *Rhododendron maximum* predominate here as they do nearly everywhere in this region. A very rare species here is *Rhododendron punctatum* which is common along the Davidson River banks, 2,000 feet lower, and on Cold Mountain, 2,000 feet higher. On the southern exposures of the mountain, *Kalmia* blooms a week earlier than it does on the adjacent ridges and two to three weeks earlier than in the Pink Beds, nearly 1,000 feet lower altitude. The buckberry (a local name), *Gaylussacia ursina*, *G. resinosa*, *Clethra acuminata*, *Leucothoë recurva*, *Azalea lutea*, *Pyrus melanocarpa* (*Aronia nigra* Britton), *Vaccinium corymbosum*, *Robinia hispida*, and *Rhus copallina* are common and conspicuous shrubs on the summit of the exposed cliffs. The drier woods on the back of the mountain contain numerous specimens of *Myrica asplenifolia* and *Vaccinium stamineum*. *Epigaea repens* is common on the wooded portions of the summit.

The herbaceous vegetation varies greatly in appearance with the season. In early May the most conspicuous herbaceous plants are *Viola hastata*, *V. rotundifolia*, *Adopogon montanus*, *Hypoxis hirsuta*, *Potentilla canadensis*, *Iris verna*, *Erigeron pulchellus*, *Saxifraga virginensis*, *Viola pedata*, *V. primulaefolia*, and *V. affinis*.

In midsummer most of the above named plants become inconspicuous and their place is taken by such species as *Eupatorium pubescens*, *Gerardia tenuifolia*, *Aster Curtissii*, *Bidens bipinnata*, *Steironema heterophyllum*, *Capnoides sempervirens*, *Talinum teretifolium*, and *Xyris* sp.

The last two named are not found elsewhere in the adjacent region, although the writer has not visited John Rock and Cedar Rock Mountains nearby which possess similar geological formations.

Woody Plants of Lookingglass Mountain in Order of Relative Abundance

(Starred species were either young, dwarfed, or shrub-like.)

Trees	Shrubs
Quercus Pinus L.	*Kalmia latifolia* L.
Castanea dentata (Marsh) Borkh.	*Rhododendron maximum* L.
Quercus rubra L.	*Vaccinium corymbosum* L.
Tsuga caroliniana Engelm.	*Gaylussacia ursina* (M. A. Curtis) T. & G.
Quercus coccinea Muench.	*Andromeda ligustrina* (L.) Muhl.
Pinus pungens Lamb.	*Vaccinium stamineum* L.
Quercus alba L.	*Rhododendron punctatum* Andr.

Acer rubrum L.
Cornus florida L.
Sassafras variifolium (Salisb.) Ktze.*
Chionanthus virginica L.*
Castanea pumila (L.) Mill.*
Hicoria glabra (Mill.) Britton
Amelanchier canadensis (L.) Medic.
Halesia carolina L.
Symplocos tinctoria (L.) L'Her.*
Robinia Pseudo-Acacia L.
Hamamelis virginica L.*
Pinus rigida Mill.
Acer pennsylvanicum L.*
Oxydendron arboreum (L.) DC.
Nyssa sylvatica L.
Liriodendron Tulipifera L.
Populus grandidentata Michx.
Betula lutea Michx. f.
Juniperus virginia L.*

Azalea lutea L.
Pyrus melanocarpa (Michx.) Willd.
Clethra acuminata Michx.
Gaylussacia resinosa T. & G.
Leucothoë recurva (Buckley) Gray.
Rhus copallina L.
Myrica asplenifolia L.
Amorpha fruticosa L.
Robinia hispida L.
Sambucus canadensis L.

It is interesting to note that eleven of the seventeen species of shrubs belong to the Ericaceae. Of the arborescent species, six belong to the Fagaceae and four to the Pinaceae. Nearly all of the other arborescent species represent different families.

Biltmore Forest School

A NEW SPECIES OF DEWALQUEA† FROM THE AMERICAN CRETACEOUS ‡

By Edward W. Berry.

The genus *Dewalquea* was founded by Saporta and Marion in 1874 § upon remains from the Senonian of Westphalia communicated by Debey and named by him in manuscript *Araliophyllum*, and on additional remains collected by those authors from the

† Illustrated with the aid of the Catherine McManes fund.

‡ Published by permission of the Director of the United States Geological Survey.

§ Saporta and Marion, Mém. cour. et des Sav. étrangers de l'Académie 37 : 55-74.

Paleocene of Gelinden, Belgium (Marnes heersiennes = Étage Thanétien). Three species were enumerated, *Dewalquea haldemiana* and *Dewalquea aquisgranensis* from the Westphalian Senonian and *Dewalquea gelindenensis* from the basal Eocene. In the last thirty-five years several additional species have been referred to this genus. These include another species from the German Senonian (*Dewalquea insignis*) described by Hosius and v. d. Marck; * two species from the Cenomanian of Bohemia (*Dewalquea coriacea* and *Dewalquea pentaphylla*) described by Velenovsky; † two American species from the Dakota group (*Dewalquea dakotensis* and *Dewalquea primordialis*) described by Lesquereux,‡ both of which are fragmentary and of uncertain relationship; a species from the Raritan of New Jersey (*Dewalquea trifoliata*) described by Newberry; § and a species described by Heer ‖ from Greenland (*Dewalquea groenlandica*) and subsequently recorded from Staten Island, New Jersey, North Carolina, and Alabama.

Hosius and v. d. Marck (loc. cit., p. 50) record the Eocene species from the Senonian of Westphalia but the remains are not of this species but fragments of *Dewalquea haldemiana* which is common at that horizon. The European species *Dewalquea insignis* is recorded by Heer ¶ from both the Atane and Patoot beds of Greenland and by Hollick** from the Cretaceous of Staten Island but both of these determinations are based upon fragments of single leaves and are, in the writer's judgment, entirely untrustworthy. Attention should also be called to the possibility of *Celastrus arctica* Heer†† representing the leaflets of a *Dewalquea*.

* Hos. and v. d. Marck, Palaeont. **26**: 172. *pl. 32. f. 111–113; pl. 33. f. 109; pl. 34. f. 110; pl. 35. f. 123.* 1880.

† Velenovsky, Fl. böhm. Kreidef. **3**: 11, 14. *pl. 1. f. 1–9; pl. 2. f. 2; pl. 8. f. 11, 12.* 1884.

‡ Lesq., Fl. Dakota Group, 211. *pl. 59. f. 5, 6.* 1892. Geol. and Nat. Hist. Surv. Minn. **3**: 18. *pl. A. f. 10.* 1893.

§ Newb., Fl. Amboy Clays, 129. *pl. 22. f. 4–7.* 1896.

‖ Heer, Fl. Foss. Arct. **6**^{2}: 87. *pl. 29. f. 18, 19; pl. 42. f. 5, 6; pl. 44. f. 11.* 1882.

¶ Heer, op. cit., 86. *pl. 25. f. 7; pl. 33. f. 14–16.* 1882; ibid. **7**: 37. *pl. 58 f. 3; pl. 62. f. 7.* 1883.

** Hollick, Mon. U. S. Geol. Surv. **50**: 106. *pl. 8. f. 24.* 1907.

†† Heer, op. cit. **7**: 40. *pl. 61. f. 5, d, e.*

This species was described from the Patoot beds of Greenland where it is sparsely represented. It is abundant, however, in the Upper Raritan of New Jersey, but of some scores of specimens examined by the writer all were detached and failed to show their habit of growth.

The botanical relationship of *Dewalquea* has always remained obscure and no better discussion of it is extant than that given by Saporta and Marion,* who after comparing these leaves with those of *Ampelopsis*, *Arisaema*, *Anthurium* (Araceae), etc., arrive at the conclusion that they are prototypes of the tribe Helleboreae of the Ranunculaceae.

The new species, a description of which follows, may be called :

Dewalquea Smithi sp. nov.

Leaves palmately decompound, the petiole dividing into three principal branches, the angle of divergence varying from 20° to 60° and the two lateral branches forking at an acute angle 1 to 2 cm. above their base. The middle leaflet is lanceolate in outline, being widest in its central part and tapering almost equally to the acute apex and base. Length 7.5 cm. to 16 cm. Greatest width 2 cm. to 4 cm. Margin entire or serrate, usually entire below and serrate in the apical three fourths, sometimes with large aquiline-serrate teeth. Midrib stout. Secondaries regular, subopposite, parallel ; about 20 pairs, branching from the midrib at angles varying from 45° to 70° usually about 50°, curving upward and running to the marginal teeth in some specimens as in the restoration. In other specimens and in entire margined forms they are camptodrome. The base of the leaflet extends downward to within 2 or 3 mm. of the forks of the petiole. Lateral leaflets more or less inequilateral, usually somewhat smaller than the middle leaflet. The internal leaflet is lanceolate, the outer lamina starting at or very near the point where the lateral branch of the petiole forks. The inner lamina, however, extends downward almost to the base of the lateral branch making the base markedly inequilateral. In general outline, marginal, and venation characters it is identical with the middle leaflet. The outer lateral leaflet is also somewhat inequilateral but less so than the internal lateral leaflet, its internal lamina starting at or near the fork and its outer lamina extending more or less below the fork. Marginal and venation characters as in the other leaflets.

* Loc. cit., pp. 55–61.

This handsome species is common in the Tuscaloosa Formation at Whites Bluff on the right bank of the Warrior River 309 miles above Mobile, Alabama. A small collection of fossil plants from this outcrop containing no less than 27 specimens of

FIGURE 1. Restoration of *Dewalquea Smithi* from the Tuscaloosa formation of Alabama (½ nat. size).

this form. Several of these were complete and were sketched at the time they were collected, which proved fortunate, since the extremely arenaceous matrix did not withstand shipment very well. The museum material, while considerably broken, shows several entire detached leaflets and three or four basal parts of the leaf showing the mode of division of the petiole. As a number of figures would be necessary to show the entire leaf a restoration of it is shown in the accompanying text-figure. This restoration is based entirely upon material representing all parts of the leaf and is therefore not hypothetical in any particular.

It is named in honor of Prof. E. A. Smith, the efficient state geologist of Alabama. Leaflets of this species, nearly all of which are terminal, are also common in the Middendorf clays near Langley, South Carolina.

This species is markedly distinct from the American species of *Dewalquea* previously described, all of which were apparently tripartite. Among the European species it is quite similar to the Senonian species *Dewalquea insignia* Hos. and v. d. Marck which is, however, entirely distinct. It is also similar to *Dewalquea coriacea* and *Dewalquea pentaphvlla* described by Velenovsky from the Cenomanian of Bohemia.

As mentioned above this Alabama species shows entire and serrated forms and it is remarkable that wherever this genus has been found to occur in any abundance, two species are usually described, one entire and one with toothed margins. Thus in Germany *Dewalquea haldemiana* is entire while *Dewalquea insignis* is toothed, and probably both are the leaves of the same plant. In Bohemia *Dewalquea pentaphylla* is entire while *Dewalquea coriacea* is toothed. In the case of the Alabama plant it is believed that the entire and serrate leaves are specifically identical since the material shows a great many gradations in the size of the teeth and great variability regarding the proportions which the entire part bears to the toothed part on single leaflets.

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SHORTER NOTES

The Weeping Willow in Winter. — A large weeping willow on the university campus shows, in winter, such a complete change from its "weeping" habit that further information seems desirable. The slender unbranched twigs (one to two feet long), which in the fall hung vertically from the whole tree, are now curled fantastically upward over the whole tree, giving it a rather bushy appearance. They have so changed their relative position with the parent branches as to be now, with few exceptions, wholly above the point of origin instead of hanging wholly below as in summer. The writer first noticed this in January, 1909, but supposing it well known, gave it no further thought except to look for it this year. In November the branches were still pendant; the next observation, January 1, 1910, showed again the winter condition described above. Has ony one observed the phenomenon elsewhere? When does it begin? What changes take place in the spring? How can it be explained? Is there any literature on the subject? JEAN BROADHURST

A WISCONSIN RIDDLE. — The accounts which the earliest explorers of our country have left of the plants which, for one reason or another, attracted their attention are always interesting, and not infrequently puzzling. Such is the Report of Father Dablon, given in the Jesuit Relations for 1671–72. He describes his new mission of St. François Xavier, at De Pere rapids, on Fox River, Wisconsin. While telling of his missionary labors among the savages, he comments also on the animals and the plants of the vicinage. "Besides the grapes, plums and apples," he writes, "which would be fairly good if the savages had patience to let them ripen, there also grows on the prairies a kind of lime, resembling that of France, but having no bitter taste, not even in its rind. The plant bearing it slightly resembles the fern."

Again he tells how an Indian pointed out to him a medicinal plant, whose root was "employed to counteract snake-bite, God having been pleased to give this antedote against a poison which is very common in these countries. It is very pungent, and tastes like powder when crushed with the teeth. It must be masticated, and placed upon the bite inflicted by the snake." He gathered some of this plant, "for future examination," but records no tests of its efficacy.

What were the plants which the good Father thus describes? Probably botanists familiar with the region may be able to recognize them. S. B. PARISH

REVIEWS

Coulter and Nelson's New Manual of Rocky Mountain Botany*

Teaching botanists in the Rocky Mountain region, and in addition a wide circle of people who are interested in knowing the vascular flora, will welcome the "New Manual of Rocky Mountain Botany" by Professor John M. Coulter, of the University of Chicago, and Professor Aven Nelson, of the University of Wyoming. For years there has been no satisfactory manual of the region available. Since Coulter's Manual of the Rocky Mountain Region appeared in 1885, botanists have been active in the field, greatly increasing the known species and segregating large genera. Several publications, among these Professor Nelson's Key to the Rocky Mountain Flora, dealing inadequately with the spring and early summer flora have appeared at intervals. In 1906 there was published, at the Colorado Agricultural Experiment Station, at Fort Collins, the "Flora of Colorado" by Dr. P. A. Rydberg, which contains analytical keys to the orders, genera, and species but no decriptions of species. It, therefore, has been necessary in order to insure correct identification to consult original descriptions or to submit specimens to the expert.

The new manual is not in any sense a revision of Coulter's Manual. Professor Nelson has completely rewritten the book and assumes responsibility for any errors it may contain. He is well qualified for the task, having given in the neighborhood of twenty years of careful study to the flora of the Rocky Mountain region. He has had a large experience in the field; has gathered by his own efforts, and with the aid of his pupils, and by exchange, a splendid herbarium; and has familiarized himself with the original descriptions and checked these by an examination of the plants. No man to-day is more familiar with the vascular plants of the region than is Professor Nelson.

It is a satisfaction to find the book is neither ultra-radical nor strikingly conservative in taxonomy. Freedom from extremes

* Coulter, John M. Revised by Aven Nelson. Pp. 646. American Book Company, New York. 1909. $2.50.

makes it a very serviceable book. It contains very clear and concise descriptions of 649 genera, 2,733 species, and 186 varieties. Synonyms, numbering 1,788, are inserted with the species descriptions thus increasing the value of the book. The keys to genera and species appear to be accurate and clear so far as they have been tested by the writer.

In priority of names and in segregation, exception is frequently taken to Dr. Rydberg's publications. There is a return to such long used and satisfactory family names as Leguminosae, Gramineae, Cyperaceae, Umbelliferae, Cruciferae, and Compositae. *Pinus*, *Apinus*, and *Caryopitys* are included in the single genus *Pinus*. The number of species of *Quercus* has been somewhat reduced. In this genus distinctions have at times been made of which the characters ascribed to separate species may sometimes be found to occur on a single tree or shrub. This reduction should meet with general approval, as will the contraction of *Gutierrezia* into five seemingly well-defined species. Among the Gramineae *Muhlenbergia* contains seven species and one variety, and *Poa* is reduced to twenty-five species. *Astragalus* has again come to its own, the seventeen genera of Dr. Rydberg are brought together into this single genus. And yet the reduction in the number of species within genera is not the policy throughout the manual. When species and varieties are clearly defined they are given a space. Thus there are described twenty-four species of *Mertensia* and fifty-four species and varieties of *Pentstemon*. Many other examples might be enumerated.

The best test of the general value of such a manual will be its usefulness to others than the trained systematist. The authors are to be congratulated on having given us a book with workable keys, clear descriptions, and at the same time to have included practically all well-defined species.

EDWARD C. SCHNEIDER

COLORADO COLLEGE,
COLORADO SPRINGS, COLORADO

PROCEEDINGS OF THE CLUB

January 11, 1910

The annual meeting was called to order at the American Museum of Natural History at 8:30 P. M., with President Rusby in the chair. Eleven members were present.

After the reading and approval of the minutes of December 14, 1909, the following names were presented for membership:

Miss Gladys Pomeroy, 55 Broad St., Newark, N. J.; Miss L. H. Seely, 50 Gautier Ave., Jersey City, N. J.; and Prof. A. O. Garrett, 615 S. 9th East St., Salt Lake City, Utah.

The resignation of Miss Sarah A. Robinson, 239 East Houston St., New York City, was read and accepted.

The annual report of the treasurer was presented and on motion was received and referred to the auditing committee.

The secretary reported that fifteen meetings had been held during the year with a total attendance of 411, as against 463 in 1908, and an average attendance of twenty-seven, as against thirty last year. Six persons have been elected to membership, and fourteen resignations have been received and accepted.

Seven illustrated lectures were delivered during the season at which the combined attendance was 260.

The chairman of the program committee reported that the programs have been provided for as usual.

As delegate to the Council of the New York Academy of Sciences, Mr. Charles Louis Pollard stated that he had attended all but one meeting during the year.

The editor of Torreya reported as follows for the year 1909: twelve numbers were issued, containing 284 pages including index to the volume, at a cost of $449.21.

By reason of the absence of the editor and the chairman of the field committee, no reports were received from them.

Mr. Fred J. Seaver, chairman of the program committee, read the following communication signed by the members of this committee:

"We, the program committee of the Torrey Botanical Club, hereby recommend that a special fund be raised by private contributions, to enable us to arrange for special lectures on popular subjects in botany, to be given on the second Tuesday evening of each month at the American Museum of Natural History and that the speakers be suitably recompensed for their services." Upon motion this recommendation was approved.

It was voted that a committee be appointed by the President to read over the minutes and consider the subject of the revision of the constitution and by-laws.

Election of officers for the year 1910 resulted as follows:

President, H. H. Rusby; *vice-presidents*, Edward S. Burgess and John Hendley Barnhart; *recording secretary*, Percy Wilson; *editor*, Marshall Avery Howe; *treasurer*, William Mansfield; *associate editors:* John Hendley Barnhart, Jean Broadhurst, Philip Dowell, Alexander W. Evans, Tracy Elliot Hazen, William Alphonso Murrill, Charles Louis Pollard, and Herbert M. Richards.

Mr. Walter C. Cameron and Mr. Bernard O. Dodge were nominated for membership.

Adjourned. PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

SUGGESTIONS FOR PLANT PHYSIOLOGY

BY G. E. STONE

Some time ago I received a letter from you with a question as to whether "physiological work in high school botany should be *more* or *less* quantitative," etc., and I am sending the following comment, although it may not be worthy of publication.

I do not feel familiar enough at the present time with the work of the high schools in botany to give an opinion as to how much time should be devoted to this subject, and whether it would be expedient to give it more time, since there is always complaint among citizens regarding the crowding of the public school curricula. If there were only a little time available for a course in physiological work in the high school it would be almost necessary that the experiments be done by the teacher ; in other words, the work would be in the form of a demonstration course. Satisfactory work may be done by pupils working in groups, but better work is done individually.

The experiments selected should be those which possess the most value ; that is, those which illustrate some fundamental plant function ; and these experiments in our estimation should be simple and carefully done with inexpensive apparatus. A larger number of failures is likely to result from the use of simple appliances, but a failure often possesses just as much pedagogical value as a success.

The question as to whether one should have a costly set of appliances with which to work out a certain course in physiological botany, or should make use of simple ones, is dependent very largely upon the instructor. Simple apparatus in the hands of an incompetent instructor would have little value, and even complicated and expensive apparatus would with such an instructor be worth little more.

For many years the tendency among American instructors has been toward the belief that it is impossible to accomplish scientific work without expensive apparatus, and this is unfortunate. It is a well known fact that original investigation and discovery does not keep pace with the improvements in appliances and the more completely equipped laboratories. Some of our best investigators, like Professor Trowbridge of Harvard and Professor Oswald of Leipzig, do not hesitate to write books advocating the use of home-made apparatus. Those who make use of these simple forms of appliances may therefore consider themselves in good company.

In regard to the line of experimentation, the most fundamental would include simple experiments in respiration, photosynthesis, transpiration, heliotropism, and geotropism. Many simple and instructive as well as fundamental experiments may also be done in connection with soils and plant foods, using commercial fertilizers, if necessary.

Massachusetts Agricultural College

Practical Plant Physiology

An address by Mr. F. H. Bolster of the Gardena (California) high school is quoted by Dr. Babcock in an article* on agriculture in the secondary schools; part of the abstract of Mr. Bolster's address is so eminently adapted to any high school and shows so concretely the kind of work necessary for good botanical teaching in any school that the following illustration is given.

"The aims of the course were to give a little general knowledge of several sciences to show how all these sciences are related to agriculture, and last and most important, to develop the individual by teaching him to reason.

"We used no text but performed experiments which had a direct bearing on agriculture. We would state the experiment as a question and then try to answer the question. For example, How deep should seed be planted? When seeds germinate, what gas is given off? How may we best retain moisture in soils? How can we control alkali? Do vetches grow better if inoculated with bacteria, or if not inoculated? The material would be placed before the pupils. The method would be described and the precautions given. Then they would go about it and from the result draw their conclusion which was the answer to the question. But that was not enough. Take for instance an experiment whose relation to agriculture is least obvious. What gas is given off by germinating seeds? They came to the conclusion that carbon dioxide was given off. But what difference does it make whether this gas is given off or not? What bearing does that have on agriculture? If the experiment is left there, we have only learned an interesting fact which is of no use whatever. The experiment must be applied if it is to be made valuable. I try to draw from the pupil the application to agriculture by reasoning from one step on to another. What is carbon dioxide? A gas composed of carbon and oxygen. If carbon dioxide is given off by germinating seeds, what must be going on in the seed? Oxidation or burning, the same as in our bodies when we exhale the same gas, or when wood burns. Where does the carbon come from? From the seed itself. Where does

* Nature Study Review. November, 1909.

the oxygen come from? From air in the soil. Can this oxidation go on in the seed if there is no air in the soil? Certainly not. Then air must be present in the soil in order that seeds may germinate just as much as moisture must be present. This brings up the whole matter of soil ventilation — the whole matter of thorough preparation of the seed bed and the pupil begins to understand that tillage is just as necessary to give air to the seed as to keep the weeds down.

"By such experiments as this the pupil learns many valuable facts, but more than this his mind should be developed so that he can apply the same form of reasoning to experiments outside the school room and answer for himself questions which may arise in the mind of any normal boy or girl.

"But we do not stop even here. After hitting a point from as many sides as possible, we go out into the garden and try to apply our knowledge. If the knowledge learned in the laboratory cannot be applied in the field, then it is useless. We plant our seeds, we give them air and moisture, and after they begin to grow, we till the soil to give air to the roots and to retain moisture."

Professor Otis W. Caldwell has called attention to the fact that the high school unit in botany mentioned in the December TORREYA was the preliminary recommendation of the committee appointed by the North Central Association, and the final form of the recommendation is still in the hands of a sub-committee.

France from her state forests (18 per cent. of the entire country) derives an annual income of nearly two dollars an acre. But a better idea of the value of the works may be gained from France's success in establishing protective forests in regions subject to destructive floods — lands originally sand dunes and marshes. Immense forests of pines, with their dependent industries connected with the production of charcoal, turpentine, rosin, vinegar, etc., have wrought beneficial climatic and economic changes in the regions under government care.

Science reports a paper presented before the Botanical Society of Washington describing the differences between the wild rices of America and China. The Asiatic plant is given as a variety of the American by Engler and Prantl, but certain "significant characters indicate that the Asiatic plant is a distinct species from the American. The American plant is an annual, being reproduced by seed which falls off into the water as soon as ripe. The Asiatic plant is perennial, capable of reproduction by rhizomes. There are also some differences in the floral characters, these being most apparent in the form of the floral pedicel and in the length of the awns of the glumes."

Experiments conducted recently by Mr. A. E. Vinson at the Arizona Agricultural Experiment Station with regard to the influence of chemicals in stimulating the ripening of fruits have demonstrated that date fruits may be ripened into perfect commercial products in less than three days. The fruit sprays were subjected to acetic acid vapor from twelve to fifteen hours, which caused them to ripen without further treatment; the process can be hastened, it was proved, by exposing the dates to sunshine, or by heating (45° centigrade). It is hoped that this — or a similar process — will make possible the shipping of green dates, as the unripe fruit is firmer and less easily bruised than fresh ripe fruit. The chemical changes connected with rapid ripening of the fruit are given clearly in *Science* for October 29.

Science (May 28, 1909) states that "the amount of wood annually consumed in the United States at the present time is twenty-three billion cubic feet, while the growth of the forest is only seven billion feet. In other words, Americans all over the country are using more than three times as much wood as the forests are producing." Having recently visited Yellowstone Park, with its unnumbered cords of fallen trees, we wonder why some disposition cannot be made of the cords and cords of wood available there. These fallen trees — which form extensive, impenetrable barriers (often several feet high) are throughout the Park a constant eyesore to any one with a modicum of botanical interest. The standing timber is much too dense, and it does seem as if the inventive Americans, with a wood famine so inevitable and so near, should be able to conduct our government reservations more economically.

The department of agricultural education of the University of Wisconsin is expanding its work in the endeavor to use effectively and wisely the annual appropriation of $30,000 of the state legislature. Under Professor Karl Hatch plans are being made, according to *Science*, "for assisting rural and high schools in their efforts to give effective instruction in agriculture. A traveling library of lantern slides illustrating various phases of dairying and farming has been provided which will be sent to schools for use. A collection of enlarged photographs of agricultural products and materials has also been prepared. An explanation of the methods of using the bulletins issued by the Experiment Station and the U. S. Department of Agriculture has also been provided, which is designed to make available for instruction the material in these official publications. The college of agriculture has arranged to have a number of its faculty deliver special lectures on teaching agriculture at county teachers' institutes."

School Science and Mathematics for January, 1910, has a short article on studying buds. The author (C. N. W.) says that "the average pupil has an idea that all buds contain flowers and that it may require some little effort to convince him that the leaf bud is far more abundant that any of the others, and that even this does not produce leaves merely, but a young twig as well." The following suggestions are included: (1) The lilac for the transition from scaly parts without to leaflike parts within; (2) the use of the buckeye instead of the horsechestnut, because of its non-sticky scales and its less woolly leaves; (3) bud protection by leaf petioles as shown in the common red raspberry, flowering raspberry, and catbrier, where the bud is protected not only to maturity (as in the sycamore) but through the winter by a petiole stub; (4) accessory buds in some oaks, forsythia, pipevine, and peach as well as hickory, walnut, and butternut; (5)

naked buds in the witch hazel, butternut, viburnum, and papaw, and the practically naked buds of catalpa, sumac, and ailanthus.

The Fourth Annual Report of the Forest Park Reservation Committee of New Jersey for the year ending October 31, 1908, contains, besides, the report of the committee, one by the state forester, Alfred Gaskill, and another from the forest fire service. The longer articles are by Mr. Gaskill on the planting and care of shade trees, by John B. Smith on the insects injurious to shade trees, and by Byron D. Halsted on the fungi of native and shade trees. The topics included contain such varied ones as the progress of forestry in New Jersey, state reserves, types of forest fires, methods of extinguishing and of controlling forest fires, shade trees, roadside trees, seashore trees, New Jersey tree nurseries, how to plant trees, tree guards, pruning, tree diseases, sprays and methods of spraying, and injuries due to soil conditions. The forty-odd illustrations are numerous, clear, and varied; each has a definite value and adds materially to the usefulness of the report. Several of the best have appeared in earlier state reports or botanical publications; mention might be made of the helpful figure on page 68 showing how to plant a street tree. To this readable report are appended the various laws affecting state and municipal parks, forests, the forest fire service, and tree planting. The report is designedly non-technical, apparently; it is a most readable account of what the state has done and is doing, and should interest the people of New Jersey in the greater improvement of public and private forest land.

In the *India Rubber World* issue of January 1, 1910, there appeared an article by Francis E. Lloyd, entitled "The Guayule Rubber Situation." Aside from stating in a general way, the factory processes in the manufacture of crude guayule rubber and the extent and future of the industry, the author gives an account of the early extraction of rubber from the plant by chewing. He tells of the discovery of the plant (*Parthenium argentatum*) to botanical science in 1852, and in giving a description of its summer and winter appearance, discusses the production and viability of the seed and natural propagation of the plant by means of shoots springing from the shallow-lying roots. In briefly describing its anatomy and the occurrence of rubber and resin, the guayule is contrasted with latex plants, and the effects of irrigation upon the secretion of rubber are noted.

Among the conclusions drawn by the author, the following are the more important. If, despite the apparently small numbers produced, all the seeds which actually germinate in the field should survive, there would frequently be many more guayule plants than could find room to develop; that it would be difficult to completely eradicate guayule on account of the readiness with which shoots are formed from the roots; that under irrigation the ratio of the rubber producing tissue to the non-producing tissue is lowered by the relatively greater development of the wood cylinder and the reduction in thickness of the medullary rays; that finally the wood becomes harder and the stems show a strong tendency to run out into flowering shoots which die back. These disadvantages are compensated for, however, by the much more rapid rate of growth which, in irrigated plants, averages five to eight times that of field plants, the maximum rubber disposition in the former comparing favorably with that in the latter.

The paper is concluded with a description of the habitat of the plant and a résumé of the economic problems concerned with its culture.

CHARLES S. RIDGWAY

NEWS ITEMS

Dr. Raymond H. Pond has recently accepted a position at the Agricultural Experiment Station at College Station, Texas.

Professor E. Dwight Sanderson has resigned the directorship of the Agricultural Experiment Station of the New Hampshire College.

Syracuse University will begin next fall courses in forestry and agriculture, leading to the establishment of a college of agriculture and forestry.

Mr. Frank D. Kern, of Purdue University, has been studying rusts at the New York Botanical Garden; Dr. J. C. Arthur also spent a short time in more general work at Harvard University.

Dr. and Mrs. N. L. Britton have sailed for Cuba on a collecting trip for the New York Botanical Garden; the Garden is also represented at present in the Bahamas by Dr. J. K. Small, and in Mexico by Dr. and Mrs. W. A. Murrill.

Applications for grants from the Esther Herrman building fund, the income from which is used temporarily in aiding scientific investigations, should be addressed to the secretary of the Torrey Botanical Club or to the secretary of the New York Academy of Sciences.

Dr. Louis Krauter, who was assistant professor of botany in the University of Pennsylvania, was frozen to death while hunting near Wildwood, New Jersey. The same fate met his companion, E. J. W. Macfarlane, son of Professor John M. Macfarlane of the same university.

Columbia University is offering through the department of botany a course of extension lectures on agriculture and agricultural methods. This series is designed to serve as an introduction to the extensive additions planned by the department, leading, it is hoped, to the establishment of schools of forestry and agriculture.

At the Boston meeting of the American Association for the Advancement of Science and affiliated societies the following botanists were elected to the positions designated: Dr. D. T. MacDougal (Desert Botanical Laboratory, Tucson), president of the American Society of Naturalists; Dr. F. L. Stevens (North Carolina Agricultural College), president of the American Phytopathological Society; Professor D. P. Penhallow (McGill University), vice-president of Section G; Dr. Erwin F. Smith (Department of Agriculture, Washington), Professor L. R. Jones (University of Wisconsin), and Dr. G. T. Moore (Missouri Botanical Garden) were, respectively, elected as president, vice-president, and secretary of the Botanical Society of America.

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BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

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TORREYA

March, 1910

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SUMMER NOTES ON THE MOUNTAIN VEGETATION OF HAYWOOD COUNTY, NORTH CAROLINA

By Roland M. Harper

In July and August, 1908, it was my privilege to spend a few weeks at the Biltmore Forest School, in the mountains of North Carolina, by invitation of the Director, Dr. C. A. Schenck. This school is located during the summer months in the "Pink Beds", a beautiful valley in the northern corner of Transylvania County, with its floor elevated about 3,200 to 3,300 feet above the sea. The Pisgah Ridge, with its crest varying in altitude from about 4,500 to 6,000 feet, forms the northwestern boundary of this valley and the southeastern boundary of Haywood County.

The Pink Beds valley seems to be unique in several respects, and considerably more field work would be necessary before one could do justice to its very interesting vegetation and ecological problems. But the mountains of Haywood County seem to be thoroughly typical of western North Carolina, and much of what follows will doubtless apply almost as well to any other county in the neighborhood.

While sojourning with Dr. Schenck I ascended to the crest of the Pisgah Ridge several times, and walked once over to Waynesville (the county-seat of Haywood County, distant 16 miles from the Pink Beds "as the crow flies" and nearly half as far again by the roads) and back. On the way over to Waynesville I followed the East Fork of Pigeon River most of the way, leaving it at its confluence with the West Fork and going thence nearly due west the remaining seven or eight miles. On the way back I went up the West Fork a few miles, then turned eastward and

[No. 2, Vol. 10, of Torreya, comprising pages 29–52, was issued February 28, 1910.]

went over the summit of Cold Mountain, a sharp peak between the two forks, whose altitude is given by Buckley * as 6,105 feet, and on the topographic maps of the United States Geological Survey as between 6,000 and 6,100 feet. From Waynesville I also walked the railroad to Balsam, about eight miles southwestward and just over the line in Jackson County. This is about 3,300 feet above sea level, and is said to be the highest railroad station east of the Rocky Mountains.

Although a great deal of botanical work has been done in these far-famed North Carolina mountains ever since they were visited by Bartram and Michaux in the latter part of the 18th century, it has been mostly mere collecting, and the publications resulting from it, with very few exceptions, have been either works relating to trees only, notes on selected species, or narratives dealing with the flora or scenery rather than with the vegetation. So perhaps an attempt to classify the habitats of a small but typical portion of the mountain region, and arrange the species in each according to structure, relative abundance, etc., will not involve too much duplication of previous publications. Although the time I spent in Haywood County was very short, and I collected no specimens (so that some of my identifications are incomplete or uncertain), some of the generalizations which follow may be just as true as if they were based on a broader foundation, and some comparisons with other regions may be of interest.

As is well known to geographers, the mountains of North Carolina are as near normal as any in North America, having been brought to their present form almost entirely by erosion, with few or no complications due to faulting, unequal hardness of strata, glaciation, solution (*e. g.*, of limestone), volcanic action, etc. The topographic forms are consequently comparatively simple, consisting chiefly of ridges and valleys, most of them sloping equally on both sides and running in every possible direction, the former with sharp crests undulating but scarcely serrate, and the latter steep, rocky, and V-shaped toward their heads and broader, smoother, and more level lower down. There are no caves, sinks, natural lakes, islands, or cut-offs, and

* Am. Jour. Sci. II. **27**: 287. 1859.

comparatively few precipices and waterfalls. These mountains are much less rocky than the glaciated ones of the North, for in the countless ages that they have been exposed to the weather all but the hardest and steepest rocks have become deeply buried in soil resulting from their own decay.

The following descriptions of vegetation are intended to apply only to areas more than 2,700 feet above sea-level. Below this rather arbitrary limit in Haywood County the country is scarcely mountainous, consisting mostly of broad valleys and low hills with fertile red soil, very largely under cultivation, and the vegetation does not differ greatly from that of the Piedmont region of the Carolinas and Georgia.

Above the altitude just mentioned the principal habitats in this county seem to be (1) mountain summits above 5,500 feet, (2) slopes and lower summits below 5,500 feet, (3) wet ravines or mountain rivulets, (4) rich ravines or steep coves, (5) river banks and bottoms, (6) gravelly and muddy river beds, (7) wet meadows, and (8) artificial or unnatural habitats.

In the following lists the species are divided into trees, shrubs and herbs, and then arranged as nearly as possible in order of abundance. Evergreens, when known, are indicated by heavy type, and vines by italics.* To make the lists more complete and determine the relative abundance of the species more accurately than would have been the case if I had adhered closely to political boundaries, I have included in my calculations notes made about a mile over the Jackson County line near Balsam, and along the crest of the Pisgah Ridge, where I was sometimes a few yards over the Transylvania County line. This will not introduce any perceptible error into the results.

The only mountain above 5,500 feet which I set foot on is Cold Mountain, already mentioned. The Balsam Mountains, a few miles farther west, are about 500 feet higher, and more densely wooded, but I did not have a chance to visit them, and little is known about the details of their vegetation. During about an hour spent on and near the sharp summit of Cold

* For explanation of a more elaborate method of treating habitat-groups see Ann. N. Y. Acad. Sci. **17**: 36–41. 1906.

Mountain late in the afternoon of August 9 the following native species were noted. (This summit, like many others in the same region, has long been used for pasturage,* and there are of course a good many weeds on it. These will be found in the last list.)

TREES

Crataegus sp.
Fagus grandifolia
Abies Fraseri (1) †
Sorbus americana (2)
Betula lutea
Quercus rubra
Betula alleghaniensis?

SHRUBS

Rhododendron catawbiense (3)
Vaccinium sp.
Pieris floribunda
Cholisma ligustrina
Kalmia latifolia
Rhododendron punctatum
Salix humilis
Menziesia pilosa (4)

HERBS

Eupatorium ageratoides
Pteris aquilina
Danthonia sp.
Deschampsia flexuosa (5)
Heuchera villosa
Houstonia serpyllifolia (6)
Potentilla tridentata (7)
Houstonia longifolia
Lysimachia quadrifolia
Silene virginica
Hypericum Buckleyi
Polypodium vulgare
Epigaea repens
Selaginella rupestris
Habenaria ciliaris
Carex trisperma
Asplenium Filix-foemina
Circaea alpina (8)
Lilium superbum

It happens that on the same afternoon Dr. H. D. House was on the summit of Mt. Pisgah, on the edge of the same county, about six miles farther east and 300 feet lower, where he found many of the same species, and *Paronychia argyrocoma* besides. Quite a number of the same have been reported from similar habitats a little farther north by Dr. Harshberger.‡

* See Gray, Am. Jour. Sci. **42**: 41, 47. 1842; Redfield, Bull. Torrey Club **6**: 338. 1879; Scribner, Bot. Gaz. **14**: 255. 1889.

† Interesting notes on the species whose names are followed by numbers can be found as follows: (1) Gray, Am. Jour. Sci. **42**: 31, 42. 1842; Redfield, Bull. Torrey Club **6**: 338. 1879; Sargent, Gard. & For. **2**: 472. *f. 132.* 1889; Pinchot & Ashe, Bull. N. C. Geol. Surv. 6: 136, 223. 1898; (2) Gray, l. c. 28, 42. (3) Redfield & Gray, Bull. Torrey Club **6**: 336. 1879; Small & Heller, Mem. Torrey Club 3[1]: 4. 1892; Cannon, Torreya **2**: 161–169. 1902; (4) Gray, Am. Jour. Sci. **42**: 42. 1842; Small & Heller, l. c. (5) Scribner, Bot. Gaz. **14**: 254. 1889. (6) Gray, l. c. 19, 40; Redfield, l. c. 337; F. E. Boynton, Pop. Sci. Mo. **31**: 654. 1887. (7) Gray, l. c. 27, 41; L. N. Johnson, Bot. Gaz. **13**: 270. 1888; Small & Heller, l. c. 14. (8) Harshberger, Bot. Gaz. **36**: 378. 1903.

‡ Bot. Gaz. **36**: 376–382. 1903.

The trees here, as in many other exposed places in different parts of the world, are very stunted, none over ten feet tall having been noticed, and they are mostly so scattered as to afford little shade. The *Crataegus* and *Fagus* together formed little groves or thickets on the northern slope near the summit, and curiously enough, could hardly be told apart at a little distance. The bark of both was smooth and gray, their leaves were of about the same size and color, and the *Crataegus* (apparently of the *coccinea* group) had ripe red fruit, about the same size as the involucres of the *Fagus*, which were also reddish-tinged.

The balsam, *Abies Fraseri*, seemed to be confined to north slopes too. It was not common on Cold Mountain, but considerable quantities of it were plainly visible on another peak of about the same height a few miles to the southward; and the Balsam Mountains are said to be covered with it, whence their name.

The herbs were scarcely stunted at all, doubtless because the larger ones are not evergreen, and thus escape the chilling blasts of winter. On the very highest point was a specimen of *Lilium superbum* about four feet tall, rearing its flowers above all other vegetation on the mountain.

The proportion of evergreens seems rather small for such an exposed habitat. Vines seem to be entirely absent, which however is not surprising. All but one of the shrubs belong to the Ericaceae.

About 20 per cent. of the species in the foregoing list are peculiar to the Appalachian region, south of the limits of glaciation, and the remainder are pretty widely distributed in the northeastern states. About one-fourth of the widely distributed species also extend as far south as Florida.

On the mountain slopes and lesser summits, from about 3,300 to 5,000 feet above sea-level, the flora is considerably richer, chiefly because this habitat is the most widespread and variable one in the region under consideration. The following species were noted in such situations in Haywood County or within a mile of its borders between the middle of July and the middle of August:

TREES

Castanea dentata
Acer rubrum
Quercus coccinea
" rubra
" Prinus
Halesia carolina
Tsuga canadensis
Robinia Pseudo-Acacia
Betula lutea
" lenta?
Acer pennsylvanicum
" Saccharum?
Picea australis?
Fagus grandifolia
Acer spicatum

SHRUBS

Kalmia latifolia
Rhododendron maximum
Cholisma ligustrina
Vaccinium sp.
(same as on Cold Mt.)
Menziesia pilosa
Gaylussacia resinosa
Leucothoë recurva
Clethra acuminata
Azalea viscosa
Hamamelis virginiana
Hydrangea arborescens
Aronia nigra
Azalea viscosa glauca
Vaccinium corymbosum
Azalea lutea
Polycodium sp.
Sassafras variifolium
Corylus rostrata
Ceanothus americanus
Robinia hispida
Comptonia peregrina

HERBS

Pteris aquilina
Dasystoma laevigata
Coreopsis major Oemleri *
Koellia montana †
Dennstaedtia punctilobula
Cimicifuga racemosa
Galax aphylla
Zizia Bebbii
Stenanthium gramineum
Phlox glaberrima ?
Campanula divaricata
Nabalus sp.
Epigaea repens
Habenaria ciliaris
Melampyrum americanum
Silene stellata
Osmunda cinnamomea
Collinsonia canadensis
Lysimachia quadrifolia
Veratrum parviflorum ‡
Pedicularis canadensis
Dryopteris noveboracensis
Viola rotundifolia
Houstonia purpurea
Monotropa uniflora
Selaginella rupestris (on rocks)
Deschampsia flexuosa " "
Polypodium vulgare " "
Heuchera villosa " "
Chrosperma muscaetoxicum
Monarda clinopodia ?
Aster divaricatus ?
Polystichum acrostichoides
Dioscorea villosa
Houstonia longifolia
Silene virginica
Solidago caesia
Potentilla canadensis
Aletris farinosa
Porteranthus trifoliatus
Viola affinis §
Iris verna
Eupatorium purpureum ?
" ageratoides
Lilium superbum
Erigeron pulchellus
Angelica villosa
Seriococarpus asteroides
Andropogon furcatus
Ligusticum canadense
Actaea alba
Chrysopsis Mariana
Angelica atropurpurea
Hieracium paniculatum
Caulophyllum thalictroides

* See Gray, Am. Jour. Sci. **42**: 46. 1842.

† See Gray, Am. Jour. Sci. **42**: 43, 47. ‡ See Gray, Am. Jour. Sci. **42**: 26.

§ Identified by Dr. House, who accompanied me on some of my walks along the pisgah Ridge.

In this habitat, or group of habitats, the trees overshadow all the other vegetation, except on the very summits of the ridges, but they hardly make the dense shade characteristic of a climax forest. Some of the herbs have thickened or reduced leaves, and are capable of flourishing in perfectly treeless habitats, while others are distinctly shade-loving, having thin and broad leaves. The scarcity of pines, other evergreens, and vines is noteworthy.*

About two thirds of the shrubs and two or three of the herbs belong to the Ericaceae and allied families. Compositae, Umbelliferae, and Melanthaceae are also pretty well represented. Only about 12 per cent. of the angiosperms are monocotyledons.

Between 15 and 20 per cent. of the species seem to have their centers of distribution right in these mountains, though none are confined to North Carolina. Many of the remainder are common on bluffs in all the southeastern states, and still more are widely distributed in various habitats in the northeastern states. A large proportion of them have been reported from the mountains of New York by Dr. Harshberger.†

The wet rocky ravines at the heads of streams have a characteristic and interesting but not very rich flora. This habitat seems to be much better developed in the Pink Beds than in the parts of Haywood County that I visited, where I found only the following species in it :

Shrubs	Herbs
Rhododendron maximum	Houstonia serpyllifolia
	Chelone Cuthbertii ?
	Impatiens biflora
	Chelone glabra
	Diphylleia cymosa ‡
	Osmunda cinnamomea
	Thalictrum clavatum ‡
	Carex gracillima ?
	Aconitum uncinatum ?

* This type of forest corresponds with a part of Ashe's "forests of the higher mountains" (Bull. N. C. Geol. Surv. 6 : 219–222. *pl. 23.* 1898), and more exactly with the "chestnut slope type" described by F. W. Reed in the vicinity of Grandfather Mountain (Bull. U. S. Bureau Forestry 60 : 12–13. *pl. 3.* 1905).

† Torreya **5** : 187–194 ; Plant World **8** : 276–281. 1905.

‡ See Gray, Am. Jour. Sci. **42** : 23. 1842 ; Redfield, Bull. Torrey Club **6** : 338, 339. 1879.

§ See Gray, l. c. 17 ; Redfield, l. c. 338 ; Small & Heller, Mem. Torrey Club 3^1 : 7. 1892.

About half of these are typical southern Appalachian species. The remainder range farther north.

Some small ravines or steep coves are so filled with deep rich humus or colluvial soil that no water appears above ground in them in ordinary weather. Such places have a decidedly climax vegetation, comprising the following species:

TREES

Tilia americana
Halesia carolina
Castanea dentata
Robinia Pseudo-Acacia
Aesculus octandra
Cornus florida
Tsuga canadensis
Acer rubrum
Liriodendron Tulipifera
Nyssa sylvatica
Hicoria alba
Fagus grandifolia

SHRUBS

Calycanthus fertilis

HERBS

Eupatorium ageratoides
Cimicifuga racemosa
Dryopteris noveboracensis
Phegopteris hexagonoptera
Astilbe biternata *
Caulophyllum thalictroides
Osmunda Claytoniana
Sanguinaria canadensis
Adiantum pedatum
Dioscorea villosa
Disporum sp.
Phryma Leptostachya
Circaea lutetiana
Meibomia nudiflora
Eupatorium trifoliatum?
Arisaema triphyllum
Lappula virginiana
Scutellaria sp.
Koellia montana
Agrimonia sp.
Cynoglossum virginianum
Falcata comosa
Aster divaricatus?
Adicea pumila
Cypripedium parviflorum?
Collinsonia canadensis
Cypripedium acaule
Osmunda cinnamomea
Dryopteris intermedia?
Trillium undulatum?
Botrychium virginianum
Thalictrum dioicum?
Geranium maculatum
Aristolochia Serpentaria
Campanula americana
Urticastrum divaricatum

In this list there is only one evergreen, and that is not abundant. The scarcity of shrubs is rather surprising, but perhaps not very significant. Plants with biternate, pinnately compound, or otherwise much dissected leaves are numerous. (*Cimicifuga*, *Astilbe*, *Caulophyllum*, *Thalictrum*, and the seven ferns are good

* See Gray, Am. Jour. Sci. 42: 37–38. 1842.

examples.) Half the trees have wind-borne seeds, but among the herbs a large proportion have berries or burs, adapted to be carried off by animals, as is the case in many climax forests.

About 15 per cent. of the angiosperms are monocotyledons. The total absence of the Ericaceae and their allies is significant. The polypetalous families are well represented here, as in many other parts of the north temperate zone where climax vegetation prevails (the Tennessee valley of Alabama for instance).

Only about 10 per cent. of these species can be regarded as typical or characteristic mountain plants. Most of them are common to all parts of temperate eastern North America where there are climax forests. There is an especially striking resemblance between this list and that for certain shaded hillsides in the Paleozoic region of Georgia, and even the valleys at the heads of some of the bays on the northwestern shore of Long Island, particularly that of Little Neck Bay just within the limits of New York City, which I had examined about a month before I went to North Carolina. The majority of those listed here occur in somewhat similar habitats in southeastern Pennsylvania, according to Dr. Harshberger,* and nearly half extend to Southwest Georgia † and the corresponding parts of Alabama.

On the banks of the two forks of Pigeon River already mentioned, between 2,700 and 3,300 feet above sea-level, the following species were noticed:

Trees	Shrubs
Fagus grandifolia	**Rhododendron maximum**
Halesia carolina	Alnus rugosa
Quercus imbricaria	**Leucothoë Catesbaei**
Quercus alba	**Kalmia latifolia**
Tsuga canadensis	*Vitis aestivalis?*
Acer rubrum	Hamamelis virginiana
Carpinus caroliniana	*Rhus radicans*
Aesculus octandra	Ceanothus americanus
Pyrus coronaria	*Lonicera* sp.
Crataegus sp.‡	Pyrularia pubera §
Tilia heterophylla ?	
Robinia Pseudo-Acacia	

* See Bull. Torrey Club 31 : 143–148. 1904.

† See Bull. Torrey Club 31 : 15–16. 1904.

‡ Probably of the *coccinea* group. Fruit ripe August 7, 3-seeded.

§ See Gray Am. Jour. Sci. 17 : 22. 1842.

Trees (continued)	Herbs
Cornus florida	Dryopteris noveboracensis
Platanus occidentalis	Epiphegus virginiana
Magnolia acuminata	Cimicifuga racemosa
Castanea dentata	Polygonum virginianum
Quercus velutina?	Podophyllum peltatum
Acer Saccharum?	Meibomia nudiflora
Juglans nigra	Phryma Leptostachya
Fraxinus sp.	Geum canadense
Prunus serotina	*Clematis virginiana*

Here the trees outnumber the shrubs and herbs, and there are more vines than in any other habitat in the region. This preponderance of trees and vines seems to be characteristic of river banks and alluvial swamps in many other parts of the world.* Rivers as a rule are bordered by vegetation approaching the climax, but at this altitude of 3,000 feet there is still so much erosion going on that the normal succession is retarded, which probably accounts for the abundance of four evergreens.

Few if any of the species in this list can be considered as peculiarly Appalachian. Nearly all of them are common in the Piedmont region from Pennsylvania to Alabama, as well as in the Mississippi valley; and several are still more widely distributed.

In the gravelly and muddy beds of the same streams, which must be covered with water half the time, the following herbs find a congenial habitat:

Polygonum sagittatum	Rhynchospora glomerata
Impatiens biflora	Carex lurida
Juncus effusus	Scirpus polyphyllus
Hypericum mutilum	Lobelia cardinalis
Eupatorium perfoliatum	Mimulus ringens

The fact that four of these, or 40 per cent., are monocotyledons, is probably not without significance. All of them are pretty widely distributed, mostly northward.

Near Davis Gap (sometimes called Pigeon Gap), about three miles east of Waynesville, and near Balsam Gap, about seven miles southwest, are the only wet meadows which I made note of in the region under consideration. Both are about 3,300 feet

*See Ann. N. Y. Acad. Sci. 17: 67–73, 103–104. 1906.

above sea-level. The cause of the treelessness of such areas, and their relations to other habitats in the neighborhood, are unsolved — though perhaps not very difficult — problems. With the exception of *Acer rubrum* and *Salix longipes*, scattered along stream channels at Balsam Gap, the vegetation is entirely herbaceous, as follows:

Eupatorium perfoliatum	Osmunda regalis
Vernonia noveboracensis	Hypericum mutilum
Panicularia nervata	Helenium autumnale
Homalocenchrus virginicus	Oxypolis rigidior
Juncus effusus	Cyperus strigosus
Eryngium virgatum	Mimulus ringens
Scirpus sylvaticus	Galium trifidum?
Rhynchospora glomerata	Apios tuberosa
Carex lurida	Carex crinita
Linum striatum	Juncus canadensis?
Polygonum sagittatum	Gerardia purpurea?
Osmunda cinnamomea	Habenaria ciliaris

All of these are just as common outside of the mountains as they are here, if not more so. Most of them can be found in wet meadows in New England, and a still larger proportion along the head-waters of East Meadow Brook, near Hempstead, Long Island; and all range at least as far south as Middle Georgia, about 100 miles farther south and 2,500 feet lower.

All the species seem to be perennial, but none are evergreen in the ordinary sense of the word. Nearly half the angiosperms are monocotyledons. There are no Ericaceae among them.

The weeds of the mountain region are found principally along trails and roads and in pastures and abandoned fields. They are all or nearly all herbs, and mostly dicotyledons. The following list is doubtless very incomplete. The species are arranged approximately in order of abundance, as usual.

Juncus tenuis *	Chrysanthemum Leucanthemum
Prunella vulgaris	Achillea Millefolium
Potentilla canadensis	Veronica officinalis *
Rumex Acetosella	Polygonum Hydropiper
Lobelia inflata	Trifolium repens
Verbascum Thapsus	Oxalis stricta?

* See Gray, Am. Jour. Sci. **42**: 41. 1842.

Verbena urticaefolia
Carduus lanceolatus
Polygonum pennsylvanicum
Fragaria virginiana
Pteris aquilina
Plantago major
Solanum carolinense
Diodia teres
Cerastium vulgatum ?
Agrimonia sp.
Hedeoma pulegioides
Potentilla monspeliensis
Erigeron ramosus
Daucus Carota
Ambrosia artemisiifolia
Plantago lanceolata
Lepidium virginicum
Polygonum aviculare
Bidens bipinnata
Lespedeza striata †
Euphorbia corollata
Anthemis Cotula
Euphorbia maculata
Erechthites hieracifolia
Leptilon canadense
Trifolium pratense
Gnaphalium purpureum
Acalypha gracilens
Oenothera biennis
Gnaphalium polycephalum
Euphorbia Preslii

Of these weeds about 28 per cent. are supposed to have been introduced from Europe and 2 per cent. from Asia, while the remaining 70 per cent. are considered indigenous by nearly all systematists. And yet all the supposed natives, with five or six exceptions, are confined to unnatural habitats, exactly like the introduced species, from which there is no possible way of distinguishing them without the use of botanical literature, such as a manual, and even that is not infallible. At least half, perhaps two thirds, of the species in the above list evidently belong to that class of native weeds (mutants ?) which I discussed just before going to North Carolina.‡

College Point, New York

MAGNOLIA AT FLORISSANT §

By T. D. A. Cockerell

The Miocene flora of Florissant, Colorado, includes so many genera living today in the southeastern states, that the apparent absence of *Magnolia* has seemed remarkable. During the past summer, however, a leaf which may I think be referred to this

* See Gray, Am. Jour. Sci. 42 : 27. 1842.

† See Gattinger, Fl. Tenn., 107. 1901.

‡ Bull. Torrey Club 35 : 347–360. July, 1908.

§ Illustrated with the aid of the Catherine McManes fund.

genus with confidence, has been found by Mr. Terry Duce, and is herewith recorded.

Magnolia florissanticola n. sp.

Leaf apparently thick, shaped as in *M. grandiflora;* apex lacking, but length apparently about 130 mm.; broadest about 42 mm., from base; base broad-cuneate, slightly inequilateral,

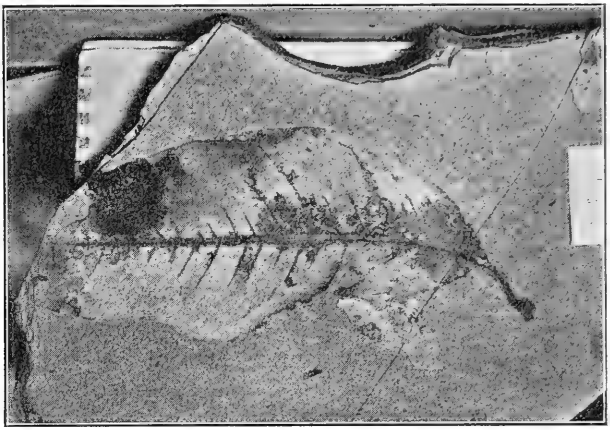

FIGURE I. *Magnolia florissanticola;* Miocene shales of Florissant.

from a very stout (3 mm. diam.) twisted petiole, which is about 16 mm. long, arising from a clasping base; width of blade about 50 mm., tapering apically, so that at 80 mm. from base the width is 38 mm.; margin entire; venation as in *M. grandiflora,* the strong lateral veins averaging about 5 mm. apart. Miocene shales of Florissant. (*Terry Duce.*)

REVIEWS

Spalding's Distribution and Movements of Desert Plants*

The author has divided his problem into seven divisions, under as many headings. Five of these appertain to various phases of his problem, the last two are mainly recapitulative.

Tumamoc Hill and its environs, near the desert botanical laboratory, Tucson, Arizona, was the place chosen where "prolonged observational and experimental work could be undertaken." The first section of the paper (pp. 5–27. *pl. 1–12*) is taken up with a clear and logical account of the plant associations and habitats as they have appealed to the author. Appended to this is an account of the lichens of the region, written by Dr. Bruce Fink.

Leaving the section on plant associations and habitats which, though valuable, is necessarily becoming more and more stereotypic in each succeeding ecological paper, we come to the most interesting part of the whole work. In this second chapter (pp. 29–66. *pl. 13–24*), the author gives an account of the local distribution. He writes: "Dealing more in detail with constituent species of the associations, the attempt to trace cause and effect is carried a step farther. Certain species have been carefully mapped and their habits have been more thoroughly studied with reference to differences of soil and aspect."

The species selected for this study are plants "with a remarkable definiteness of habitat preference"; they are *Encelia farinosa, Larrea tridentata, Cereus* (why not *Carnegiea?*) *giganteus, Cercidium Torreyanum*, and *Prosopis velutina*. A distribution-map for each of these species is included, and they form a series of invaluable notes. Each map is practically a graphic census of the individuals of the species under discussion. Nothing could have been found to indicate so well the relative density of these plants. The various soil formations are critically studied, and following as they do the various distribution-maps mentioned above, they are at least a suggestion of the factors the author credits with the

*Spalding, V. M. Distribution and Movements of Desert Plants. Pp. 1–144. *pl. 1–31*. 22 Oct. 1909. Carnegie Institution of Washington, Publication No. 113.

control of the distribution of these plants. Other regulative factors, such as temperature, rainfall, humidity, etc., all carefully measured, come in for their share of attention.

Still under the general heading of local distribution are sections devoted to dispersal, invasion, competition, and succession, in which the author attempts to trace some of the other factors bearing on the distribution of the plants in the area studied. A section on the root system of *Cereus giganteus* is here introduced by Dr. W. A. Cannon.

Space forbids an account of the chapter on environmental and historical factors. There are included within it sections on the geology and soils of the region written by C. F. Tolman and B. E. Livingston respectively.

Chapter four is taken up with the vegetation groups of the desert laboratory domain and is contributed by Professor J. J. Thornber. It contains lists of the plants growing on the various major formations found in the area, and also considerable statistical matter.

The chapter on the origin of desert floras is contributed by Dr. D. T. MacDougal. This brings into co-relation much of what has been treated specifically in earlier parts of the work. Some of this section has already seen the light in the *Plant World* for September, 1908.

Dr. Spalding has collected and put on permanent record a mass of very interesting and essential facts dealing with the subject in hand. Throughout there is a creditable hesitancy in drawing conclusions, some of which might have been warranted in view of the wealth of detail. The statistical and graphic part of the work is splendid ; and work like this and that done by Jennings and others will undoubtedly serve as the bases of numerous ecologic palimpsests.

The illustrations and typography are all that could be desired.

NORMAN TAYLOR

PROCEEDINGS OF THE CLUB

January 26, 1910

The Club met at the Museum of the New York Botanical Garden at 3:30 P. M., with Vice-president Barnhart in the chair. Twenty-five persons were present. After the reading and approval of the minutes of January 11, the resignation of Dr. Cyrus A. King, 661 Flatbush Ave., Brooklyn was read and accepted.

The chairman of the field committee reported that 25 meetings were advertised during the season, of which 23 were held. The total attendance at these meetings for the year was 92.

The expenses incurred by the committee for printing and mailing the circulars has been considerable, and it was suggested that future notices which cannot be printed in the Academy Bulletin be printed in Torreya.

Collections made for the Club herbarium aggregrated during the season 2,400 specimens; 1,750 of which were collected by the committee and about 500 specimens were secured by Mr. G. V. Nash in northwestern New Jersey and adjacent Pennsylvania. Material has been received also from other members.

The following committees of the Torrey Botanical Club were appointed by the president for the year 1910:

Finance Committee: Eugene P. Bicknell (chairman) and H. M. Richards.

Committee on Admission: J. K. Small (chairman), G. V. Nash, and C. C. Curtis.

Program Committee: Fred J. Seaver (chairman), Tracy E. Hazen, Jean Broadhurst, Charles L. Pollard, and E. G. Britton.

Field Committee: Norman Taylor (chairman), E. B. Southwick, and Wm. Mansfield.

Committee on Local Flora: N. L. Britton, chairman; Phanerogams—N. L. Britton, C. C. Curtis, Eugene P. Bicknell, K. K. Mackenzie, E. S. Burgess, and E. L. Morris; Cryptogams—Wm. A. Murrill, E. G. Britton, Tracy E. Hazen, M. A. Howe, and Philip Dowell.

Committee to consider the subject of revision of the by-laws: Edward S. Burgess, John Hendley Barnhart, Percy Wilson, Marshall Avery Howe, William Mansfield, Jean Broadhurst, Philip Dowell, Alex. W. Evans, Tracy E. Hazen, William Alphonso Murrill, Charles Louis Pollard, Herbert M. Richards, Addison Brown, Fred J. Seaver, Norman Taylor, and N. L. Britton.

As a special committee for securing funds to provide speakers on the second Tuesday evening of each month: Jean Broadhurst (chairman), Tracy E. Hazen, and N. L. Britton.

A letter was read from Dr. Howard J. Banker of the department of biology, DePauw University, making application for one hundred and fifty dollars from the Esther Hermann Fund to aid him in his studies on Hydnaceae. Dr. Banker proposes to visit some of the European herbaria during the coming summer for the purpose of studying type material of this family.

This communication was approved and the secretary was instructed to forward it to the Council of the New York Academy of Sciences.

The scientific program consisted of two papers, of which the following are abstracts prepared by the speakers.

"The U. S. Experiment Station at Sitka, Alaska", by Miss Jean Broadhurst:

The visit to the Experiment Station at Sitka was made as a side trip when returning from the Hawaiian Islands to the United States, and afforded many striking contrasts fully summed up in the expression "from tree ferns to glaciers." Following the inland route from Seattle, the site of one of the most pleasing American expositions, we spent twelve days on the steamer Spokane, making stops at various points of interest: fishing villages; Kasaan, a deserted Indian town with its ghostly totems; an Indian mission settlement; Muir Glacier; the Treadwell gold mine, with the famous "Glory Hole"; Juneau, the governmental center and chief city; Skagway, which was our "farthest north" for the summer; and Sitka, which despite the rise of Juneau, still holds its own with its old Russian fort and the Greek church containing the famous Sitka Madonna.

The weather was real Alaskan weather, partly cloudy and mostly rainy. The short stops did not (after the special object of the visit had been accomplished) allow trips to regions far from the beaten paths; at Skagway, *train* connections afforded a twenty-mile trip into the interior to the summit of the White Horse road; at Sitka, a walk to the Experiment Station, less than a mile from the town, revealed some interesting plants in the low ground traversed.

This station — like most of those in Alaska — is a simple unpretentious structure. Mr. Georgeson, the superintendent, lives in a large frame house near the wharf, and this house serves also as herbarium rooms and office; but the station consists of a small, frame house and two small greenhouses, with a few acres of cleared and cultivated ground. The station supports but one man beside Mr. Georgeson, Mr. De Armand, from the Kansas State Agricultural College. Labor is high — the poorest type of Indian demanding two dollars a day — and much of the actual work is therefore done by the officials, who elsewhere would be free to direct the work and plan new departures. The actual results, which at first seem disappointing, are lessened also by the great cost of preparing land — about $500 an acre; for, besides clearing and breaking new land, drainage and fertilizing are most expensive processes in the preparation of the ground. A record of 220 days with rain or snow to 95 clear days (the rest of the year being cloudy or partly cloudy) is not unusual for Sitka. This means a minimum rainfall of 80 or 90 inches a year, and gives a water-soaked soil that is difficult to plow or prepare early in the year, and too wet for most plants much of the growing season. The soil of this region — mostly volcanic ash — is poor in humus; seaweeds and fertilizers used so helpfully in other countries are of little benefit here, because they do not decay readily in the cool summers of Sitka. For, at Sitka, the greatest limitation is due, not to short summers but to the lack of heat during the growing season, the actual heat units of effective temperature (above 43° F.) being less than 1,500, while Ottawa has over 3,400 and Stockholm 2,700. The winters here are not severe; often, the ponds near the station do not freeze to allow skating. Frost along the coast may not be experienced from May 1 to October 1, or even November 1. The interior of

Alaska, with shorter warmer summers (frost sometimes in August) and colder winters (sometimes 70° below zero) boasts of fruits and grains that are impossible at Sitka. Grains often fail to mature, because the wet soil prevents timely planting; the stalks do not harden sufficiently to allow easy cutting, and the limp sodden growth is good for forage only. Potatoes never mature so the skin will not slip, and good results require that they be sprouted indoors and "set by hand with extra care." Apples ripen slowly (our fall apples do not mature at all there) and the native crab with cherry-like fruit is considered a necessary stock for grafting our less hardy varieties. The grafts "winter-kill", because the buds and the woody twig substances do not complete their development in the slow growth of the summer. To initiate the usual winter preparations the twigs are sometimes stripped of their leaves, a method which often proves successful. The native strawberries, which grow down to tide water, are being successfully crossed with cultivated varieties; and the red raspberry is forced indoors in the endeavor to secure successful hybrids with the large native salmon berry. Small plums, tiny cherries, little cranberries (chiefly *Vaccinium*), and currants are wild there. The introduced vegetables which are fairly successful are Brussels sprouts, cauliflower, kale, lettuce, parsley, onion, rhubarb, and peas. Beans do not do very well.

Kenai and Kadiak, two other government stations, are devoted chiefly to cattle-breeding and the improvement of cattle foods. Rampart and Copper Center are farther north, but farther inland; the winters are much more severe, but the shorter, warmer summers allow better results with grains and vegetables. Hay here is quoted at $200 a ton and retails at $0.20 a pound at the roadhouses.

The problems in Alaska are not the simplest in the world, and the workers there do not hope to make of it a garden spot or an agricultural center. If the investigators can add variety to the present limited food supply, or enable Alaska to become more nearly self-productive of the food required for man and his domesticated animals, they will more than justify the moderate government assistance now given them.

"The Culture Methods of Studying Plant Rusts", by Mr. F. D. Kern:

The first experiments in the culture of plant rusts were made by DeBary and Oersted in 1865. For a number of years after this many botanists were very skeptical. It was not an easy matter to believe that what had been considered separate and distinct genera of parasitic fungi could really be only different stages of one species. Through the work of a number of mycologists the study of rusts by means of cultures has been advanced with results that are now well known. The methods employed by the bacteriologist are familiar. He makes up artificial culture media of various sorts, and from a sowing of a certain kind of bacterium he obtains a crop of the same sort, if his culture is a successful one. With the rusts the story is quite a different one. They are strictly parasitic and living plants must take the place of culture media. The best success has been attained by carrying on the work under glass. Potted plants with vigorous roots and rather small tops are most desirable. The proof that different forms on unlike hosts are only stages of the same species is obtained by sowing spores taken from one host on another host and raising a crop of spores wholly unlike the ones sown. Take for example the rust of corn (*Zea Mays*). It has been found by means of cultures that the spores formed on the corn leaves in the fall cannot be made to grow upon corn again. One spring recently it was noticed that some sorrel (*Oxalis*) plants growing near a pile of rusted corn stalks were badly infected with rusts. From this observation in the field it was thought possible that the corn rusts might be associated with the *Oxalis* rust. Such proved to be the case. The spores taken from the corn will produce rust on the *Oxalis* and vice versa. There is much need for further studies and observations of this sort. The cultures are best made in a greenhouse with plants that are grown in pots. Suggestions as to relationships must, however, be obtained in the field and there is an opportunity here for much valuable work.

The auditing committee reported that the books of the treasurer had been examined and were found to be correct.

PERCY WILSON, *Secretary*

OF INTEREST TO TEACHERS

Note-Books in High School Botany

By Willard N. Clute

I think I have partially solved the problem of botanical note-books by a scheme of allowing certain pupils to answer the questions in the laboratory work by drawings, instead of written work. In buds, for instance, the question may be asked, "Do underground plants produce buds?" One pupil would hunt up some underground plants and answer "yes"; the others would make a drawing of such buds. For bud protection one would describe how buds are protected; another would make drawings to show this. All notes that cannot be answered by drawings must be in the temporary note-book, but those who draw their answers are excused from the written work of the permanent note-book. One course takes about as long as the other, but most pupils prefer the drawing; it is certainly easier for the teacher and I am inclined to think is fully as useful in teaching form and structure.

A lecture on water purification plants, one of a series in sanitary science at Columbia University, is announced for April 26.

An injunction issued by Secretary Ballinger after a personal inspection of the region has at least delayed the appropriation of the Hetch-Hetchy valley by San Francisco as a municipal water reservoir.

Cacti and desert plants for schools, gardens, and conservatories may be obtained from Mr. J. C. Blumer, Box 684, Tucson, Arizona.

A well-indexed and fully-illustrated government bulletin (No. 166) has just been written by William L. Bray on The Mistletoe Pest in the Southwest. The hosts, life history, and methods of combating the mistletoe are the main topics included in this clearly-written pamphlet of about forty pages.

A paper read by Dr. Roland M. Harper before the American Geographers at the Boston meeting of the American Association for the Advancement of Science describes a natural prairie on Long Island. The natural prairie of about fifty square miles, known locally as "Hempstead Plains," was treeless when the country was first settled; and a considerable part can still be seen in its natural condition, though it is situated in a country with about 300 inhabitants per square mile.

Secondary education in agriculture was discussed by Director A. C. True at the Association of American Agricultural Colleges and Experiment Stations (Portland, Oregon, August, 1909). It was recommended (1) that agricultural colleges give credit in their entrance requirements for agricultural subjects properly taught in the secondary schools; (2) that agricultural colleges should have a definite legal relation to the public school system; (3) that agriculture should be generally introduced into the high schools; and (4) that there should be a limited number of special state agricultural high schools.

The *Outlook* (February 5) describes fully an interesting phase of the Farmers' Coöperative Demonstration Work of the Bureau of Plant Industry which focuses upon the farmer boy. Through the coöperation of the Bureau and of the state and county school authorities, boys are led to agree to plant and care for one acre of corn each. Advice, seeds, etc. are furnished by the Bureau; the soil, usually by the boys' fathers; and prizes, by local civic organizations, private individuals, etc. Four such prizes for 1909 sent four southern boys to Washington for a week, and Secretary Wilson presented them with certificates of merit. Last year there were 12,000 boys in the corn clubs under Dr. Knapp's care, and the Bureau estimated that these clubs will register over 35,000 boys next year.

In the recent report of Professor Willis L. Moore, chief of the Weather Bureau, the relation of forests and rainfall is discussed and the statement is made that one is entirely independent of the other. It is said that his opinion is shared by Professor Cleveland Abbe, the first weather forecaster of the federal government and Professor W. J. Humphreys, of Johns Hopkins University, and practically all meteorologists who have taken the trouble to look into the matter. The claim is made that drouths and excessive rain, as well as prolonged departures from the normal temperatures of a region, are due to eccentricities in the distribution of atmospheric pressure; these eccentricities of air pressure are traced back to the interchange of atmosphere between the equatorial and polar regions, the routes and intensity of the great currents undergoing more or less modification from time to time. These arguments lead Professor Moore to say that the causes of climatic change are general, not local; and he vigorously attacks the widely-accepted statement that removal of forests can diminish the rainfall. The instances on record of lessened precipitation after a particular area has been cleared he regards as mere coincidences, which will be proven to show no forest connection if observatian is continued for a sufficiently long period. No other meteorological phenomenon, it is said, is so variable as rainfall, and any one who studies the figures for too short an interval is likely to be deceived.

Botanists, however, will not accept readily this coincidence theory and a lively discussion will doubtless follow the publication of this report.

NEWS ITEMS

Dr. Carlton C. Curtis has been advanced from assistant professor to associate professor of botany and Dr. Tracy E. Hazen from instructor to assistant professor of botany in Columbia University.

Professor Charles Fay Wheeler, expert in charge of the economic gardens, Bureau of Plant Industry, United States Department of Agriculture, since 1902, died March 5. Professor Wheeler was formerly instructor in the Michigan Agricultural College, and consulting botanist for the Michigan Experiment Station.

George Plumer Burns, director of the Botanical Garden and junior professor of botany in the University of Michigan, has accepted an appointment as professor of botany in the University of Vermont. He was graduated from the Illinois State Normal School, 1891; B.S. and A.M. Ohio Wesleyan University, 1898; Ph.D. University of Munich, 1900. In 1907–8 he was instructor in botany in Ohio Wesleyan, then after two years of work with Goebel, went, in January, 1901, to the University of Michigan, where he has since remained.

Charles Reid Barnes, professor of plant physiology in the University of Chicago since 1898, died on February 24, in the fifty-second year of his age, as a result of a fall upon an icy sidewalk, which brought on a cerebral hemorrhage. He was instructor and professor in natural science lines in Purdue University from 1880 to 1887, and from 1887 to 1898 was professor of botany in the University of Wisconsin. His two best known works are perhaps his "Analytic Keys to the Genera and Species of North American Mosses" (revised by F. D. Heald, 1897), and "Outlines of Plant Life" (1900). He was the author also of scholarly papers relating to plant physiology and of many critical reviews. Professor Barnes had been a co-editor of the *Botanical Gazette* since 1883. He was president of the Botanical Society of America in 1903 and was a prominent and active member of the American Association for the Advancement of Science.

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Meetings the second Tuesday and last Wednesday of each month alternately at the American Museum of Natural History and the New York Botanical Garden

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EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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A PLANT-CASE FOR THE CONTROL OF RELATIVE HUMIDITY

By W. T. Bovie

In connection with some work on the non-available water in soils the writer has devised a plant-case in which plants can be grown under conditions of constant humidity. The apparatus has given excellent satisfaction, not only in its efficiency for controlling humidity, but also because it has made it possible to determine, within a reasonable degree of accuracy, the time of death of the plants. This is a necessity in non-available water determinations. The relative humidity is controlled by forcing a current of dried air into the plant-case by means of an air pump, at a rate necessary to balance the moisture given off by the plants. It is often desirable to control humidity conditions when working with plants; and as far as known to the writer the only published description of a humidity balance is that of a case devised by Gregaire and Hendrick.* This publication has not been accessible to me.

The plant-case is a cubical box, two feet on a side. The top and four sides are made of plate glass, one-fourth of an inch thick. Any kind of glass will do provided it be free from irregularities which might refract the light-rays, like a lens.

The frame of the case is made of wooden pieces fitted together with screws, and so arranged as to hold the glass sides as a window pane is held in its sash. All of the glass is set in asphalt. Asphalt is also used to close the joints where the several pieces of the frame are fastened together. The front of the case contains a door, which is held, by means of twelve

* Reported by A. Petermann (Bul. Inst. Chim. et Bact. Gembloux, 70: 22–3. 1901). See Exp. Sta. Rec. 13: 1018. 1901–02.

[No. 3, Vol. 10, of Torreya, comprising pages 52–76, was issued March 31, 1910.]

bolts, in practically air-tight contact with its bed, which is cut into the case frame. The bottom of the case is of wood, covered inside with a continuous sheet of tin.

The pump used for forcing air into the case was made by the local tinner at an expense of twenty-five cents. The cylinder of the pump is four inches long and two inches in diameter. A pump of this size will deliver, approximately, one hundred cubic centimeters of air at each stroke, and, at a rate of eighty strokes per minute, it will change the air in the plant-case every thirty minutes.

The air passes from the pump into a filter-flask, which serves as a "stuffing-box," from which it passes into the series of wash-bottles at a more uniform rate than it would if the pump were connected directly with the wash-bottles. Considerable acid is swept along by the air, from one wash-bottle to the next. This exposes much more surface of acid to the air, but necessitates the inclusion of a bottle at the end of the series to catch the acid thus carried over.

An electric fan, within the case, keeps the air well mixed. A thermograph of convenient size, a recording hygrometer, and a small hygrometer of the "Mitthof's" pattern were also kept in the case. This latter instrument is much more sensitive than the recording hygrometer, and thus indicates any temporary variations in the humidity.

The air in the case can be reduced from saturation to approximately 10 per cent. (hygrograph record) in 12 hours, even when the case is full of living plants. In these experiments the air was continually kept as dry as possible, but the humidity could have been maintained at any desired per cent. within a range limited only by the sensitiveness of the hygrometer used, had the index-arm of the hygrometer been made to open and close mercury switches, operating the circuit of the electric motor which drives the pump. The current of dry air would then have ceased when the desired humidity was reached.

As stated above, the time of death of the plants grown in the case could be determined quite closely. By holding the humidity very low all of the time, the plants dried out at once, and became

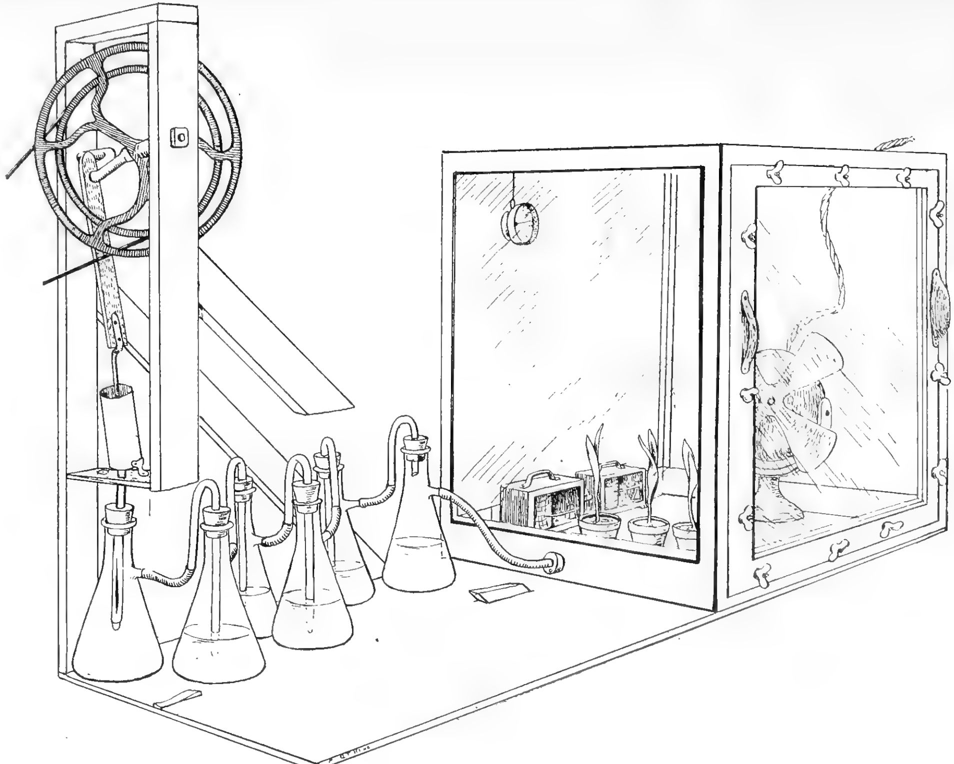

FIG. 1. Plant-case for the control of relative humidity. Description in text. (Illustrated with the aid of the Catherine McManes fund.)

practically crisp, as soon as the protoplasm died. There were no temporary recoveries to complicate the determination, as is the case when the humidity relations are fluctuating.

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LOCAL FLORA NOTES — III

By Norman Taylor

A goodly number of replies to questions asked in the first two numbers of this series have been already received. The members of the club are so evidently interested that it can be only a matter of short duration until many of the disputed or little known species are fairly well understood, so far as the local range * is concerned. Several letters and post cards containing information on the distribution of certain plants have come in, unaccompanied by specimens. Of the authenticity of these statements there is, for the most part, no question. But without a specimen deposited in the club's herbarium, where it constitutes an indisputable record, the present members of the Torrey Club can scarcely expect to silence the questionings of an incredulous posterity. Members are urged to continue their kindly coöperation so that the work may be pushed as rapidly as possible. Specimens submitted in answer to questions will be put in the club herbarium and full acknowledgment will be made.

The list continues :

Commelinaceae

1. *Commelina hirtella* Vahl. The only specimen in our collections is from near Camden, N. J. Judging from the manuals it should be found throughout southern Jersey. Has any one seen it anywhere else in New Jersey except near Camden ?

*The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows : All the state of Connecticut ; Long Island ; in New York, the counties bordering the Hudson River, up to and including Columbia and Greene, also Sullivan and Delaware counties ; all the state of New Jersey ; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

2. *Commelina nudiflora* L. While this is apparently a widely distributed plant the only specimen in the collections is from Inwood, N. Y. City. According to general works it should be found from New Jersey southward, etc. Is it found on Long Island?

Pontederiaceae

1. *Pontederia cordata lancifolia* (Muhl.) Morong. While the common pickerel-weed is exceedingly common everywhere, this lanceolate leaved form comes only from Green Pond, N. J. General works say of it "Ont. to N. J.," etc. Has it ever been found outside of this one pond in New Jersey?

2. *Heteranthera reniformis* R. & P. All the specimens in the collections are from New Jersey and Pennsylvania. The exclusion of this plant from the Hudson valley and Connecticut is obviously untrue but specimens at hand do not show its distribution outside of New Jersey and Pennsylvania.

Juncaceae

1. *Juncus gymnocarpus* Coville. Its general distribution is given thus, "In swamps, mountains of Schuylkill and Lebanon counties, Penn." The only specimen in the collections is from the former county. Is the plant localized in the hills near this region or may it be looked for elsewhere?

2. *Juncus Balticus* Willd. So far as the specimens show this plant grows only on Staten Island. With a general range of from Labrador to southern New York, is this delimitation, as shown by our specimens, reasonable?

3. *Juncus Roemerianus* Scheele. Through an early though still current error, the plant is credited to New Jersey. No specimens can be found which come from north of the Carolinas, and as an element in our local flora the plant may be ignored.

4. *Juncus maritimus* Lam. The only station in the New World for this plant is Coney Island, New York City. Years ago it was reported from New Jersey but no specimens are extant. How far from Coney Island has the plant spread, if at all? Has any one specimens from New Jersey? Staten Island?

5. *Juncus trifidus* L. The only specimen is from Sam's Point, Ulster Co., N. Y. This may well be its southerly point of distribution within our range. However, it should grow in Delaware and Greene counties, particularly in the higher mountains.

6. *Juncus dichotomus* Ell. New Jersey seems to be the exclusive possessor of this species, according to the specimens at hand. It is supposed to be found from Maine to Florida, near the coast. Does it grow on Long Island or on the coast of Connecticut? On Staten Island?

7. *Juncus aristulatus* Michx. Our representation of this species is very scanty. Princeton is the only station in New Jersey; Westchester in Pennsylvania, and Sag Harbor on Long Island. It is supposed to grow near the coast from New York to Florida. Any extension of its present apparaently limited distribution is desirable.

8. *Juncus nodosus* L. With a general range of from Nova Scotia to Virginia, our specimens are wrongly limiting this plant to a small area from Goshen, Conn., to Lake Grinell, Sussex Co., N. J. The plant is doubtless more widely distributed in our area than this, but how much more?

9. *Juncus caesariensis* Coville. Griffiths and Landisville, N. J., are the only stations represented in herbaria. Where else in Jersey is the plant found? It is supposed to grow in "Sandy Swamps of S. N. J."

10. *Juncus canadensis subcaudatus* Engel. This variety is represented by a single specimen from Red Bank, N. J. Its general distribution is from Rhode Island to Pennsylvania and Georgia. Where else, besides the Jersey station, does the plant grow?

11. *Juncoides nemorosum* (Poll.) Kuntze. So far as known this plant seems to be locally naturalized at Riverdale, New York City. Has any one a record of its being found elsewhere?

12. *Juncoides parviflorum* (Ehrh.) Coville. There are no specimens of this from the range. Judging from its general distribution it should be found on the higher mountains of the Catskills and perhaps in the Pocono region. Has it been seen in either of these localities?

Melanthaceae

1. *Tofieldia racemosa* (Walt.) B. S. P. The specimens in the collection all come from southern Jersey. How far north in the pine barrens may the plant be looked for?

2. *Helonias bullata* L. With the single exception of one specimen from near Philadelphia, Pennsylvania is apparently lacking this species. How many of the counties in eastern Pennsylvania may be expected to contain the plant?

3. *Clorosperma muscaetoxicum* (Walt.) Kuntze. The general distribution of this plant is stated to be Long Island to eastern Pennsylvania, etc. Valley Stream, L. I., is the only station so far known from the island. Do Long Island botanists know of its being anywhere else? The plant's Jersey and Pennsylvania distribution is about what general works credit it to be.

4. *Oceanorus leimanthoides* (A. Gray) Small. (*Zygadenus* of the manuals.) So far as its distribution in New Jersey is concerned the plant is well understood. One locality on Long Island, Rockville Center, has recently been discovered by Mr. Bicknell. Other stations are reported from Long Island but no specimens are in the collections representing these. What is its present distribution on the island?

5. *Melanthium virginicum* L. The plant's distribution around New York City is fairly well represented in herbaria. There are no specimens from the Hudson Valley above Yonkers and none from Connecticut. With a general distribution of from Rhode Island to New York, Florida, etc., the localization of the plant around the city is undoubtedly false.

6. *Uvularia grandiflora* J. E. Smith. This plant may confidently be expected to turn up in the higher Catskills although up to now no record is extant. The stations nearest to our range are Troy, N. Y., and Susquehanna Co., Pa. Has any one ever seen it within the range?

New York Botanical Garden

THE EUCALYPTUS TREES OF CALIFORNIA

By Jean Broadhurst

While the palms of California are at first the most novel feature of the landscape to the tourists from eastern or northeastern United States, they, because of our familiarity with that type of vegetation through pictures and the struggling specimens seen in conservatories and even in parlors and roof gardens, soon become an almost unnoted part of the general impression that means California.

The above is not true of the eucalyptus trees or "eucalypts" as they are beginning to be called — and quite sensibly, too. For those who object to the English plural of cactus would refuse to try similar five-syllabled plural for eucalyptus; and even the advocates of anglicized spelling must be relieved to learn the simpler three syllabled "eucalypts" for the plural form. The eucalypts, with the erratic and unsymmetrical branching of the tall and rapidly-growing younger trees, are as striking as young ginkgo trees, though they, too, become more symmetrical as they grow older. Irregular rows of these characteristic trees border the lanes, streets, and fields; young, blue-gray groves of them cover mistily the distant slopes. Examining them more closely the usual tourist comes away with a hazy idea that the eucalyptus tree is "very easy to tell at a distance, and very difficult to identify when seen close by. The bark scales off, like the buttonwood or sycamore, or in strips like a juniper, or it doesn't come off at all. The leaves are either blue-gray, or dull green; or both kinds may be found on one tree. The leaves are broad, rounded at the tip, and sessile like the boneset; or else they are slender, falcate, and long petioled, in which case they have a wholly different position from the broader spreading leaves of the same tree, hanging down in a limp loose-jointed way like the heavy hands of an uncomfortable raw-boned youth. The eucalypts bear curious conical flower bases or fruits which are very aromatic, or they never bear any fruit at all." And so the contradictions continue until one wonders if there is anything the eucalyptus trees may or may not have and yet be eucalyptus trees. Then, suddenly, some of the eucalyptus "literature" that floods the state comes that way, and the dazed traveler reads that "there are now growing in California over sixty species of *Eucalyptus*", and he is at once illuminated and satisfied until his next walk abroad; then the differences and likenesses become amazingly confused, and he sees that no tree is like any other tree, and yet every tree is like every other tree. Then, if he be a philosophical traveler, his satisfaction becomes merged into relief that *he* doesn't have to demonstrate the existence of one hundred and fifty possible species, and that, anyhow, he isn't going to stay long enough in California for people who guess his botanical taint to find out his weakness — at least if he tactfully leads them to discuss the merits and value of the eucalyptus and so away from the dangerous quicksand of eucalyptus teleology, which is just what this article proposes to do. For it is enough to have sixty or more species of any one family suddenly thrust upon the unsuspecting traveler, without having among them, species in which the "leaf" is so varied that a single tree may show leaves that are alternate or opposite, spreading or declined, and broadly elliptical or narrow and unsymmetrical.

The eucalyptus tree commonly called the "gum" tree was introduced into California for ornamental purposes in 1856. It is a native of Australia and the adjacent islands, and belongs to the family Myrtaceae, numbering over one hundred and fifty distinct species. The genus was first discovered by the French botanist, L'Heritier, in 1788, and was named by him *Eucalyptus*, meaning "well concealed," the name being prompted by the closely-covered and well-concealed flower buds. Baron von Mueller, a recognized authority on eucalyptus, suggested the general term "eucalypts" which is now in common use. In 1870 Elwood Cooper, of Santa Barbara, commenced large planting operations to test many species.

The Department of Agriculture (Bulletin No. 35 of the Bureau of Forestry) issued an extensive series of photographic plates as aids in identifying the species. Since then the state forester's office has issued a very comprehensive bulletin covering the trees now growing in California; and the State Agricultural Experiment Station has recently issued a detailed bulletin concerning the many species growing in the state.

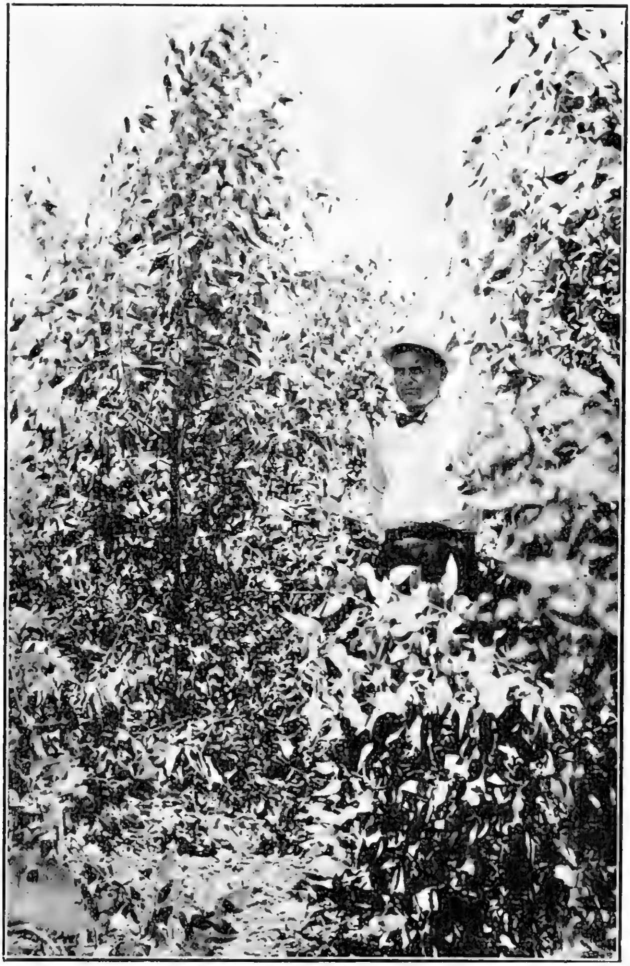

FIGURE I. A good stand of *E. tereticornis* trees, fourteen months old.*

The common species in California are *Eucalyptus botryoides*, bastard mahogany; *E. citriodora*, lemon gum; *E. corynocalyx*,

* Plate loaned by the Eucalyptus Timber Company, Los Angeles, California; the same company also furnished numerous pamphlets from which were gathered most of the data in this article.

sugar gum; *E. crebra*, narrow leafed ironbark or gray gum; *E. diversicolor*, Karri; *E. globulus*, blue gum; *E. pilularis*, blackbutt; *E. punctata*, leather jacket; *E. resinifera*, mahogany, forest mahogany, or red mahogany; *E. rostrata*, Murray red gum, red gum, mahogany; *E. tereticornis*, gray gum, Queensland blue gum, red gum, flooded gum, or bastard box; *E. microcorys*, tallowwood; and *E. viminalis*, manna gum.

Two years ago the term "commercial eucalyptus" was written in quotation marks; now it is a common term, and thousands of acres have been devoted to seedling nurseries, and to timber production.

The commercial importance of the eucalyptus is implied in the title of an article in a recent magazine * where it is ranked with the hickory. All the species produce hardwood, varying quite widely, however, in hardness. Originally the trees were regarded as suitable for forest cover, for windbreaks, for hedgerows, and for fuel. Now, there is no possible use to which wood may be put which is not claimed for one or more of the eucalypts which may be grown in a region where the wood supply has always been a distressing problem, and in a state where the beams used in the old mission churches were, it is said, carried hundreds of miles. The uses claimed by enthusiastic growers include fuel, fenceposts, corduroy roads (sixty years of service), paving blocks, railroad ties, bridge and mine timbers, telegraph and telephone poles, shipbuilding,† cooperage, furniture, house finishings and cabinet making. Handsomely finished rooms with highly polished "mahogany" furniture form part of the advertising methods of the larger eucalyptus and state-promotion organizations.

Extracting the antiseptic oil from the leaves and twigs is also profitable; that and the keeping of bees where they can feed

* Hickory's Younger Brother, by F. D. Cornell in the Sunset Magazine, March, 1909.

† "The wood is very dense, hard, close grained, and tough, and will bear a tremendous load or strain. Some species produce a wood so dense as to be practically impervious to water, and they are therefore almost proof against rot or decay, in water or out of it, in the earth or out of it; and, owing to the oils and acids in the wood some species are proof against teredos, termites, insects, and borers."

on the eucalyptus blossoms, adds materially to the income; but these are admitted to be secondary considerations. The shade value is not inconsiderable, and the forest cover it affords must render an enormous service to the whole Southwest. These last considerations do not appeal to the farmers and wood-growers any more forcibly than in the rest of the country, unfortunately; and the "literature", therefore, emphasizes the high financial profits to be gained within a few years, through the incredibly rapid growth of many of the species. Pamphlets published by the state forestry department and by private commercial corporations include the following statements: 1. "*E. globulus* trees 175 feet in height and 5 or 6 feet in diameter have been produced here (California) in from twenty-four to thirty years. The single quality, rapidity of growth, entitles the eucalypts to serious consideration, for no other species can attain like dimensions in five times this period." 2. "The average growth of a ten-year-old eucalyptus, based on exhaustive measurements, is given as eleven inches in diameter and ninety-two feet in height." 3. "Under favorable conditions trees in seedling plantations have reached a maximum development of 5 inches in diameter and 67 feet in height in four years. This represents an average of 17 feet height growth per year, though a growth of 10 to 15 feet in height yearly is the general average." 4. "In the height of the first growing season seedlings have frequently been observed to make an average height growth of 6 inches a day. The most rapid seedling growth noted was made by a tree which in nine years reached a height of 125 feet and a diameter of 36 inches." 5. The actual size of a tree from the forests of the Eucalyptus Timber Corporation, which was planted April 20, 1908, and dug up August 5, 1909, was "13½ feet in height, measured on the bole, and 13¾ inches in circumference at the base; the main tap-root had penetrated to an actual depth of 16½ feet below the surface of the soil." 6. "*E. globulus* eight to ten years old, if cut to the ground, will send up shoots that will reach a height of 75 or 100 feet, in from 6 to 8 years. The cutting may be repeated every few years for an indefinite period."

Californians are fond of quoting comparisons like the following which is based upon tree measurements made in Kentucky by Mr. John B. Atkinson:

Pine oak	will grow to	12	in. diam.	in	40 yrs.
Black locust	"	" 12	"	"	40 "
Tulip	"	" 12	"	"	50 "
Black oak	"	" 12	"	"	50 "
Black walnut	"	" 12	"	"	56 "
Texas red oak	"	" 12	"	"	58 "
Sweet gum	"	" 12	"	"	62 "
Ash	"	" 12	"	"	72 "
Hickories	"	" 12	"	"	90 "
White oak	"	" 12	"	"	100 "
EUCALYPTUS	"	" 12	"	"	10 "

The above figures, which are probably somewhat biased, suggest however that in a short period the California wood famine will cease to be an important problem. It will not help materially the greater part of the United States, of course, as the eucalypts thrive best where the temperature does not fall below 24°.

Except that the entire genus is rather intolerant of cold, and therefore is confined to those sections of the globe where favorable climatic conditions obtain, there seems to be no limit to the fitness of the eucalypts to any given soil or climatic conditions. Some thrive in swamp land; others in coastal situations or on high plateaus, hillsides, rocky lands, and even deserts. While the trees produce seeds freely, the seedlings do not "volunteer"; and the production of seedlings for commercial purposes is confined to regularly established nurseries devoted to that purpose. The trees reproduce, however, very rapidly from shoots springing from the stump of felled trees, and the second growth is much more rapid and as valuable as the first growth.

Facts like the above indicate not only large financial profits in the near future (seven to ten years) with very little outlay, for these trees need very little care after the first two years; but they also justify the optimistic claim that the "gap which is yawning between the supply which exists and the supply which will have to be provided" can be filled effectively — at least in the Southwest — if we but recognize the possible uses of the eucalypts, and that prompt action in planting quantities of the more desirable eucalypts will postpone indefinitely the "lean years" close upon us.

SHORTER NOTES

The Andropogon-Viola Uromyces. — A note has previously been published in Torreya * on the probable identity of an *Aecidium* on *Viola* and of the *Uromyces andropogonis* Tracy on *Andropogon virginicus* L. This conclusion was reached after repeated observations and inoculations had been made in the field. Proof of their identity was obtained during the spring of 1909 by inoculating violet leaves, under control conditions, with teleutospores of the *Uromyces*. Seven days after the inoculations were made, spermogonia began to show on the violet leaves, followed by mature aecidia on the fifteenth day.

In reply to a letter to Professor J. C. Arthur, concerning the nomenclature of the rust, he states that "Tracy published his *Uromyces andropogonis* in 1893, while *Caeoma* (*Aecidium*) *pedatatum* Schw. dates from 1832." This being the case, the name of the rust becomes **Uromyces pedatatus** (Schw.) n. comb.

John L. Sheldon

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A new Ponthieva from the Bahamas: **Ponthieva Brittonæ** sp. nov.

Aff. *P. racemosæ* (Walt.) Mohr, *sed in floribus minor et in racemo angustior. Radices* elongatæ, flexuosæ, villosæ. *Folia* rosulata, oblongi-lanceolata vel oblanceolata, 4–10 cm. longa, 1.5–3.5 cm. lata, acuta ad basim in petiolum sulcatum 1–2.5 cm. longum contracta. *Scapus* teres, gracilis 26.5–37 cm. altus. *Bracteæ* oblongæ, acuminatæ, acutæ. *Inflorescentia* racemosa. *Racemus*, floribus 20–35, 1–1.8 dm. longus, circa 2 cm. in diametro, laxiflorus, pubescens. *Bracteæ* inflorescentiæ oblongæ, acuminatæ, valde acutæ, circa 5 mm. longæ. *Pedicellus* cum ovario 7–9 mm. longus.† *Sepala lateralia* ovato-lanceolata, 4 mm. longa, 2 mm. lata. *Sepalum dorsale* oblongi-lanceolatum, obtusum. *Petala* lanceolata pauci-nervia, obtusa, 4.5 mm. longa. *Labellum* sub-saccatum, 4.5 mm. longum, 3-lobatum; *lobi laterales* rotundati; *lobus medius* oblongus, obtusus, 1 mm. longus, 0.5 mm. latus.

* Torreya 9: 54. 1909.

† This measurement applies to open flowers.

Ponthieva Brittonæ is very closely allied to *P. racemosa* from which it differs chiefly in its smaller flowers, slenderer raceme, and in its differently formed petals.

BAHAMAS, NEW PROVIDENCE: Maidenhead Coppice, February 7, 1905, *E. G. Britton* (no. 3297). *Type* in Hb. New York Botanical Garden; *Co-type* in Hb. Ames.

OAKES AMES

ANSWERS TO THE WISCONSIN RIDDLE. — In TORREYA for February, 1910, Mr. S. B. Parish asks for information as to certain plants referred to by Father Dablon in the Jesuit Relations as occurring on the Fox river in Wisconsin. Of course I cannot answer his query definitely but I suggest that the "kind of lime resembling that of France but having no bitter taste, not even in its rind" and which "slightly resembles the fern" may be the fruit of *Podophyllum peltatum* L. The shape and color of the fruit might suggest the lime, and the plant a remote resemblance to the brake. The identity of the second plant is more doubtful as there are so many "snake-roots", but *Polygala Senega* L., occurred to me in that connection.

J. J. DAVIS

RACINE, WISCONSIN

Dr. Roland M. Harper, referring to the "lime" mentioned in the February TORREYA says: "I read Mr. Parish's 'Wisconsin riddle' with considerable interest, for there are a good many analogous cases in the southeastern states in the writings of Bartram and other early travelers. Although I have never been within several hundred miles of Wisconsin, I think I can suggest an answer to the first part of the riddle. There are said to be some species of *Astragalus* with fleshy (perhaps edible?) fruit out that way, and as the leaves in that genus are pinnate a comparison with a fern would not be very far-fetched." With reference to *Podophyllum* Dr. Harper says: "*Podophyllum* would be a pretty good guess for that Wisconsin plant, but for the fact that in the East it is a typical shade plant, and I could hardly think of it as growing on a prairie. But of course it may behave differently in the West, for all I know."

PROCEEDINGS OF THE CLUB

February 8, 1910

This meeting was held at the American Museum of Natural History. Dr. William Mansfield occupied the chair. Seventeen people were present.

The minutes of the last meeting, January 26, were read and approved.

The special committee for securing funds for the Tuesday evening lectures made a report.

Resignations were read and accepted from Miss Nellie P. Hewins and Mrs. Jane Condit Robison. The scientific paper of the evening was by Dr. P. A. Rydberg on "Flora of the Arctic Regions."

It was well illustrated by numerous mounted specimens collected on the later Peary expeditions.

The following abstract has been prepared by Dr. Rydberg:

"The two collections exhibited were made by Dr. Goodsell in 1908–9 and by Dr. Wolf in 1905–6, partly on Greenland, partly on Ellesmere Land, and partly in Labrador. As the last-mentioned locality belongs to the subarctic rather than the arctic regions, the plants from there were merely shown, but no description of the flora was given. It contained one new species of umbellifers of which Dr. Rose of the U. S. National Museum has furnished a description.

"A general description of Greenland and Ellesmere Land was given. Greenland is an immense ice-covered plateau, rising on the east side to 10,000–11,000 feet and on the west side to 5,400 feet. Only a narrow strip along the coast and the small islands outside become bare in the summer, and here the meager flora is found. Ellesmere Land is lower. There is no continuous inland ice, although smaller icefields, snow-covered mountains, and glaciers are found.

"In accounts of the flora of Greenland and Ellesmere Land, one seldom finds any references to the altitude at which certain plants grow. There seems to be no difference between the flora at sea-level and that at an altitude of two thousand feet; the luxuriance or meagerness of the flora depends wholly on soil and water-supply.

" A comparison was made between the flora of these regions and of the Scandinavian peninsula at the same distance from the pole. At a latitude at which the hardwood forests grow in Sweden, there is found in Greenland only one tree, a small birch, *Betula odorata tortuosa;* and dwarf undershrubs are the only representatives of the woody flora at the same latitude as that in which we find pine and spruce forests in Scandinavia.

" At the Danish colonies, all south of Lat. 72°, no grains or fruit can be grown, only a few vegetables, as green cabbage, lettuce, turnips, and parsley. None of them grow as far north as Etah. The only native plants that can be used as food at this latitude are the following: the crowberry, *Empetrum nigrum*, and a blueberry, *Vaccinium uliginosum microphyllum*, of which the fruit is eaten; a stone-crop, *Rhodiola rosea*, and the mountain sorrel, *Oxyria digyna*, of which rootstock and leaves are used; and two scurvy-grasses, *Cochlearia groenlandica* and *C. fenestrata*, the foliage of which is used for food and as a remedy against scurvy.

" The woody plants of Greenland, north of Lat. 72°, consist of small undershrubs: a dwarf birch, *Betula flabellifolia;* three willows, *Salix groenlandica, S. anglorum*, and *S. herbacea;* the crowberry and blueberry, mentioned above; *Cassiope tetragona;* and *Diapensia lapponica.* A few degrees south of Etah the following are added: *Phyllodoce coerulea, Andromeda polifolia, Cassiope hypnoides, Chamaecistus procumbens, Rhododendron lapponicum*, and *Ledum decumbens*, all of the heath family. The woody vegetation of Ellesmere Land consists of two willows, the small blueberry, the crowberry, *Diapensia lapponica*, and *Cassiope tetragona.*

" The flora of northern Greenland (north of Lat. 72°) and Ellesmere Land numbers about 150 species of phanerogams. Of these not more than 100 are found as far north as Etah. Three fifths of the plants are circumpolar, more than one fifth are common to the region and Arctic America, and the remaining fifth or less are endemic plants or else plants of European origin, that is, also common to Iceland or Spitzbergen.

"Outside of the grasses, sedges, and rushes (together about 40 species), there are no monocotyledons in Ellesmere Land and only *Tofieldia palustris* in northern Greenland. The rest are dicotyledons, representing 26 families.

"Nearly all the plants are perennials. The herbs are mostly densely tufted plants with thick rootstocks; these grow in the gravel-beds and among rocks. The plants of the moister and richer soils have usually more slender and creeping rootstocks. The only annuals, as far as the speaker knew, were the two species of scurvy-grass.

"The collections made by Dr. Goodsell and by Dr. Wolf numbered together 60 species. Some of the species were duplicated by specimens from different localities. A few other Greenland and Ellesmere Land plants, not in these collections, were also exhibited in order to give a fairer idea of the flora of the region. Some species were represented also by specimens collected in the Rocky Mountains, in northern Europe, or northeastern America, to show how the same plants grow under more favorable conditions."

The meeting adjourned at 10.25 P. M.

JEAN BROADHURST,
Secretary pro tem.

FEBRUARY 23, 1910

This meeting was held in the morphological laboratory of the Museum of the New York Botanical Garden at 3:30 P. M. Seventeen persons were present. Dr. William A. Murrill presided.

Mr. Sereno Stetson, 507 West 113th Street, New York City, was nominated for membership.

The first part of the announced program consisted of an "Informal Report on a Collecting Expedition to Panama" by Dr. Marshall A. Howe. The period between December 5, 1909, and January 12, 1910, was devoted to botanical explorations in the Canal Zone and vicinity. The special object of the visit was to collect and study the marine algae of the region, but the marine algae proving rather unexpectedly infrequent, especially on the Pacific shores of the Isthmus, there was considerable opportunity for turning attention to the land flora, particularly the fungi, Hepaticæ, Musci, etc., and for securing photographs of general botanical interest. The speaker exhibited many specimens and also numerous photographs, illustrating the floral aspects of the region and details of certain selected plants. A marine flora, in the more popular sense of the word, seems to be almost non-existent in the Bay of Panama, or at least in the parts of it that were examined. There are, however, a few closely incrusting species of such genera as *Ralfsia* and *Hildenbrandtia* and of the families Squamariaceae and Corallinaceae, and there are repretatives of the Cyanophyceae and of such genera as *Enteromorpha, Chaetomorpha, Bostrychia, Caloglossa, Catenella, Lophosiphonia, Herposiphonia,* and a few other rather small and inconspicuous kinds. Not a fragment of an alga or of any marine seed-plant was found washed ashore at any part of the Bay of Panama that was examined. The cause of the paucity of marine plant life in this region is not wholly obvious, but is probably to be found in the combination of wide-ranging tides with tropical conditions as to light and heat. The scorching effect of the direct rays of the tropical sun is of course unfavorable to any luxuriant development of the algae between the tide-lines, and at and below the low-water mark the fluctuations in water-pressure and light-intensity seem here in some way to act unfavorably upon plant-life. At least, on the Atlantic or Caribbean side of the Isthmus, only fifty miles to the northward, where the conditions are apparently similar except that the tides are much lighter, there is a fairly well-developed and diversified marine flora, in striking contrast to that of the Bay of Panama. On the Pacific side, in the Bay of Panama, the tides have a maximum vertical range of from ten to nineteen feet; at Colon, on the Atlantic or Caribbean side, the range is commonly less than two feet. About three weeks were devoted to making collections at Colon and vicinity, with more satisfactory results so far as the algae were concerned. A more detailed account of the expedition appears in the *Journal of the New York Botanical Garden* for February.

The second paper on the program was by Dr. W. A. Murrill and was entitled "Collecting in Mexico." This paper, an abstract of which follows, was illustrated by numerous photographs taken by the speaker.

"The special object of the expedition to southern Mexico was to secure specimens, descriptive notes, and colored drawings of the fleshy and woody fungi. Collections were made in eight different localities, 3,300 specimens of fungi being obtained, 120 of which are represented by colored drawings.

"The first stop was made at Jalapa, at an elevation of 5,000 feet, in the moist region of the eastern slope. About a week was spent there, searching the dense virgin forests for fungi. A number of medicinal plants, such as jalap and sarsaparilla, were formerly exported from these forests in large quantities. Ferns, mosses, liverworts, and lichens are abundant in the woods and on the lava walls along the roads and in the fields.

"The next principal stop was at Cuernavaca, where we collected in the barrancas and gardens from the village of San Antonio to Chapultepec. An excursion was also made on horseback to the Tepeite Valley, on the southern side of Ajusco at an elevation of 7,000 feet. This region was moist and very rich in fungi, as well as in mosses and epiphytes.

"A short stop was made in Mexico City in order to visit the famous tree of "*la noche triste*" and the magnificent grove of ahuehuetes (*Taxodium mucronatum*) adjoining the castle of Chapultepec.

"From Mexico City, we went direct to Colima, on the western coast, a journey of 24 hours by rail. We found the climate there too dry for fleshy fungi, but obtained a number of woody species. Specimens of the interesting *candelilla*, or wax-plant, which grows in the barrancas about Colima, were obtained from Monsieur A. Le Harivel. The wax obtained from this plant is coming into use in New York City for phonographic records.

"The only considerable journey made from Colima as a base was to Tecoman and the west side of the valley of the Armeria River, where the elevation is only one or two hundred feet above sea-level. The dense tropical jungle along this river was examined for several miles and many interesting specimens obtained. On the return journey, the buried city of San Juan Teotihuacan, thirty-two miles northeast of Mexico City, was visited, together with the maguey plantations and cactus thickets so abundant in the vicinity.

"Orizaba, at 4,000 feet elevation among the mountains of the eastern slope, was our next collecting base, and here the ravines and coffee plantations yielded many interesting specimens. The weather, however, remained a little too cool for some forms of fungi, and it was decided to seek lower elevations while the rains continued. Accordingly, we went to Cordoba and from there south to Motzorongo, 800 feet above sea-level, where the conditions were ideal. Another trip was taken to Xuchiles, between Motzorongo and Cordoba, and collections were made in the coffee and banana plantations of the Rio Blanco. This whole region about Cordorba is of great botanical interest and is easily accessible by railways running in four different directions.

"A full descriptive account of this expedition, illustrated with original photographs, will be published in the *Journal of the New York Botanical Garden* for March."

Adjournment followed.

Marshall A. Howe,
Secretary pro tem.

OF INTEREST TO TEACHERS

Science Teaching

The address of Professor John Dewey, before Section L of the American Association for the Advancement of Science at Boston is reprinted in *Science* for January 28, 1910. The gap between "scientific specialists and those who are interested in science on account of its significance in life" is mentioned, and attention is called to the fact that those interested in "securing for the sciences the place that belongs to them in education feel a certain amount of disappointment at the results hitherto attained." The one great cause suggested for this failure is thought to be that science is "taught too much as an accumulation of ready-made material with which students are to be made familiar, and not enough as a method of thinking, an attitude of mind, after the pattern of which mental habits are to be transformed." Two of the most serious difficulties that confront the educator are the number of sciences and the "indefinite bulk of the material in each, making it seem as if the educational availability of science were breaking down because of its own sheer mass." In the secondary school the rival claims of (1) a little of a great many sciences, (2) a good deal of one, (3) a combination of one exact and one biological science, and (4) full option of one to three sciences from the six or more given have not helped in the solution of the main problem. Attention is called to the fact that laboratory methods do not of themselves influence the pupil or student; that one's mental attitude is not necessarily changed because he handles certain tools and materials. They are part of the ritual—and too often only that. Dr. Dewey further states that "the future of our civilization depends upon the widening spread and deepening hold of the scientific habit of mind; and that the problem of problems is therefore to discover how to mature and make effective this scientific habit."

German foresters are importing larch seeds from Montana and white pine seedings from Ontario.

Evaporation experiments made with cotton or wax spread over evaporating surfaces of saturated blotting paper (*Science*, March 18) have led Professor Wiegand of Wellesley to conclude that plants may "make use of waxy coverings when transpiration is to be retarded at all times, and hairy coverings when it is to be retarded only if exposed to strong dry winds and sunshine."

The United States government spends about two cents an acre on the national forests. Germany and Switzerland, it is said, spend one to two dollars an acre. It would seem, therefore, that the appropriations for the coming year should be increased, instead of lessened; and increased not only as a gross sum because of the larger area to be cared for this year, but increased sufficiently to give a higher sum per acre.

In the February *Journal of the New York Botanical Garden* attention is called to the danger to buildings from the dry rot (*Merulius lacrymans*). It has not "been recognized in this country as it has in Europe and builders have been allowed to use unseasoned wood to a large extent. A recent investigation in New York City by Professor I. H. Woolson, of Columbia University, brought to light an astonishing condition of affairs in a great number of wooden buildings, which may collapse as did the Gledhill factory unless speedily repaired."

A recent paper by Haven Metcalf calls attention to the fact that the chestnut disease (*Diaporthe parasitica*) "ordinarily gains entrance through wounds, of which the commonest are the tunnels produced by various bark borers. Such wounds as these are always moist, and hence favorable to the growth of any spore." This bark disease shows "no definite relation to the points of the compass, as the location of lesions is determined by the position of the wounds through which the fungus gained entrance. In small, smooth-barked trees, death may be prevented by a system of inspection and cutting out of diseased tissue, somewhat similar to that practiced with pear-blight. On large, thick-barked trees this is impracticable, as it is impossible to distinguish disease lesions under the thick bark."

NEWS ITEMS

Dr. G. Haberlandt of Graz has been appointed to the chair of botany at the University of Berlin.

Professor Alexander Agassiz, the naturalist, died of heart disease, March 27, while returning to America on the *Adriatic*.

Mrs. Eliza Caroline Bommer, widow of the botanist J. E. Bommer, died January last in Brussels. Mrs. Bommer was known chiefly for her work with ferns.

A new American institute of research, the Jewish Agricultural Experiment Station, has just been incorporated in New York. The station is to be located at the foot of Mt. Carmel, and, under the directorship of Mr. Aaron Aaronsohn, will endeavor "to put the Jewish colonists and farmers of Palestine and the neighboring colonies in a position to carry on agriculture" in a progressive manner. Laboratory privileges will be given properly accredited visitors.

Brooklyn is to have a botanic garden and arboretum. Thirty acres of grounds are now being laid out by Frederick L. Olmstead, the landscape artist, back of the Museum of the Brooklyn Institute of Arts and Sciences on Eastern Parkway. A recent endowment of $50,000 through unnamed friends of the Brooklyn Institute has made possible the establishment of the Brooklyn Botanic Garden, for the construction of which the city is pledged for $100,000. Professor C. Stuart Gager, head of the department of botany of the University of Missouri, has accepted the directorship of the Garden. The plans include large laboratories, affording opportunity for study to the pupils of the public and private schools, as well as graduate students. Professor Gager's professional experience in normal and high schools, and in several colleges and universities, including some years at the New York Botanical Garden, fit him admirably for the position of Director of the new Brooklyn Botanic Garden, which promises to contribute most helpfully to the problems of the teaching of botany.

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EDITED FOR

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BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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May, 1910

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VARIATION AMONG NON-LOBED SASSAFRAS LEAVES *

By Edwin W. Humphreys

Sassafras is for various reasons one of the most interesting of our native trees. One of the interesting features, and the one that has probably attracted the most attention to the tree, is its variously shaped leaves. That each of these leaf forms in turn shows considerable variation in its characters is apparently not so definitely known, and the limits of such variation are still less known. Yet a study of these differences is of much interest, particularly from the viewpoint of paleobotany; for most of the identifications of fossil plants are based on leaves only and naturally the limits of leaf variation are of more importance to the paleobotanist than they are to the botanist who has, in addition to the leaves, other characters on which to base his identifications. It was for the purpose of determining, in a measure, how greatly the non-lobed sassafras leaves varied among themselves that the present study, based on leaves collected at random in Bronx and Pelham Bay Parks, New York, and on the Palisades of New Jersey, was made.

The most obvious variation is in the proportion of length to breadth. At one extreme is a leaf in which the length is only one and two fifths times the breadth, making an almost circular leaf; while at the other is a leaf whose length is three and one half times the breadth, producing a very long narrow leaf. By dividing the leaves into groups based on the relation between breadth and length, the following curve was prepared (Fig. 1). It should be stated that all the curves given here are based on the same five hundred leaves. The figures along the base line

* Illustrated with the aid of the Catherine McManes fund.

[No. 4, Vol. 10, of Torreya, comprising pp. 77–100, was issued April 26, 1910.]

indicate the ratio between breadth and length adopted for each group, while the height of the curve is determined by the number of individual leaves in that group. It appears, from the curve, that the normal or common type of leaf is that which is about twice as long as it is broad. The progression from very

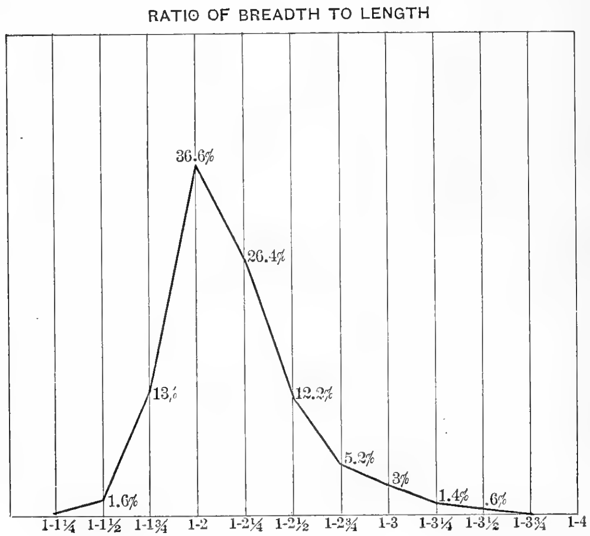


FIGURE 1.

broad leaves to the common form is very abrupt, while that toward the long narrow forms, though still abrupt, is somewhat gentler, tending to show that variants toward the long narrow types are more common, at least among the leaves measured, than are those toward the broader forms.

The shape of a leaf depends chiefly upon the relationship existing between its length and breadth, and upon the position of the broadest part of the blade. Therefore the curve expressing this relationship is to a certain extent prophetic as to what the predominant shape will be. It indicates that the ovate, obovate, oval, and elliptical leaves are likely to be in the majority. Which of these four forms will, however, predominate depends upon the position of the widest part of the leaf. The accuracy of this forecast is shown by the curve (FIG. 2). It shows that the greater number of leaves are of the shapes mentioned. And, since the widest part is for the most part near the middle, the dominant shape is oval.

SHAPES OF SASSAFRAS LEAVES

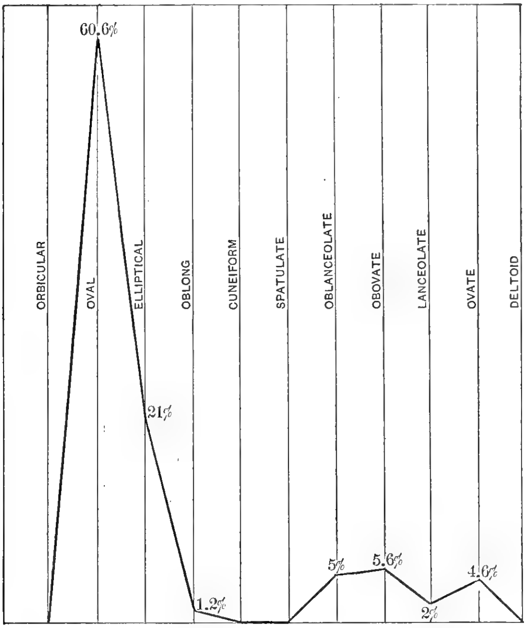


FIGURE 2.

In regard to the form of the tip there is also much variation. As most of the leaves are oval, obtuse tips might be expected to prevail. Though the curve (FIG. 3) shows that this is true, yet a surprisingly large number of other forms are shown. Some of these, for instance the emarginate, may possibly be due to wounding, but that cause can hardly be advanced for all of the variants.

On the condition of the base, sassafras leaves may be divided into two large classes. The first of these includes those leaves in which the blade begins at opposite points on the petiole; the second those in which the blade starts at points that are not opposite, one side beginning at a point either higher or lower than the other. Of the leaves here studied two hundred and seventy-six, or 55.2 per cent. were of class one, while two hundred and twenty-four, or 44.8 per cent. belonged to class two. Thus the opposite type is apparently the more common.

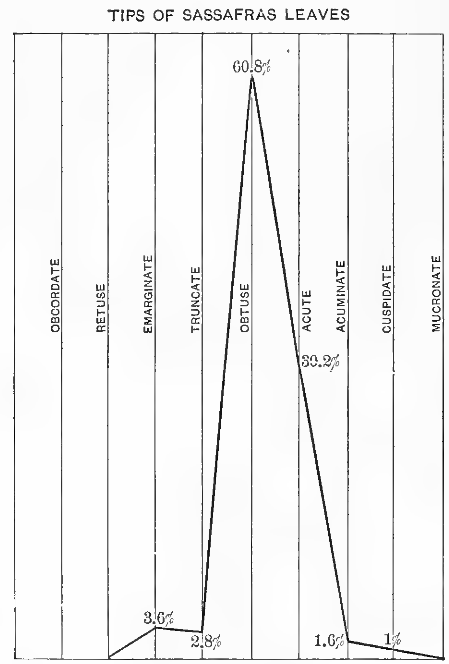


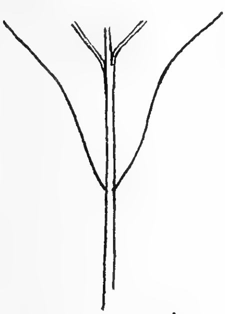
FIGURE 3.

According to the outline of the base, the leaves were divided into four classes. The first of these (FIG. 4) may be called the acute type. The second (FIG. 5) is wedge-shaped, while the third (FIG. 6) is the rounded type. The fourth class consists of mixed types. For example one side of the base of the blade may be wedge-shaped and the other may be rounded, and so on through the various possible combinations. A curve (FIG. 7) based upon these four classes shows at a glance that the acute type (FIG. 4) leads all the others.

An attempt may now be made to formulate what may be regarded as the chief characters of the most common sassafras leaves. The study just completed shows that such a leaf is about twice as long as broad, oval in outline, with an obtuse tip, the base of the blade acute and commencing at opposite points on the petiole.

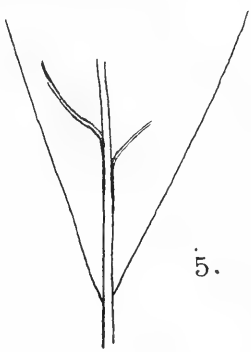
There remains now to be considered the characters of the venation. In all sassafras leaves, the midvein extends from the base as a petiole. In some bud leaves the parenchyma of the blade continues as a wing-like appendage along each side of the midvein to the point of attachment. As the leaves become older this appendage is not found, and the petiole is channeled.

Upward the midvein passes to the tip of the leaf, sometimes forming a short, sharp projection, sometimes a cusp. At times, the parenchyma extends beyond the end of the midvein, forming



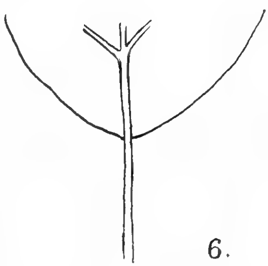
4.

FIGURE 4.
Acute type of base.



5.

FIGURE 5.
Wedge type of base.



6.

FIGURE 6.
Rounded type of base.

an emarginate tip. This is probably due to an arrestation of the growth of the midvein, while the parenchyma on either side continues to grow.

From the midvein a number of secondaries are given off. As these soon curve upward and loop into the next succeeding vein, the nervation may be described as pinnate-camptodrome. Two large secondaries always branch off from the midvein near its base. The disposition of these is not the same in all leaves. Sometimes they are opposite, while at other times they are not. Of the five hundred leaves examined 18.8 per cent. were opposite and the remaining 81.2 per cent. were not. It may be remembered in this connection that the majority of the bases of the leaf margin were opposite. From the above it may be inferred that if the position of these first, and by far the largest secondaries, affected the condition of the base, as to its being opposite or not, the greater number of leaves would not have had opposite bases, but this in the leaves examined is not so. Hence it would appear that the position of the first secondaries does not affect the base.

The secondaries arise at different angles in different leaves. The largest angle found for the lowest secondaries was 74

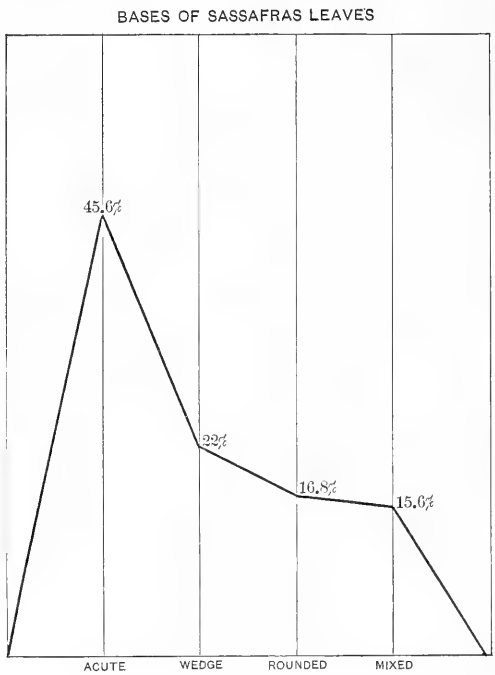


FIGURE 7.

degrees, the smallest 27 degrees. The usual angle is apparently somewhere between 40 and 50 degrees. The other and smaller secondaries likewise leave the midvein at various angles. These are, however, as a rule much larger than the angles at which the first two secondaries depart from the midvein. Sometimes the angles of departure of the smaller secondaries are as large as 90 degrees. The largest angle measured was 93 degrees. Another point in regard to the secondaries is that they are confluent with the midvein before branching off. After leaving it they branch upward in the manner described, though they sometimes fork (Fig. 8).

Besides the larger secondaries described above, there also extend from the midrib a number of smaller ones that may be classed with the tertiaries, as they usually connect with them.

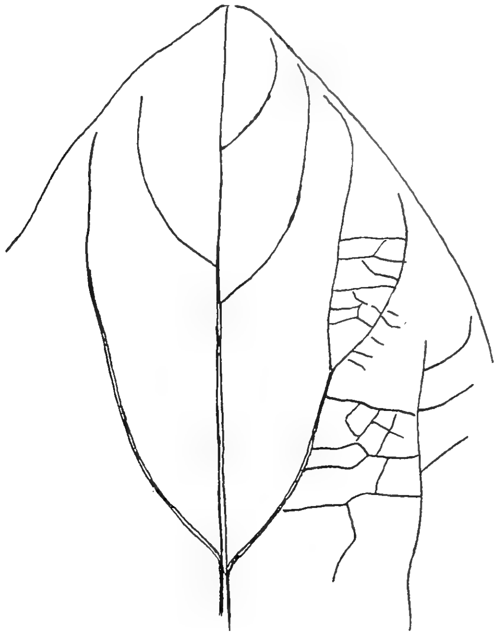


FIGURE 8. Leaf showing forked secondary.

It often happens, though, especially when there is a particularly large gap between any secondary and the one next succeeding it, that one of these smaller veins is so strongly developed that it takes the place of a larger one. They may, however, be easily distinguished from the others by the fact that they do not extend out far enough to form a part of the regular secondary system.

Connecting the secondaries with each other is a series of tertiaries which are much smaller than the veins just considered and which tend to form oblong or quadrangular areolae. Usually, they are rather uniform in size, but they often vary, particularly those projecting from the outer and lower side of the first and largest pair of secondaries. When there is a narrow margin bordering these veins, the tertiaries proceeding from them are not very strongly developed; but when this margin is wide, they are very strong. Further, when one side is wider than the other the tertiaries of the wider margin are the more strongly developed.

Joining the tertiaries are the quaternaries which also exhibit a tendency to form quadrangular areolae. These, particularly when the tertiaries are strong, may be quite marked, but as a rule they are rather weak.

The nervation may now be briefly described as pinnate and camptodrome, with the two lowest secondaries very much larger than any of the others, while the tertiaries and quaternaries tend to form quadrangular areolae.

Finally, it may be noted that the facts here presented in regard to the form and venation of the leaves studied tend to show that the practice in vogue among paleobotanists of placing more emphasis upon the venation, for purposes of identification, than upon the form, is a sound one, based upon an appreciation of the more constant characteristics of the former.

THE VITALITY OF PINE SEED IN SEROTINOUS CONES

By J. C. Blumer

It has long been observed by naturalists that the cones of the group of pines known as jack pines, and some others, often carried closed cones upon their branches for many years. As has been observed for *Pinus attenuata* by John Muir and others, this serotinous character may be a potent factor in producing the aggressive restocking of forest land that has been burned over, characteristic of several such species, a fact of importance in forestry as well as ecology.

In the southwest, this group of pines is represented by *P. chihuahuana*, and it has the same habit of carrying aged cones. One instance is on record in which a cone belonged to a node originating 16 years previous to the time it was observed, and this period may often be exceeded. Probably it has the same capacity to invade burnt areas, though this the writer has not yet observed.

In order to obtain advantage over other species in such an invasion by this means, the closed cones should preserve vital seed. In the *American Naturalist* for November, 1909, Professor W. C. Coker reviews the literature on the subject, and adds results of his experiments made in 1909 at the New York Botanical Garden. An experiment is quoted as having been made by Professor Sargent in 1879, on the germination of seed extracted from cones of *P. contorta Murrayana* from Colorado, sent him by Dr. Engelmann. Out of 74 seeds held in cones from 7 to 10 years, 15, or 20 per cent., germinated. Seeds from cones 11 and 14 years old did not germinate. The seeds may have deteriorated during the five years in which the branches bearing them lay in St. Louis. Out of 534 seeds obtained by Professor Coker in North Carolina from cones which had been persistent for periods ranging from 4 to 10 years upon *P. serotina*, 226, or 42 per cent., germinated in filter paper and moss, and 307, or 57 per cent., in soil pots. Out of 162 seeds from cones hanging on the trees for 14 years, 40 germinated by the former, and 35 by the latter method, giving percentages of 25 and 22 respectively.

If any further proof is needed that such seeds preserve their vitality for a remarkably long time, the following should furnish it. In experiments made by the writer in the Seed Laboratory of the United States Department of Agriculture in 1904,* the germinative power of seeds of lodgepole pine (*P. contorta Murrayana*) which had been preserved in cones hanging on the trees for a period of 10 to 30 years was compared with that of seeds from cones less than 10 years old. The two lots of seed were gathered by C. A. Scott at Fairplay, Colorado, in 1903, being obtained at the same place and time, and stored in the same place. It will be noted that the species and state were the same as Dr. Engelmann's. The older seeds were separated by counting back 10 internodes from the ends of the branches, and picking the

* Germination of Pine Seed, Miscellaneous, Forest Service, U. S. Dept. Agr., 1907.

cones thence backward as far as found. Out of a total number of 3,000 seeds less than 10 years old, germinated in the laboratory under varying conditions, 928, or 31 per cent., proved vital. Out of 3,000 seeds from 10 to 30 years old, 1,346, or 40 per cent., were found to have preserved their vitality. Under the most favorable laboratory conditions the younger seed germinated 57 per cent., and the older 67 per cent. Six hundred additional seeds of the same lots were tested in soil, and they gave similar results. At Halsey, Nebraska, in nursery tests made by W. H. Mast, the younger seed produced 28 per cent., the older 47 per cent. of seedlings. At Pasadena, California, also in the nursery, T. P. Lukens obtained figures almost identical; viz., 27 per cent. for the younger, 45 per cent. for the older. At Washington, the older seeds only were tested in sand flats kept outdoors in occasional freezing temperatures. The following spring the result was a crop of seedlings amounting to 64 per cent. of the number of seeds planted.

The uniformly higher figures for the older seed does not mean that the seed improved with age instead of deteriorating, but simply that it was seed of better quality and that it probably lost little, if any, of its vitality. It was noted at the time of testing that the younger seed was less well filled, and lighter in both weight and color. In cutting open 400 seeds, it was found that only 53 per cent. of this was filled, as against 73 per cent. of the old seed. The cause did not lie in the direction suggested by a case reported by G. E. Tower,* in which the same species in the same state exhibits marked differences in the time of opening its cones according to the soil on which it grows. For all the seed came from the same stand of trees on the same kind of soil. It is possible that the younger seed came from younger trees, although, as nearly as could be learned, both lots came from the same trees. If the latter is true, the most likely cause would be the unfavorable character of the seasons producing the inferior seed, which might include both weather conditions and parasitic attack. However this may be, there is no longer any doubt as to the longevity of seeds held in serotinous cones.

* Proc. Soc. Am. Foresters, IV, No. 1.

Little difference appeared in the rapidity of germination (germinative energy) of the two lots in question, the seed requiring about 8–10 weeks under the better conditions. High temperatures hastened germination, and low ones retarded it, while the final percentages were lowered by both. Alternating temperatures, with a range of 15°–35° C. (59°–95° F.) or less, simulating the daily fluctuation in nature, proved most efficient in the class of pines possessing the habit of persistence of cones. Of stationary temperatures 35° C. was found to be the best. Although of the six species tested that belong to this class of pines the northern jack pine (*P. divaricata*) is the only one that germinates equally well at low temperatures, few show a decided lowering of their record by high temperatures. The shore pine (*P. contorta*), probably from California, actually made its best record at a temperature of 20°–50° C. (68°–122° F.). If nothing more, this at least indicates that the seeds are able to withstand with little injury a rather high degree of dry heat incident to the fires that open the cones.

Adding an observation on other pine seeds it may be noted that no such deterioration appeared in *P. ponderosa* and its variety *scopulorum* in 18 months as Professor Coker finds for *P. palustris*. Two tests of the first-named pine six months old germinated 68 and 85 per cent. respectively, while four tests 18 months old produced 64, 70, 71, and 85 per cent. of sprouts. The cause for the difference may be partly a matter of storage conditions, and partly an inherent tendency of the species bred by its native climate. In other words, the perishable character of the seed of *P. palustris* may be due, wholly or in part, to the warm and humid climate where the species is indigenous.

REVIEWS.

Macdonald's Dry Farming*

This neatly-bound book with nearly forty photographs illustrating various phases and processes of farming begins with a history of dry farming, which the author claims "has been

*Macdonald, William. Dry-Farming: Its Principles and Practice. Pp. 290. Pl. 37. The Century Co., New York. 1909.

practiced since the dawn of civilization in Mesopotamia, in Egypt, and in northwestern India." Jethro Tull, who in 1731 published an "agricultural classic" on the "new horse-hoeing husbandry" is called the father of the new method, although his theory, that "tillage is manure" is not, of course, accepted now.

The book describes clearly dry farming as it is followed in various parts of the United States, with rules for successful practice, results that may be expected, and modifications in methods and results based upon the kind of soil, the depth of the water table, the size of the farm, and the climatic belt in which the farm is situated. The effects of different tools and implements used in tillage and the seasonal phases of dry-farming are also included. The book is elementary and simple enough for a high school boy, and yet wholly readable to any older person who thinks of dry-farming vaguely as a sudden and mysterious discovery of the "Golden West" which enables farmers to raise plants without water. JEAN BROADHURST

FIELD MEETINGS FOR 1910

The meetings for May are published in the Bulletin of the Academy of Sciences.

June 4.—New Rochelle, N. Y. Train leaves 129th Street and Third Avenue (N. Y., New Haven, and Hartford R. R., Harlem River branch) at 12.20 P. M. Returning trains leave at 4.00 and 5.00 P. M. Cost of trip about 25 cents. Guide, Miss Levy, who will meet the party at New Rochelle.

June 11.—West Englewood, N. J. Train leaves foot West 42nd Street (West Shore R. R.) at 1.15 P. M. A special study of swamp ferns will be conducted by the guide, Dr. Dowell, who will meet party at West Englewood. Buy return ticket. Cost of trip about 45 cents.

June 18.—Moonachie, N. J. Party will meet at the Rutherford Trolley, Hoboken, N. J., at 1.30 P. M., where they will be met by the guide, Mr. G. V. Nash.

June 25.—Springfield, L. I. A special study of the relation of insects to plants. Train leaves foot east 34th Street (Long Island R. R.) at 1.10 P. M. Returning trains leave at 4.46 and 5.45 P. M. Cost of trip about 70 cents. Guide, Dr. Southwick.

July 2–9. — The 1910 Symposium will be held in conjunction with the Philadelphia Botanical Club at Farmingdale, Monmouth Co., N. J. It will open at 8 P. M. on Saturday, July 2, with a discussion of the geological features and other points of interest at Farmingdale. Headquarters for the week will be at the American Hotel (rates two dollars a day, by the day; or ten dollars a week). Members are requested to make their own arrangements, and this should be done early as the accommodations are limited. A convenient train for the New York contingent leaves foot of Liberty Street (Central R. R. of N. J.) at 6.20 P. M. and arrives at Farmingdale in time for the opening of the symposium. Guide, Mr. Stewardson Brown.

July 16. — Great Kills, Staten Island. Buy return ticket at municipal ferry, foot of Whitehall Street, Manhatten. The guide, Dr. Hollick, will meet the party which arrives at St. George on the 9.00 A. M. boat from N. Y. Cost of trip about 40 cents.

July 23. — A study of medicinal flowers, leaves, and fruits at Moshulou, N. Y. City. Train leaves 155th Street and Eighth Avenue (Putnam Div. N. Y. Central) at 1.02 P. M. Returning trains leave at 4.37 and 5.13 P. M. Guide, Dr. Mansfield.

July 30.— Douglaston, L. I. Train leaves foot East 34th Street (Long Island R. R.) at 1.00 P. M. Returning trains leave at 4.05 and 5.00 P. M. Cost of trip about 50 cents. Guide, Mr. E. N. E. Klein.

August 6. — Special excursion for fungi to Cold Spring, L. I. Train leaves foot East 34th Street (Long Island R. R.) at 9.00 A. M. Returning trains leave at 4.49 and 6.51 P. M. Cost of trip about two dollars. Guides, Mr. Seaver and Mr. Dodge.

Members of the club are urged to verify the train times given above. In case of change it is understood that the train leaving nearest the advertised time will be the one used.

The chairman of the committee regrets that owing to unavoidable circumstances the determinations for the specimens collected on last year's field trips will have to be delayed.

The Field Committee,
NORMAN TAYLOR,
Chairman

PROCEEDINGS OF THE CLUB

March 8, 1910

The meeting was held at the American Museum of Natural History, beginning at 8.15 p. m. Mr. Charles Louis Pollard acted as temporary chairman, giving way soon to Vice-president Barnhart. Forty persons were present.

The minutes of the meeting of February 23 were read and approved.

The committee appointed to consider ways and means of increasing the influence and efficiency of the Club presented a report, which was read by its chairman, Miss Jean Broadhurst.

An application from Professor J. C. Arthur of Purdue University, Lafayette, Indiana, for a grant of $200 from the Esther Herrman Fund of the New York Academy of Sciences to further his researches upon the Uredinales was read and was ordered to be forwarded to the Council of the Academy with the endorsement of the Club.

The editor asked permission to publish as one of the Club's *Memoirs* a paper by Mr. O. Butler of Cornell University, entitled "Observations on the California vine disease". It was voted to refer the matter to the editorial board with power to act.

The secretary called the attention of members of the Club to a communication from Rev. L. H. Lighthipe, offering for sale back volumes of the *Bulletin*, *Memoirs*, and *Torreya*.

The following new members were then elected: Walter C. Cameron, 239 West 136th St., New York City; Rev. H. M. Denslow, D.D., 2 Chelsea Square, New York City; Bernard O. Dodge, 528 West 123d St., New York City; Carl A. Schwarze, 92 Stagg St., Brooklyn, N. Y.; and Sereno Stetson, 507 West 113th St., New York City.

The announced scientific program consisted of a lecture by Dr. Mel T. Cook on "Cuba: The People and Country".

The lecture was of a popular character and was illustrated by numerous lantern-slides. The speaker first showed views of the city of Havana, of its parks with their luxuriant tropical vegetation, and of the old fortifications which are being over-run by various plants, causing the disintegration of the massive walls. Among such plants *Rhytidophyllum crenulatum* is the most prominent. Attention was next directed to the suburban driveways and country roads in both winter and summer conditions and to the trees that have been planted along their sides. These plantings consist prinicipally of *Ficus religiosa*, *Ficus nitida* (which is commonly known as laurel), *Terminalia Catappa* (popularly called almond), royal poincianas, royal palms, and other well-known ornamental trees of the tropics. The palms are made use of for many purposes; they furnish shade for tobacco, and their leaves are employed for wind-breaks, in the construction of houses, in making coverings for tobacco bales, in making rain-coats, etc.

Allusion was made also to the work of the Agricultural Experiment Station at Santiago de las Vegas and to the agricultural conditions and products of various parts of the island. The speaker also showed views from thinly settled portions of Cuba, giving an idea of the scenery and the character of the indigenous vegetation.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

OF INTEREST TO TEACHERS

SOME REFLECTIONS UPON BOTANICAL EDUCATION IN AMERICA

BY W. F. GANONG

In the address with which he welcomed the American Association for the Advancement of Science to Columbia University three years ago, President Butler centered his remarks on a matter of the first scientific and educational importance. He said, in effect, that for a quarter century he had been a close and friendly observer of the progress of the sciences in education, that during this time he had seen them win almost complete recogni-

* Address of the retiring president of the Botanical Society of America, delivered at Boston, December 28, 1909. Reprinted by permission from *Science*, March 4, 1910.

tion and opportunity, but that he was obliged to confess to some disappointment at the results. He was not referring to the sciences in technical education, for in this field their status is satisfactory, but to their position in general or cultural education. He did not presume, he said, to suggest either an explanation or a remedy, but he submitted the matter to the consideration of his expert audience. These words of this eminent educational observer touched an answering chord in my own thoughts, and since that time I have found, by inquiry among my colleagues, that he voiced a feeling quite general among scientific men themselves. It seems, therefore, to be a fact that the sciences, although dealing in knowledge of matters of the greatest immediate interest, and although concerned with the most elemental of all trainings — that in the correlated use of hand, eye and mind — are still of mediocre efficiency as factors in general education. I propose now to discuss briefly the reasons I have been able to find for this undesirable condition of a part of our scientific affairs, and to suggest with particular reference to our own beloved science, some remedy therefor.

It will help to clarify our problem if we can come to an understanding upon certain points in the general relations of the sciences to education, the first being this — what place ought the sciences to have in education? I think we shall agree that the sciences can never, under any circumstances, hold a place in education nearly as prominent as that of the humanities. Man is not primarily a reasoning but a feeling being. As a philosopher has expressed it, "few men think at all and they but seldom." Hence the great majority of people in most part, and all people in some degree, can best be reached and influenced by studies which appeal primarily to the feelings, that is, by the humanities, while it is only a minority which can best be reached by studies appealing chiefly to the reason — that is, by the sciences and mathematics. But a minority has rights, and those to whom the sciences especially appeal, and to whom therefore they are of the higher cultural value, are just as entitled to efficient instruction in their subjects as are the majority in theirs. The sciences must always hold, from their nature in conjunction with that of humanity, a position quantitatively inferior to that of the humanities, but they are entitled to a qualitative equality of educational rank and opportunity. This they do not yet possess, and it is alike our duty and our interest to see that they shall.

A second point of importance in the general relations of the sciences to education is involved in the fact that the times themselves are a bit out of joint, educationally speaking. This is not a matter of individual opinion, but of well-nigh universal agreement. The recent addresses of our younger college presidents have united in expressing dissatisfaction with the results derived from our superb educational equipment, while the remarkable declaration of principles of the National Educational Association, issued a year and a half ago, recognizes an equivalent condition for the schools. It is a fact that our students as a whole have many hazy impressions but little exact knowledge, are habitually inaccurate even in the three r's and have too little regard for intellectual matters. The cause of it all is obvious enough. Our education, step by step with our modern life, has become luxurized. Its features disagreeable to young people have been sedulously softened, their whims are determinants of educational programs, and the responsibility for learning has been largely shifted from them to their teachers. The wise Mr. Dooley has the modern college president say to the incoming freshman: "What branch iv larnin' wud ye like to have studied f'r ye be our compitint profissors?" and his humor as usual illumines a central kernel of truth. The trouble with our education is this, that it needs more starch; yea, it needs a bit more blood and iron. It ignores the fact that, with the mind as with the body, it is only through effort that strength can be gained, and through responsibility that character can be formed. It is not more work our students need, but work of a kind which does more to inculcate a willingness for effort, and pride in a Spartan devotion to duty — of a kind which enkindles in the heart of youth the precious spark of intellectual ambition. I would not exaggerate the defects of our present-day education. I know they do not go to the vitals, and certainly they are more serious in some places than others. But this granted, there yet remains too great a deficiency, especially in educational morale. Our colleges are not going to the dogs, but they certainly permit some very queer mongrels to roam at large on the campus.

Now the application of these remarks to our present problem is doubtless sufficiently plain. In an educational system which too much permits inaccuracy of work, indefiniteness of knowledge, avoidance of effort, and whimsical selection of studies — in such a system the sciences, whose essence is care, exactness, persistence and consistency, have not a wholly fair chance. One of the principal reasons, therefore, why the sciences do not loom larger in present-day education is the fault of that education and not of the sciences.

A third point of importance in the educational status of the sciences is involved in the fact that they have not as yet had time to become organized and standardized for their most effective educational use. The humanities have behind them so many generations of experience that they are now measurably standardized throughout, and offer a continuous and suitably-graded training from kindergarten to college. But the sciences as laboratory-taught subjects are not much more than a single generation old, and many of their problems are still unsettled. In the higher grades our teaching is better than in the lower, while, as everybody knows, we are still far from any consistent and continuous system of instruction in nature knowledge in the lower schools. Just here lies a great weakness of scientific education at the present day, for students too often are sent into high school and college not only without the positive advantage of good early training, but even with a prejudice against a kind of activity of which they had little, or too often an unfortunate, experience. This condition is inevitable to the youthfulness, educationally, of the sciences, and will be remedied in time.

The last point I would mention in the educational relations of the sciences to the older subjects is this, that the sciences are under some minor disabilities from which the others are free. These center in the laboratory, and are connected in part with the fact that the laboratory type of study, with its mechanical manipulation, its fixed hours and methods of work, and its absolute requirement of independent observation, is distasteful to the great majority of persons, who, whether by natural inclination or acquired habits, prefer to absorb their knowledge in physical ease, by methods which can be lightened by the wits, and from printed books upon which they can lean for authority. Again, laboratories are expensive, much more expensive than the equipment of the other subjects. This acts as a check to the sciences all along the line, while in poorer communities it is often determinative against their introduction at all.

Now it may seem, at this point, that I have needlessly infringed on your patience and my own allotment of time in thus enumerating such obvious matters, but in truth I have had a good object, which is this: I wish to emphasize that all of these disabilities under which science-teaching now labors, these elements of our problem which are not our own fault and for the most part are beyond our control, and the list of which I have made as long as I could, — all of these taken together go only a very small way towards explaining the deficiency of the sciences in education. This deficiency, I believe, is for the most part our own fault and removable, and it all centers in this, that we are not teaching our subjects properly. And now I have reached the real theme of my present address.

Whenever we are faced by any large problem, we tend to seek its solution in some single great factor. Yet, as the phenomena of our own science so often illustrate, the solution is as likely to be found in the cumulative action of several small causes, and such I believe to be true of the problem before us. These causes are some four in number, of which the first appears to be this — *we are not faithful to the genius of our subject.*

The genius of science consists in exact observation of real things, critical comparison of actual results, and logical testing of the derived conclusions. The educational value of science consists in a training in these things, and our teaching should reflect them. Yet in fact in too great part it does not. For one thing we have joined in the rush to render our subjects popular, a spirit which is one of the pernicious by-products of the elective system under which most of us work. Our subjects being elective, students will not take them unless they are made attractive; our success as teachers is largely judged by the number of students we can charm into our courses; our colleagues stand ready to cry "snap" to any course which grows faster than they can see cause for; therefore the logical procedure for the teacher is to draw great numbers but keep them complaining of the work, and he is the greatest teacher under this system who can attract so many students that a new building must be provided immediately, while their lamentations over the difficulty of the course are loud enough to reach the ears of all of his colleagues! Now this condition can be attained with quantity, though not with intensity, for most students will not elect a course involving intensive work which they cannot escape, but they are willing to elect one in which the work may be eased by the wits, no matter how copious the irrigation of information may be. Just here indeed is a very fundamental trouble with our education in general. We are teaching our students to gobble when they need to be taught to fletcherize.

Another phase of our treason to the genius of science is found in the belief and practise of some teachers that broad generalizations are the true aim of elementary teaching. I know a recent elementary text-book in which the author laments that "some teachers do not yet understand the importance of imparting to beginners a general rather than a special view point." And I could cite many passages to show a belief of this and some other teachers that subject matter, accuracy in details, and other fundamental verities of science, are not important in comparison with viewpoints and outlooks on life and that sort of thing. In my opinion there can be no greater educational error. There is no training which American youth needs more than that in a power to acquire knowledge accurately and to work details well. Disregard for particulars and a tendency to easy generalities are fundamental faults in American character, and need no cultivation, but, instead, a rigorous correction.

Another phase of our disregard of the genius of science is found in the bad character of some of our elementary teaching. Our plant physiology in some cases is so erroneous that it is only the general badness of our teaching which saves us from the humiliation of having our errors pointed out by those we are trying to teach. Our elementary experiments ought to be conducted in the spirit of rigid control, just as carefully as in any investigation. The motto in the experimenting recommended by our text-books seems to be, "the easiest way that will give a result in agreement with the book," and we seem not to care whether that result is logically or only accidentally correct. In this spirit is the use of make-shift and clumsy appliances instead of accurate and convenient ones, something which is justifiable only when no better can possibly be had. Such slip-shod and inaccurate ways are not only wasteful of time and effort, but are actually pernicious because they inculcate a wrong habit and ideal of scientific work. I do not mean at all, here or anywhere, that young pupils should be made to study advanced scientific matters or to use technical methods, but simply that the treatment of their subjects according to their grades should be strictly scientific in spirit as far as it goes. Moreover, any attempt to avoid this spirit is the more unfortunate because needless, for as a matter of fact the great majority of young people respect exactness, and really like to be made to do things well. They do not like the process at first, and will avoid it if they can, but they like the result, and if the process be persisted in they come in time also to like that.

In a word the first great need of our science teaching is to make it scientific.

(*To be continued*)

This spring all teachers interested in the preservation of wild flowers ought to read The Passing of the Wild Flowers, a prize essay published by the *Journal of the New York Botanical Garden* last July. The writer, Miss Mary Perle Anderson, shows by actual tests made in the first five grades with one of the very comprehensive prohibitive signs now in use in Bronx Park that these placards are not easily comprehended by children. The conversations with various lawbreakers of all ages and nationalities are interesting and indicate clearly the general thought-less and usually selfish attitude of so many park visitors; the willfully lawless are estimated at but five to ten per cent. of the offenders.

The parts of President Taft's message most interesting to botanists deal with the control of forests, the conservation of soils, and the irrigation of arid lands. They are reprinted below:

Control of Forests: "The forest reserves of the United States, some 190,000,000 acres in extent, are under the control of the Department of Agriculture, with authority adequate to preserve them and to extend their growth, so far as that may be practicable. The importance of the maintenance of our forests cannot be exaggerated. The possibility of a scientific treatment of forests so that they shall be made to yield a large return in timber, without really reducing the supply, has been demonstrated in other countries, and we should work toward the standard set by them, as far as their methods are applicable to our conditions.

"Upward of 400,000,000 acres of forest land in this country are in private ownership, but only 3 per cent. of it is being treated scientifically and with a view to the maintenance of the forests. The part played by the forests in the equalization of the supply of water on watersheds is a matter of discussion and dispute, but the general benefit to be derived by the public from the extension of forest lands on watersheds and the promotion of the growth of trees in places that are now denuded and that once had great flourishing forests goes without saying. The control to be exercised over private owners in their treatment of the forests which they own is a matter for state and not national regulation, because there is nothing in the Constitution that authorizes the federal government to exercise any control over forests within a state, unless the forests are owned in a proprietary way by the federal government.

It has been proposed, and a bill for the purpose passed the lower House in the last Congress, that the national government appropriate a certain amount each year out of the receipts from the forestry business of the government, to institute reforestation at the sources of certain navigable streams to be selected by the Geological Survey with a view to determining the practicability of thus improving and protecting the streams for federal purposes. I think a moderate expenditure for each year for this purpose for a period of five or ten years would be of the utmost benefit in the development of our forestry system."

Conservation of Soils: "In considering the conservation of the natural resources of the country, the feature that transcends all others, including woods, waters, minerals, is the soil of the country. It is incumbent upon the government to foster by all available means the resources of the country that produce the food of the people. To this end the conservation of the soils of the country should be cared for with all means at the government's disposal. Their productive powers should have the attention of our scientists, that we may conserve the new soils, improve the old soils, drain wet soils, ditch swamp soils, levee river overflow soils, grow trees on thin soils, pasture hillside soils, rotate crops on all soils, discover methods for cropping dry land soils, find grasses and legumes for all soils, feed grains and mill feeds on the farms where they originate, that the soils from which they come may be enriched.

"A work of the utmost importance to inform and instruct the public on this chief branch of the conservation of our resources is being carried on successfully in the Department of Agriculture; but it ought not to escape public attention that state action in addition to that of the Department of Agriculture (as, for instance, in the drainage of swamp lands) is essential to the best treatment of the soils in the manner above indicated.

"The act by which, in semi-arid parts of the public domain, the area of the homestead has been enlarged from 160 to 320 acres has resulted most beneficially in the extension of "dry farming", and in the demonstration which has been made of the possibility, through a variation in the character and mode of culture, of raising substantial crops without the presence of such a supply of water as has been heretofore thought to be necessary for agriculture."

Arid Land Irrigation: "But there are millions of acres of completely arid land in the public domain which, by the establishment of reservoirs for the storing of water and the irrigation of the lands, may be made much more fruitful and productive than the best lands in a climate where the moisture comes from the clouds. Congress recognized the importance of this method of artificial distribution of water on the arid lands by the passage of the reclamation act. The proceeds of the public lands create the fund to build the works needed to store and furnish the necessary water * * * . It would appear that over thirty projects have been undertaken, and that a few of these are likely to be unsuccessful because of lack of water, or for other reasons, but generally the work which has been done has been well done, and many important engineering problems have been met and solved.'

NEWS ITEMS

At Leland Stanford George J. Pierce, associate professor of botany, has been advanced to professor.

Willis T. Pope, professor of botany in the College of Hawaii, has been appointed superintendent of public instruction for Hawaii, his position will be filled by Vaughan MacCaughey (Cornell, '08).

At the University of Missouri, assistant professor George M. Reed has been appointed assistant professor in charge of the department for the coming year. Dr. E. J. Durand of Cornell University has been appointed assistant professor of botany. The professorship in botany, made vacant by the resignation of Professor C. Stuart Gager, will not be filled for the coming year.

The illustrated public lectures at the New York Botanical Garden, which were begun in April, will continue until early in July. The coming lectures are "An Expedition to the Panama Canal Zone" by Dr. M. A. Howe, May 28; "Summer Flowers" by Dr. N. L. Britton, June 4; "The Rose and Its History" by Mr. George V. Nash, June 11; "The Native Trees of the Hudson Valley" by Mr. Norman Taylor, June 18; "The Extinct Flora of New York City and Vicinity" by Dr. Arthur Hollick, June 25; and "The Fungous Diseases of Shade Trees" by Dr. W. A. Murrill, July 2.

THE TORREY BOTANICAL CLUB

Meetings the second Tuesday and last Wednesday of each month alternately at the American Museum of Natural History and the New York Botanical Garden

PUBLICATIONS. Bulletin. Monthly, established 1870. Price $3.00 per year; single numbers 30 cents. Of former volumes only 24-36 can be supplied entire. Certain numbers of other volumes are available, and the completion of sets will be undertaken.

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

Torreya. Monthly, established 1901. Price $1.00 per year.

All business correspondence relating to the above publications should be addressed to William Mansfield, Treasurer, College of Pharmacy, 115 W. 68th St., New York City.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 36 published in 1909, contained 720 pages of text and 34 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 24–36 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–36 three dollars each.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–11 and 13 are now completed; Nos. 1 and 2 of Vol. 12 and No. 1 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

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TORREYA

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BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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THE TORREY BOTANICAL CLUB

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TORREYA

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NOTES ON THE GENUS SAMBUCUS *

By T. D. A. Cockerell

There has recently appeared † a very interesting review of the genus *Sambucus*, by Fritz Graf von Schwerin, of Wendisch-Wilmersdorf, Brandenburg. It includes the species of the whole world, discussing them from every point of view, giving maps to illustrate distribution, and numerous figures, including a beautiful colored plate of the fruits. The genus is divided into seven groups; Ebulus, Eusambucus, Heteranthe, Scyphidanthe, Botryo-Sambucus, Tetrapetalus, and Tripetalus. In the first five, the corolla is five-lobed, in the manner normal for Caprifoliaceae; but the last two have it four- and three-lobed respectively. Tetrapetalus has a single species, confined to Australia and Tasmania; while Tripetalus has also only one representative, exclusively Australian. The austral distribution of these aberrant groups has naturally suggested the idea that they are the oldest members of the genus; and this conception is illustrated in a phylogenetic tree on p. 11, where Tripetalus appears as the stem-form, and Tetrapetalus, as a lateral branch near the base. In Tripetalus the fruits are golden-yellow, and hence it might be supposed that the yellow mutations found in the northern species are atavistic. There are, however, some reasons for doubting whether the three- and four-lobed groups really are primitive. In the first place, five lobes seems to be characteristic of the whole family Caprifoliaceae, as well as related families. In the second, meristic evolution usually proceeds by reduction, and it would seem, on general principles, much easier to derive a three- or four-lobed flower from a five-lobed, than the reverse. Finally, the most

* Illustrated with the aid of the Catherine McManes fund.

† Mitt. Deutsch. Dendrolog. Gesellschaft. No. 18. 1909.

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ancient species of *Sambucus* known are in Baltic amber, of Oligocene age, and these actually have the corolla *more* than five-lobed! They are represented by beautifully preserved flowers, figured by Conwentz, *S. multiloba* having a seven-lobed, *S. succinea* a six-lobed corolla. *Sambucus succinea* Conwentz was originally described as *Ilex minor* Caspary, 1881. Conwentz changes the name because he says there is already a species *minor* among living *Sambucus*. This appears to be an error, as no such name occurs either in the work under review or the Index Kewensis; hence *S. succinea* is entitled to the name *Sambucus minor* (Caspary).

In this country, fossil *Sambucus* occurs at Florissant, in the Miocene shales. I have described one species as *S. newtoni* in Amer. Journ. Sci., 1908, p. 541. A second, very distinct by its long tapering leaflets, is represented by the very beautiful specimen figured herewith. It may be diagnosed as follows:

Sambucus amabilis n. sp.

General structure of leaf, including venation, inequilateral bases of upper lateral leaflets, and apparently texture, as in *S. neomexicana* Wooton, but leaflets much longer and more tapering, as the figure shows. The lateral leaflets are at least 100 mm. long, with a maximum breadth of 12 or 13 mm., the apex very long and tapering, quite different from *S. Newtoni.* The marginal teeth are finer than in *S. neomexicana*, being about 4 in 5 mm., instead of 2 or at most 3 as in *neomexicana*. The tapering leaflets are much more like those of *S. canadensis* in outline, but more finely toothed. The type specimen was collected at Station 14, in the Miocene shales of Florissant (*W. P. Cockerell*). As preserved, the leaf is light reddish.

One of the most interesting things in the geographical distribution of living *Sambucus* is the occurrence of a species of the Asiatic group Scyphidanthe in the mountains of German East Africa. This plant was originally described by Engler (Ann. Bot., 1904, p. 537) as *Sambucus ebulus africanus*, but it is really a form of *S. adnata*, and must be known as *Sambucus adnata africana*. By some accident, Count von Schwerin has overlooked Engler's publication.

A point to be investigated in our own flora is the southern extension of *S. melanocarpa* Gray. I have reason for thinking

FIG. 1. *Sambucus* [illegible] : Miocene shales of Florissant.

that many of the plants from Colorado so referred may rather pertain to the mut. *oinocarpa* (cf. TORREYA, 1904, p. 58) of *S. microbotrys*.

REVIEWS

Catalogue of the Flowering Plants and Ferns of Connecticut*

In the many contributions to the flora of restricted areas one, of two fundamental ideals, must color the whole tone of the work. One of these aims to present a list of all the plants which are known to grow in the area treated and to outline the local distribution of them. Such a work is subjective, a record of facts, and perhaps the only method that can safely be pursued in a preliminary treatment. At its best it is little more than a carefully prepared record of undigested and often indigestible facts.

Contrasted with this necessary but somewhat prosaic concept is the local flora which aims in some measure to *account* for the distribution of the plants in the area treated. A work of this character must digest the records of previous workers, or else begin the accumulation of new ones, and from this point onwards its aims are objective. It is not merely a record of facts but a projector of ideas. It does not confine itself to recording the occurrence of such a plant at such a place, but seeks to unfold the reason of its occurrence at that place and its non-occurrence elsewhere. That in most cases the attempt is an approximation to failure proves nothing, except the desirability of attempting a work, the failure of which postulates a vastly greater contribution to our knowledge of plants, than is conceivable in the most successful works of the old order.

It must be a matter of regret to those interested in local flora work hereabouts, that the recently issued catalog of Connecticut plants must undeniably be placed under the first of these cat-

* Catalogue of the flowering plants and ferns of Connecticut growing without cultivation. Prepared by a committee of the Connecticut Botanical Club. Published as Bull. 14. Conn. Geol. and Nat. Hist. Survey. 1–569 pp. Hartford. 1910.

egories. And it is an unwelcome surprise that a state of the historical antiquity of Connecticut, should not long ago have passed through this necessary, but confessedly preliminary, stage of the mere cataloging of plants and their known points of occurrence.

Taking the work as it is, however, and not as we had hoped it might be, it is a genuine pleasure to record its comprehensive and conservative treatment of the plants of the state. Only such plants are admitted into the list as have been seen by at least one of the members of the committee.* It is, then, certain that the plants listed in the catalog are all to be found in the state.

Much less certain are "some localities, . . . [which] rest upon the authority of collectors alone, when the species is once definitely admitted and there is no reason to doubt identity." While the present generation may be willing to accept such records, as in the majority of cases they are probably perfectly authentic, what must be the attitude of our successors in the work? If it is anything like our attitude towards the work of our predecessors, it will be a fine scepticism towards any station listed for which an accessible specimen is not extant. There is a long list of plants which the authors have excluded from the list on this reasoning, and they have even excluded some weeds of more or less fugitive character. These are all listed in a copious appendix.

From a taxonomic standpoint the work is shot through and through with the traditions of the Cambridge botanists, thus embodying the conservative and reasonable treatment of our eastern plants that is presented in the new Gray manual, so called. Any attempt to review the whole taxonomy of the work is impossible in such a short article but a few points call for comment.

In the genus *Potamogeton* the *P. bupleuroides* Fernald is admitted while the *P. perfoliatus* L. is not credited to the state. Even if one grants the specific validity of this coast segregate of Professor Fernald (which N. Am. Flora denies) what becomes of the inland forms of the *P. perfoliatus* L. as understood in the new sense? Specimens in the herbarium at New York from Litchfield are certainly true *P. perfoliatus* L.

*The gentlemen who have prepared this work are C. B. Graves, E. H. Eames, C. H. Bissell, L. Andrews, E. B. Harger, and C. Weatherby.

Under *Allium* more information would have been welcome under *A. canadense* L. Judging from our collection it is scarcely so common as to merit the remark, "Frequent." In the same family the inclusion of the genus *Hosta* is surprising, as both of the two species listed are usually only very doubtfully established escapes. Throughout the work there are many plants of this character included within the regular list. From the standpoint of the completeness of the record this is necessary, but it would have added to the general consistency of the work to have printed them in some distinguishing type, so that they might at a glance have been separated from the legitimate elements in the wild flora of the state.

The omission of *Quercus borealis* Michx. f. from the list is surprising, in view of the fact that all our best specimens of this plant come from Connecticut. It would be easy to multiply instances of this sort, but they are, for the most part, referable to differences of botanical parentage, and not therefore subjects which come within the scope of a short review. As the name of the work indicates it is a catalog and the lack of descriptions is not a very serious omission, but the introduction of keys would have almost trebled the value of the work to the general run of its users. Under most of the species there are notes on the economic or cultural uses of the plant. While these are interesting they have the tang of the book and candle rather than that of the botanically unsophisticated. And the space they take up would have been very acceptably filled with keys.

As a point of departure for future work on Connecticut this list will be a landmark and a bulwark. The care and devoted labors of the authors have been the means of making an invaluable record of the plants and their distribution. As such it is most welcome and the Connecticut Botanical Club is to be congratulated upon the completion of a book that will serve as a basis for all future work.

The appendix requires brief notice. It contains, besides a copious index, a list of corrections and additions, "Native plants not found in recent years", "Excluded species", "Fugitive species", "Statistical Summaries", and a list of botanical authors cited in the body of the work. Much of this matter requires a great amount of labor and the clearing up of many of the points still in doubt will serve as a stimulus to the club in its future studies on the flora of Connecticut.

The book is a well printed volume of 596 pages, the thickness of which makes it a trifle bulky.

Norman Taylor

PROCEEDINGS OF THE CLUB

March 30, 1910

The meeting was held in the museum building of the New York Botanical Garden, beginning at 3.30 p. m. Vice-president Barnhart occupied the chair. Seventeen persons were present.

The minutes of the meeting of March 8 were read and approved.

Professor J. C. Arthur, Dr. John Hendley Barnhart, and Professor Alexander W. Evans were elected delegates to the Third International Botanical Congress to be held in Brussels, May 14th to May 22d, 1910.

First on the announced scientific program was a discussion of "Exploration in Andros" by Dr. J. K. Small. An abstract of this follows:

"Recent exploration of the botanically little-known parts of Andros, Bahamas, carried on by the New York Botanical Garden, brought to light plants not only new to the flora of Andros itself, but also to the flora of the Bahamas. In order to carry out the plans made previously to entering the field, seven bases were selected along the eastern coast of the island, namely, Deep Creek, Smith Hill, Crow Hill, Lisbon Creek, Fresh Creek, Staniard Creek, and Nicholl's Town. The vessel was left at these points while the party, consisting of Mr. J. E. Aranha of the Surveyor General's Office of the Bahamas, Dr. J. K. Small, and Mr. J. J. Carter, together with such members of the vessel's crew as were needed, made excursions inland. Excursions were made on the one hand as far as it was possible to go on foot and on the other by a small boat to the headwaters of most of the creeks mentioned above.

"The topography of Andros is comparatively simple, and the highest altitude is probably less than one hundred feet, still there is sufficient diversity in the general make-up of the island to support six different plant formations. Of course, the coastal region represents the usual littoral flora of the tropics. Along the eastern edge of the island is a limerock backbone of a single ridge or broken into several ridges. It extends nearly the length of the island or a distance of about ninety miles. This backbone ends more or less abruptly with the shore on the eastern side. On the western side, however, the usually several undulations extend mostly one or two miles inland and gradually die off in the flat country. Behind this rock ridge is a nearly level expanse, extending to the western side of the island, which varies from about eight to forty miles in width. The rock backbone is broken south of the middle of the island by three transverse channels known as Northern, Middle, and Southern bights. These bights make the four primary divisions of Andros. A second category of islands is formed by the numerous small cays in the bights and on the barrier reef along the eastern shore, which varies from one to four miles in width. A third category of islands is formed by the network of waterways resulting from the almost innumerable branches of the eight or nine principal creeks which break through the rock ridge of the eastern shore and the numerous creeks of the western shore. The region made up of this third category of islands is called the "Swash". The backbone of the island is covered with a hardwood forest called the "coppice". The swash is divided between five distinct plant formations, namely, "coppice", which exists here in isolated patches and not continuous as it is on the rock ridge, the "scrub", the "pineyard", the "Savannah", and the "marl".

"Andros is said to comprise fully one third the land area of the Bahamas. Approximately one thousand species of flowering plants are definitely known to occur on the islands of the Bahamian archipelago. Of this number about five hundred and fifty or over fifty per cent. of the Bahamian flowering plants grow naturally on Andros. An exceptionally large percentage of the plants are native mainly because such a small area of the islands is inhabited and cultivated. Less than a half dozen species are endemic. About three hundred and fifty species out of the five hundred and fifty growing on Andros, are known to occur in Florida, and many occur also in Cuba."

The second paper on the program was on a "Trip to Santo Domingo" by Mr. Norman Taylor. An abstract of the paper prepared by the speaker follows:

"The expedition covered the easternmost part of the Dominican republic, comprising the provinces of Samana, Seibo, and Macoris. Sanchez, a town on Samana Bay, was the first stopping place and was used as a base for the exploration of the Yuna River, the large swamp to the west of the town, and the mountainous part of the country in the vicinity. The country along the north coast, which is hilly, has an abundant rainfall and maintains a rich moisture-loving vegetation, in striking contrast to the semi-xerophytic or actually desert flora of more sheltered and drier portions of the republic.

"An overland ride to the south coast furnished much valuable information as to the topographic and vegetative characteristics of the interior. In the province of Macoris, a section along the south coast, a large collection was made, with Consuelo, a sugar estate, as a base. The flora here is much the same as that seen along the north coast and the flat character of the country insures a large rainfall. Trips to La Romana, a town along the south coast, nearly at the eastern extremity of the island, netted some interesting cactuses, which seem to be the only representatives of this group that are arboreal in eastern Santo Domingo. From La Romana an excursion to Higüey, an interior town surrounded by large tracts of valuable timber, was made. An endemic *Sabal* and many interesting plants, as yet unnamed, were collected. A cruise to the island of Saona, the southeastern extremity of the larger island, resulted in the collection of *Pseudophoenix Sargentii* and many other distinctively Bahamian scrub plants. The low scrub growth here and a salt lake with a natural savanna surrounding it suggest very vividly some of the larger Bahamas."

"The expedition left New York on October 13, 1909, and returned January 2, 1910."

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

APRIL 12, 1910

The Club met at the American Museum of Natural History and was called to order by Mr. E. B. Southwick, who presided in the absence of the President and both Vice-presidents. The attendance during the evening was one hundred and one.

Mr. Ralph C. Benedict was nominated a member of the Club. The resignation of Mrs. Carolyn W. Harris was read and accepted.

The announced paper of the evening on "A Visit to the Hawaiian Islands" was then presented by Miss Winifred J. Robinson. The lecture was illustrated by over one hundred lantern slides.

Adjourned.

PERCY WILSON,
Secretary

APRIL 27, 1910

The meeting was held at the museum of the New York Botanical Garden and was called to order at 3:30 P. M. by Vice-president Barnhart. Nineteen persons were present. After the reading and approval of the minutes of the meeting for April 12, the following persons were elected members of the Club: Mr. Ralph C. Benedict, Dr. Z. L. Leonard, and Dr. Gertrude S. Burlingham. The program of the afternoon consisted of a talk by Dr. N. L. Britton on "Recent Botanical Exploration in Cuba." The island of Cuba is about 670 miles long from Cape San Antonio to Cape Maisi and 100 miles at its greatest width. In area, Cuba is about as large as the state of Pennsylvania; it has a flora consisting of over 4,000 flowering plants, nearly double that of Pennsylvania.

The topography of the island is exceedingly varied; the greater portion is a plain lying a little above sea-level. This plain is broken at numerous points by isolated peaks, hills, and mountain ranges.

The collections made by the early botanists found their way to large herbaria of the Old World and contained a number of species which have not as yet been rediscovered. Following brief remarks on the collectors who have visited Cuba since

Charles Wright's time, Dr. Britton exhibited many interesting herbarium specimens secured on the recent expedition to that island.

He also reviewed the literature relating to the Cuban flora, after which discussion followed.

Adjourned.

Percy Wilson,
Secretary

OF INTEREST TO TEACHERS

Some Reflections upon Botanical Education in America

By W. F. Ganong

In a word the first great need of our science teaching is to make it scientific.

The second of the four principal causes of our inferior teaching is this, *we take more thought for our subject than we do of our students*. In the graduate teaching of a university this attitude is logical, but in college and school it is wholly wrong. I think we may express the matter thus, that any teacher who is more interested in his subject than in his students is fit only for a university. It is, I am sure, somewhat more characteristic of scientific than of other teachers that they tend to shut themselves up in their subjects, and to withdraw more than they ought from the common interests, duties and even amenities of the communities in which they live. For this, of course, the very attractiveness of science is largely responsible, because to those who have once passed the portals, science offers an interest so vastly and profoundly absorbing that all other matters appear small by comparison; and we are apt to conclude that the nobility and beneficence of such a mistress are sufficient justification for a complete immersion in her service. We forget that science has no existence apart from humanity, and no meaning unless contributory, however indirectly, to human welfare and happiness. And it should be emphasized to every young teacher that success in science teaching, as in so many other occupations, is well-nigh in direct proportion to one's ability to influence people. Our science teaching would be better if our teachers trusted less to the abounding merits of their subjects, and more to the qualities which personally influence young people — the sympathetic qualities involving interest in their pursuits, the diplomatic qualities involving the utilization for good purposes of the peculiarities of human nature, the perfecting qualities involving the amenities and even the graces of life. There is no inconsistency between these things and the preservation of the scientific quality of the teaching. It is simply a question of the presentation of science in a manner which is humanistic. It is the gloving of the iron hand of the scientific method by the soft velvet of gentle human intercourse. Science is the skeleton of knowledge, but it need lose nothing of its strength and flexibility if clothed by a living mantle of the human graces. It is idealism with realism which is demanded of the science teacher, and if some one would rise to say that this union is logically impossible I would answer, that many a problem of this life unsolvable by the subtleties of logic can be settled by robust common sense.

Of our over-neglect of the personal peculiarities of our students I know several illustrations, but have space only for one. Young people appear to have in them some measure of Nägeli's innate perfecting principle, which leads them upon the whole to respect and like those things which are good and clean and dignified, a feeling which manifests itself in their strivings after good clothes, good society and things supposedly artistic, not to mention innumerable longings after the lofty unattainable. Now a dirty or carelessly-managed laboratory is a direct shock to this feeling, and most scientific laboratories sin in these features. I believe there is no part of a college or school equipment which ought to be prepared and managed with more care than a scientific laboratory. Efficiency for its purpose is of course the first requisite of any laboratory, but in college or high school that efficiency should be secured with attention to the utmost of pleasing effect, in the direction of a large simplicity, evidence of care for each feature, and an atmosphere of spacious and even artistic deliberation. As an example of what can be done by good taste to give a pleasing setting to the most unpromising objects, I commend the New

York Zoological Park, which embodies an idea much needed in most of our botanical institutions. We ought not to permit the accumulation of dusty and disused articles around laboratories any more than around libraries; our teaching museums should contain no crowded accumulations of half-spoiled specimens in leaky green bottles, but only a selection of the most important, and those in the best of receptacles well labeled and tastefully displayed. Our experiments with plants should not exhibit dirty pots on untidy tables, but every plant should present an aspect suggestive of considerate care, while all the surrounding appliances should glitter with cleanness and stand on a spotless table widely enmargined with space and neatness. One of my friends in a neighboring college has said of the methods of my laboratory that they savor of the old maid. I take pride in this compliment, for it shows I am advancing. All of these qualities of care, neatness, concentration upon a few large and worthy things, can be made to appeal greatly to youth, as I have learned from experience. Besides, they are scientific, and they are right.

There is yet one other phase of this subject of humanism in science teaching which I wish to emphasize. I think we do not make enough use in our teaching of the heroic and dramatic phases of our science, of the biography of our great men and the striking incidents of our scientific history. I know that their use is attended with dangers, dangers of false sentimentalism, of substitution of weak imagery for strong fact, of complication with religious prejudices; and they should therefore be introduced only as the teacher grows wiser. But when the tactful teacher can employ them to touch the higher emotions of his students, he should do so. The imagination is as necessary a part of the equipment of the man of science as of the man of letters or of art, a matter which has been illuminated with all his usual skill by President Eliot in his great address on the new definition of the cultivated man. When Darwin wrote his famous passage on the loss of his esthetic faculties he was a little unfair to his science and a good deal unfair to himself. For he never mentioned the compensation he had found in the intensity of lofty pleasure derived from his acquisition of new truth. Science hath her exaltations no less than poetry, music, art or religion. Not only is the feeling of elation which comes to the scientific investigator with the dawning of new truth just as keen, just as lofty just as uplifting as that given by any poetry, any music, any art, any religous fervor, but they are, in my opinion, the same in kind. There is but one music heard by the spirit, and that is in us, whether it seem to come from the spheres, from the lyres of the muses, or from the voices of angels, and it gives forth when the last supremest chord in the soul of man is touched, it matters not by what hand.

We come now to the third of the causes which make our teaching of science defective, and it is this — *we put our trust too much in systems and not enough in persons.* And of this there are many evidences. For one thing we rely too much on a supposed virtue in buildings and equipment, though in this we but share the spirit of our machinery-mad day and generation. It is much easier for us Americans to obtain great laboratories and fine equipment than to make good use of them afterwards, and nowhere among us do I see any signs of a Spartan pride in attaining great results with a meager equipment. Moreover, we make a deficiency of equipment an excuse for doing nothing. As one of the most brilliant of American botanists once said, some persons think they can do nothing in the laboratory unless provided with an array of staining fluids which would make the rainbow blush for its poverty. A second evidence of our confidence in systems is found in the easy insouciance with which university professors proceed to write text-books for high schools. The only qualification the most of them have therefor is a knowledge of their subject, and they seem to regard any personal acquaintance with the peculiarities of young people, and with the special conditions of high school work, as comparatively negligible. In consequence these books are necessarily addressed to some kind of idealized student, usually a bright-eyed individual thirsting for knowledge. This kind does exist, but in minority, whereas the real student with which the high school must deal is one of a great mass willing to learn if it must. Confirmation of the correctness of my view that knowledge of students is as important as knowledge of subject for the writing of a high school book is found in the fact that the author of the botanical text-books most widely used in the high schools of this country has had only a high school experience. Another phase of our belief in the sufficiency of systems is found in the utterly unpractical character of many of the exercises or experiments proposed for the student in some of our books. These recommendations have obviously been worked out in the comfort of the study chair, and have never been actually tested in use by their suggestors; yet they are presented in a way to make the student feel that he is either negligent or stupid if he fails to work them. These theoretically constructed schemes for elementary teaching, and these recommendations of untried and impracticable tasks for students, sometimes run riot in company with sweeping denunciations of our present laboratory courses, and suggestions for their replacement by hypothetical field courses, utterly regardless of the fact that the former, whatever their faults, have been evolved in actual administrative adaptation to the real conditions of elementary work, while the proposed substitutes are wholly untried, and in the light of actual conditions, wholly impracticable.

On the other hand, there is one particular in which we have not system enough, and that is in the standardization of nature study and elementary science courses. I have already mentioned the advantage the humanities have in the approximate standardization of their instruction throughout the educational system, and towards this end for the sciences we ought to bend every effort. For one thing we should give all possible aid and comfort to our nature-study experts in their efforts to develop a worthy system of nature study in the grades. Again, the peculiar relation of preparatory schools to colleges in this country makes it imperative that we develop standard elementary courses which any school can give with assurance that they will be accepted for entrance to any college. Happily we are here upon firm ground, for we already possess such a standard course, or unit, in that formulated by a committee of botanical teachers, now the committee on education of this society. This course is formulated upon the synthetic principle, that is, it selects the most fundamental and illuminating matters offered by the science without regard to its artificial divisions, and combines these in such manner as to make them throw most light upon one another. Its adaptability to our conditions, and its acceptability to our best educational opinion, is shown by several facts, by its adoption as the unit by the college entrance examination board which has been holding examinations upon it all over the country for six years past, by its use in innumerable high schools, by the agreement between its plan and that of all of the recent and successful text-books, by the final disappearance of all influential opposition to it, and lastly by the substantial concurrence of the unit now in formulation by the teachers of the middle west. With so firm a foundation in a plan we ought to be able to unite on perfecting details. There is no inconsistency between such standardization as this and the greatest freedom in teaching. The optical power of the microscope has not been injured by the standardization of its form and screwthreads.

(*To be continued*)

The April *Bulletin of the Torrey Botanical Club* contains an illustrated paper by Philip Dowell on the violets of Staten Island, with a simple key and named habits of all the island forms. Thirty hybrids are also named or described.

The Russian Agricultural Commission has a representative here studying the hardier American fruits and agricultural methods and machinery, with a view to introducing them into the Russian steppes; two representatives from Denmark — one from an agricultural college and one from an experiment station — are investigating our production and pathological treatment of forage crops.

A paper read at the Boston meeting of the American Association for the Advancement of Science showed the effect of various gases on sweet pea seedlings (inhibition of growth, swelling of the growing region, and horizontal placing of the stem). The authors, Knight, Rose, and Crocker suggest the use of these seedlings in detecting traces of illuminating gas, it being well known that gas leakage (in amounts too small for the usual chemical tests) often causes large losses to florists, especially in producing the "sleep" of carnations.

Science (May 6) in the botanical notes mentions an archaic type of seed from the Palaeozoic rocks which was first discovered in 1875 in England by Professor Williamson. It is 5–6 millimeters long and ribbed; the ten ribs forming so many separate arms which project beyond the nucellus for a considerable distance. The plants which bore these seeds have not been found; but Professor F. W. Oliver who described them (*Annals of Botany*, Jan., 1909) thinks the plants belong to the Cycadofilices, and that the seed is "the most primitive seed that has yet come to light."

Under the caption "Children of the Land" the *Outlook* (April 23) recently described the great school garden movement in Canada. It is really much more than that, for through the munificence of Sir William MacDonald under the management of Dr. Robertson (formerly of MacDonald College) a systematized attempt is being made not only to "adjust the schools and train the children that the children will be attracted to rural occupations and will be qualified to remain in them," but to give "practical illustrations of how the occupation in each locality may be made more attractive, profitable, and satisfying to those engaged in farming."

Professor Ira D. Cardiff, at the winter meeting of the American Association for the Advancement of Science described some aberrant walnut fruits from two trees, one in Indiana and one in Tennessee. The fruits (see also the *Plant World* for April) have a walnut-like basal part, while the opposite part is smooth and four-furrowed, suggesting the hickory. In all the endocarp is walnut-like; the trees in general aspect, bark (except for some hickory characters in the Tennessee tree), and leaves are walnuts. Cross-pollination is not believed by Professor Cardiff to account for the conditions; in each case the nearest hickories are (now) 30 meters from the trees under discussion, and the hybrid (?) character of the fruit is found in "that portion of the nut produced by the parent sporophyte." A careful study is planned; it is thought that histological characters of the trees may indicate a cross.

The botanic garden papers read at the Boston meeting (A. A. A. S.) have been reprinted in *Science* (April 29, May 6,). In all the garden is discussed as a public institution, whether from the viewpoint of administration, rare plants, taxonomic completeness, or landscape effects. Professor Blakeslee's paper on the botanic garden as a field museum includes many suggestions, some of which feature in our better botanic gardens and which might be incorporated into many school gardens — even the small ones. A garden dictionary — and that of common things — is advocated rather than a "plant circus" where the curious may enter with the expectation of being surprised at oddities in nature and horticulture. Improvement under cultivation, plant diseases, and illustrations of heredity, variation, and hybrids (including even Mendel's law, failing to come true to seed, etc.) may be shown in odd corners of a school garden and with inexpensive material.

An interesting review of Researches on Fungi, by A. H. Reginald Buller, is given in *Science* (March 18) by Professor George F. Atkinson. The review includes brief mention of the geotropic curvature of the stem of certain mushrooms (in *Coprinus* an "overtilting or supracurvature four times before it came to rest in the perpendicular position"); the adjustment of the pileus in a horizontal position by the negatively geotropic stem, and the finer adjustment of the gills by their positive geotropism; the immense numbers of spores produced by single individuals (varying from 2,000,000,000 in *Agaricus campestris* to 7,000,000,000,000,000 in *Lycoperdon giganteum;* the enormous spore waste, (in *Polyporus squamosus*, about one spore in a trillion has a " chance of starting a new successful cycle); the resuming of spore ejaculation by many of the xerophytic fungi which have been preserved dry for months or even years; and autodigestion of regions of the inky caps *following* spore dissemination, the spores being, it is held, anemophilous, and not mixed with the inky liquid and spread by insects.

NEWS ITEMS

At the University of Nebraska adjunct professors Walker and Pool have been made assistant professors of botany.

Professor William James Beal, having completed forty years of continuous service, will resign his professorship in botany at the Agricultural College of Michigan.

Professor John M. Macfarlane of the University of Pennsylvania is planning to spend the coming year in botanical study in several botanical centers of Europe.

Professor J. C. Arthur, Dr. John Hendley Barnhart, and Professor Alexander W. Evans represented the Torrey Botanical Club at the International Botanical Congress held in Brussels May 14–20. Dr. Barnhart also has a commission to purchase books for the library of the New York Botanical Garden.

Mr. W. W. Eggleston, recently of the New York Botanical Garden, has been appointed assistant botanist of the Forest Service, U. S. Dept. of Agriculture. He has been detailed for work in Colorado in investigations of poisonous forage plants in cooperation with the Bureau of Plant Industry. He left New York for his new field on May 28.

The Naples Table Association for Promoting Laboratory Research by Women hereby announces the offer of a fifth prize of one thousand dollars for the best thesis written by a woman, on a scientific subject, embodying new observations and new conclusions based on an independent laboratory research in biological, chemical, or physical science. For further information address the secretary, Mrs. A. D. Mead, 283 Wayland Avenue, Providence, R. I.

Announcements of the following summer schools have been received:

1. The Biological Laboratory at Cold Spring Harbor, Long Island; June to September; tuition $30; for further information address Dr. Charles B. Davenport, Cold Spring Harbor, Long Island.

2. The Mountain Laboratory for Botany and Zoölogy at Tolland, Colorado; June and July; tuition $20; information may be obtained from Dr. Francis Ramaley, University of Colorado, Boulder, Colo.

3. The Puget Sound Marine Station at Friday Harbor, Washington; no tuition fee, laboratory fees, $10; for further details write Dr. Trevor Kincaid, University of Washington, Seattle, Wash.

The New York State College of Agriculture announces two new fellowships in the department of plant pathology. One provides for the investigation of the use of dry sulphur as a fungicide (both to plants and in the soil) and is established by the Union Sulphur Company (New York City) with an annual appropriation of $3000 for four years. Mr. C. N. Jensen (University of Califfornia) and Mr. F. M. Blodgett (Cornell University) have been appointed to this joint fellowship. The second fellowship, by the Davey Tree Expert Company, provides $750 a year for investigating the heart rot of trees, and has been awarded Mr. W. H. Rankin (Wabash College).

THE TORREY BOTANICAL CLUB

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TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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Matter for publication should be addressed to

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New York City

TORREYA

July, 1910

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LOCAL FLORA NOTES—IV

By Norman Taylor

Liliaceae

1. *Hemerocallis flava* L. This plant has been cultivated so commonly in our gardens that it is likely to become established at any time. Is it known to grow where it could be considered as unquestionably established?

2. *Allium carinatum* L. In the appendix to Britton's manual this plant is given as a naturalized plant in Bucks Co., Pa. Is it naturalized elsewhere? There are no specimens from the local flora range.*

3. *Allium canadense* L. The only stations represented in the collections are Crosswicks Creek, N. J., and two points on Staten Island. This common meadow garlic has a general range of Maine to Florida. The inference is unmistakable.

4. *Lilium Philadelphicum* L. There are a great many specimens in the collection. Curiously enough they all represent localities north of the terminal moraine. Whether this restriction is only accidental or whether it actually exists is entirely conjectural. Has anyone seen this plant south of the moraine? What is its distribution on Staten Island and Long Island? There are no specimens from either island.

5. *Lilium canadense* L. What has been said of *L. Philadelphicum* applies equally to this species. Apparently the restriction is not generic for *L. superbum* L. is found in New Jersey well to the southward of the moraine.

* The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows: All the state of Connecticut; Long Island; in New York the counties bordering the Hudson River up to and including Columbia and Greene, also Sullivan and Delaware counties; all the state of New Jersey; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

[No, 6, Vol. 10, of Torreya, comprising pages 125–144, was issued July 1, 1910]

6. *Erythronium albidum* Nutt. The general range of this species is given as "Ont. to Minn., south to Ga.", etc. There are no specimens from our range, the nearest stations represented in the collection, being Albany, N. Y., and Alleghany Co., Pa. In Britton's catalog of New Jersey plants the species is doubtfully credited to the state. What is the distribution of the plant in our range?

7. *Erythronium propullans* A. Gray. The inclusion of this plant in these notes is probably quite useless. In Britton's manual the species is reported from New York. No specimens are extant from the range and the plant's general distribution almost precludes the idea of its occurrence. It may turn up in the higher Catskills.

8. *Aletris aurea* Walt. The plant is reported from southern New Jersey, according to Gray and Rusby. Apparently the report is not true, for at least some of the specimens on which it was based are *A. farinosa.* Has anyone ever seen it in southern Jersey? Otherwise its most northerly station is in Virginia.

CONVALLARIACEAE

1. *Clintonia umbellulata* (Michx.) Torrey. A single rather doubtful specimen from Short Hills, N. J., is all that was found in the combined collections. While the plant may be rare it seems scarcely credible that we know its true range. The general range is given as "N. Y. and N. J. to Ga.", etc.

2. *Vagnera racemosa* (L.) Morong. The only excuse for mentioning this common plant is that in spite of general statements that the plant is common throughout New Jersey, none of our specimens are from south of New Brunswick. Among the twenty-odd stations represented it is curious that this plant should be so restricted to the upper part of the pine land region. Elsewhere in the range it is very common.

3. *Vagnera trifolia* (L.) Morong. One specimen marked merely "Conn." is all we have from the range. With a general range of from Newfoundland to New Jersey and Pennsylvania it should be found in northern New Jersey, the hilly part of the counties in Pennsylvania, and almost certainly in the Catskills. Judging

from extra-territorial specimens in the collections the plant marked merely "Conn." came from the northern part of the state.

4. *Streptopus amplexifolius* (L.) DC. The only two stations represented by our specimens are in the higher Catskills. Presumably the species is found along the mountains south to North Carolina, but just how far down within our range it may be found is entirely unknown except by inference.

5. *Trillium erectum* L. Among the twenty or more stations represented there is only one on Long Island, at Glen Cove. Has this plant ever been seen south of the hilly back-bone of the island? In New Jersey the statement that it is found only in the middle or upper counties is quite correct, so far as our specimens show. Has the plant been collected south of a line extending from Perth Amboy to Belvidere, N. J.?

6. *Trillium undulatum* Willd. The most southerly station in our range is apparently the Pocono Plateau, Pa. With a general distribution reaching to Georgia on the south this plant can probably be found considerably further south than the Pocono region.

7. *Trillium grandiflorum* (Michx.) Salisb. There are no specimens from the range. The nearest locality to our area is Lancaster Co., Pa. The general distribution of this species postulates a wider range for it within our area than is evidenced by reports and specimens.

SMILACACEAE

1 *Smilax tamnifolia* Michx. Some specimens from southern. Jersey show the plant's distribution in this region to be about as the manuals indicate. Neither of them says anything about the occurrence of this species on Long Island. An unquestionably authentic specimen from Rockville Centre, L. I., collected by Mr. E. P. Bicknell, gives rise to the query as to where else the plant may be found. There is a strong probability that the species will ultimately turn up in the intervening territory, particularly that which is of similar geologic structure.

2. *Smilax pulverulenta* Michx. With a general distribution of "Ontario to N. Carolina", etc., our single specimen from Bartow, New York City, quite obviously does not hint at the

plant's distribution in the range. It is doubtless common but specimens are desired to permanently record its true distributional status.

3. *Smilax Pseudo-China* L. In a footnote to page 239 of Britton's catalogue of New Jersey plants we read ". . . admitted into the Preliminary catalogue on the authority of Gray's manual, . . . not definitely known to me from the state." Dr. Britton's manual credits the species with a range from Maryland southward, but says nothing about any Jersey stations. The new Gray manual still credits the plant to southern New Jersey, but to offset this there is complete neglect of the species in the carefully compiled catalog of the plants of Philadelphia and vicinity. Has the plant ever been found growing in southern Jersey?

4. *Smilax hispida* Muhl. Although this species is supposed to grow "from Ontario to Va.," etc., our most northerly station is Andover, Sussex Co., N. J. Its distribution in the upper counties of Pennsylvania and in New York state above the Jersey state line is completely unknown.

5. *Smilax Bona-nox* L. Both manuals give New Jersey as a state in which this plant grows. The combined collections here do not show the plant as coming north of Virginia. The Philadelphia catalog excludes the plant from New Jersey but credits it to Delaware. If the station at Nantucket is correct,* the apparent lack of the plant between Maryland and Massachusetts is curious. If, on the other hand, the Massachusetts station should prove to be invalid we have still to account for the plant's distribution in south Jersey and adjacent Pennsylvania.

6. *Smilax laurifolia* L. The only two specimens from the range are both from stations just to the westward of Barnegat, N. J. The general distribution of "southern New Jersey" includes more territory than the specimens in our collections represent. A northern extension of the range may be looked for.

7. *Smilax Walteri* Pursh. There is a very meager representa-

* E. P. Bicknell in his serial flora of Nantucket, now appearing in the bulletin of the Torrey Club, says that the occurrence of this plant in Massachusetts is doubtful, and excludes it from the island, the only recorded occurrence of it in that state.

tion of this species in the collection, the only definite locality recorded being May's Landing, N. J. It should occur commonly in the pine-barren regions of the state.

NEW YORK BOTANICAL GARDEN

REVIEWS

Greene's Landmarks of Botanical History*

Julius von Sachs' well-known history of botany from the sixteenth century to the year 1860 is confessedly brief in its treatment of the beginnings of botanical science. Furthermore, it was written as a volume of a series on the history of the sciences in Germany and is somewhat predominantly German in its outlook, even though it must be admitted that the modern developments of the science of botany have, in a large measure, been fostered on German soil. And, again, this work, like its recent continuation by Professor J. Reynolds Green (1909), was written by a botanist who was primarily a physiologist, and the physiological aspects of the science are the ones that receive the most adequate treatment. The historical works of Sprengel (1807–'08) and of Meyer (1854–'57) do more justice to the very interest. ing beginnings of botanical literature, but they were never translated and are less well known to English and American readers-

This first instalment of Doctor Edward Lee Greene's "Landmarks," covering the period prior to the year 1562, will therefore prove most welcome to the many botanists, both amateur and professional, who have been awaiting a readable scholarly account of the earlier phases of the development of their science. A reader equipped with a certain amount of knowledge of the morphology of plants and with a certain degree of personal familiarity with plants in the field and garden is likely to find Dr. Greene's elegantly phrased paragraphs so interesting and illuminating that the book, once opened, will hardly find its way to the shelves until it has been read through.

*Greene, Edward Lee. Landmarks of Botanical History. A Study of Certain Epochs in the Development of the Science of Botany. Part I—Prior to 1562 A. D. Smithsonian Miscellaneous Collections, part of volume 54. Pp. 1–329. 1909.

The present part of the "Landmarks", after the preface and the introductory remarks on the "Philosophy of Botanical History", includes nine chapters, with headings as follows: I. The Rhizotomi; II. Theophrastus of Eresus, B. C. 370–286 (or 262); III. Greeks and Romans after Theophrastus; IV. Introductory to the Sixteenth-Century German Fathers; V. Otho Brunfelsius, 1464–1534; VI. Leonhardus Fuchsius, 1501–1566; VII. Hieronymus Tragus, 1498–1554; VIII. Euricius Cordus, 1486–1535; IX. Valerius Cordus, 1515–1544.

In the introductory chapter on the "Philosophy of Botanical History", the author discusses in a very entertaining manner the development of human ideas in regard to the plant world and the early attempts to arrange these ideas in an orderly fashion. "Botany", he says, "did not begin with the first books of botany, nor with the men who indited them; though every historian of the science whom I have read has assumed that it did. The most remote and primitive of botanical writers, of whatever country or language, found a more or less extensive vocabulary of elementary botany in the colloquial speech of all". He then goes on to show the baselessness of "the fond conceit" "that there was never anything in the world that could be called science until some three centuries ago, or four, at the farthest."

Among the ancient Greeks were the rhizotomi, "mostly illiterate men and quacks" whose root-gathering for medicinal purposes was often accompanied by prayers, incantations, and other curious ritual, but some of them studied the nature and properties of plants in a scientific way and wrote books, which were quoted by Aristotle and Theophrastus. One of these, Cleidemus, is said to have "investigated diseases of plants, especially of the fig-tree, olive-tree, and vine." Professor Greene pronounces him "the earliest of vegetable pathologists". Another of these protobotanical Greeks, whose writings are known to us only from excerpts made by their more illustrious countrymen, was Hippon, concerning whom the author of the "Landmarks" has the following paragraph:

"Hippon was among the rhizotomi who philosophized about plants in general, and wrote books. His writings are quoted by both Aristotle and Theophrastus, and he appears to have been the earliest among students of plant life and form to venture the opinion that all cultivated trees, shrubs, and herbs have been derived from wild ones, and are susceptible of reversion to their pristine condition. It is the earliest hint—and a very early one, apparently unknown to the annalists of evolution—of what cultivation may accomplish in the way of transformation. But the doctrine must have had the sound of a heresy verging toward atheism in the ears of a populace that had never questioned the proposition that every cultivated plant and tree had been coeval with the human race, and had been so created at the first."

But the longest, by far, of the chapters of the present part of the "Landmarks" is that devoted to Theophrastus of Eresus, whom Linnaeus called the Father of Botany, though in later years that title has sometimes, by the less discriminating, been transferred to Linnaeus himself. Several pages are given to what is known of the personal history of Theophrastus, including many interesting details of his relations with Aristotle, his teacher, patron, and devoted companion. A personal sketch of this sort, by the way, accompanies the discussion of the work of each of the early botanists considered in the succeeding chapters, a feature that for many readers will doubtless contribute much to the interest and attractiveness of the book. The botanical work of Theophrastus is treated under the general headings, "Method", "Vegetative Organography", Anthology", "Fruit and Seed", "Anatomy", "Phytography", "Taxonomy", "Ecology", "Dendrology", and "Transmutation", followed by a "Recapitulation". In his studies of flowers Theophrastus recognized the centripetal and centrifugal types of inflorescence, the hypogynous, perigynous, and epigynous modes of insertion of the corolla and androecium, and the fact that the "head" in the composites is a flower-cluster and not a single flower. In regard to the inflorescence of composites Professor Greene remarks: "Less than three generations ago, eminent systematists were still writing up the scales of such involucres as 'sepals', the whole involucre as a 'calyx', and the circle ray flowers as the 'corolla'. At this juncture the sublime old Greek will appear to have lived before his time by more than two thousand years." In connection with the observations of Theophrastus on germinating seeds, the author of the "Landmarks" has the following:

"To the beautiful work of a Malpighi one gives somewhat more credit than is fairly due it, until one has read these chapters of the ancient Athenian master. Then it is clearly apprehended that the man of the seventeenth century may have received the suggestions of his own work directly from the Greek philosopher; and is almost ready to add that the beautiful drawings of sprouting grain adorning Malpighi's folio might almost have been done from the Theophrastan descriptions of the same. It must needs be conceded that the botanic garden at Athens, founded by Aristotle, and the earliest of which there is any record, was wonderfully prolific of new botanical facts of profoundest import."

Theophrastus appears to have had little sympathy with popular notions of his day as to the possible changing of plants into others of different kinds. In regard to one phase of this belief he observes: "Some say that barley changes to wheat sometimes and wheat to barley, and that in the same field. Such statements are to be received as fables. Changes of that kind would be without a cause. It is diversity of condition that induces change."

Under the heading "Taxonomy", Dr. Greene discusses in a very interesting and instructive manner the ideas of Theophrastus in regard to genera and various other aspects of the interrelationships of plants. The author candidly admits that "one ascertains with difficulty, if at all, what the historian is most in need of knowing, namely where this writer of the first book of botany is recording points of taxonomy that are of prehistoric discovery and universal traditional acceptance, and where he is introducing some amendment or improvement of his own." These words were written especially of some of the primary groupings of plants made by the Greek philosopher, but Dr. Greene, we think, would be the first to acknowledge and does acknowledge, by implication, at least, that the same difficulty obtains in connection with the generic names adopted by Theophrastus—a reflection that might well give pause to any one who, in quest of primal historic truth and absolute justice in matters of botanical nomenclature, would be so bold as to cite Theophrastus as the author of any particular generic name.

The influence of Theophrastus in fixing the names of plants is well summed up in the following passage:

"Pliny, the supreme Latin writer about plants, in translating Theophrastan texts by the hundred into Latin for Roman readers, made use of familiar Latin names in place of the Greek names when there were such, *e. g.*, instead of the Greek itea he wrote salix; in place of drys, quercus; Latin ulmus, sambucus, and ranunculus in place of Theophrastan ptelea, acte, and batrachium. There were still many scores of plant types which were known to Latins by no other names than those that had been assigned them in Greek; another evidence that Theophrastus by his books had been the one teacher and authority upon botany to Latins as well as Greeks. Platanus, cerasus, rhamnus, anemone, thalictrum, delphinium, helleborus, paeonia, and a host of other such remained the only names of the genera, whether one spoke or wrote in Latin or in Greek; and so during some seventeen centuries most of the plant names in use were quoted from Theophrastus. The popular fable about Linnaeus as first nomenclator of botany is not yet a hundred years old, and will need to be perpetuated for sixteen centuries yet to come if the years of his nomenclatorial fame are to equal those during which Theophrastus held the prestige."

As a particular instance of the Theophrastan conception of genera Dr. Greene cites the four species of water-lilies for which recent writers use the names *Nymphaea lutea*, *Castalia alba*, *Castalia Lotus*, and *Nelumbo speciosa*—species which Linnaeus grouped in the single genus *Nymphaea*, although Theophrastus had them under the four names Nymphaia, Sida, Lotos, and Cyamos, respectively. Referring to the generic relationships of these four plants, Dr. Greene remarks, . . . "recent systematists have well-nigh completely returned to the Theophrastan view, in all save the names of genera; and the restoration of even these will follow under the law of priority." It will hardly be denied, we think, that, although the botanists of the present generation may profit by some instruction as to the merits of Theophrastus, very few of them will feel any necessity, either moral or practical, for adopting the botanical language of the Greeks to any greater extent than they have already adopted it through inheritance. And, in the opinion of the reviewer, the prevailing sentiment of the botanists of the present day in this particular is likely to be strengthened rather than weakened as the time-distance from Theophrastus increases. Nevertheless, it must be admitted that Dr. Greene's sympathetic and masterly interpretation of the writings of Theophrastus has brought the "Father of Botany" appreciably nearer to the botanists of the present age.

Among the botanical writers discussed in the chapter on "Greeks and Romans after Theophrastus", the principal are Nicander of Colophon, Cato, Varro, Virgil, Columella, Dioscorides, Pliny, and Galen. "The scientific botanist among the Greeks", Dr. Greene observes, "was Theophrastus; and there is no comparison between him and Dioscorides, whose theme was medical botany; but, quite as usual, the man of 'applied science' was the one to meet with general appreciation and approval. . . . Latin editions of Dioscorides are too numerous to be given a reckoning; and almost the same may be said as to early translations of him into modern tongues; for between the years 1555 and 1752 there were at least twelve Spanish editions, as great a number in Italian". And there were several editions, also, in French and German. Nicander, a Greek grammarian and poet, wrote, it seems, a versified dissertation on poisonous fungi and another on the cultivation of edible mushrooms. The Roman writers treated of plants chiefly in their relations to horticulture and agriculture. "Cato (B. C. 235–149) knew 125 kinds of plants, Varro (B. C. 117–27) mentions 107, Virgil (B. C. 70–19) 164. Yet the sum total of the plants of these Romans, 245, is only about half the number that had been known by Theophrastus some 300 years earlier."

The sixteenth-century "German Fathers" whose lives and works are interestingly set forth by Dr. Greene are Brunfels, Fuchs, Tragus, Euricius Cordus, and Valerius Cordus. The author of the "Landmarks" is so bold as to say that the works of the "German Fathers" have been quite inadequately examined even by the German historians. "Julius von Sachs, the latest in the line, copied Sprengel's caption 'The German Fathers', etc., but knew next to nothing of their works, even rating as unimportant Valerius Cordus, who was immeasurably the greatest of them all."

Brunfels and Fuchs were concerned almost wholly with medical botany. They both illustrated their principal works copiously with the idea of improving upon certain other plant illustrations then in vogue and with the intention of facilitating the identification of plants used in medicine. Their descriptions were copied or compiled from Theophrastus, Dioscorides, Pliny, Galen, and other ancient writers, with occasional annotations and discussions of their own. The works of Brunfels and of Fuchs enjoyed great popularity, but Dr. Greene considers it "superlative" to include these two worthies among the "German Fathers of Botany", though some such title as "Fathers of Plant Iconography" might fittingly be bestowed upon them. But the works of Tragus and of Valerius Cordus were of another character, and these two authors may justly be called the "Fathers of Descriptive Botany". "Both these were deeply interested in plants of all kinds; were given to examining their organs minutely and marking the behavior of certain growths at different stages, and all this before even having thought of writing books thereon. . . . They were under an inspiration of a new idea in botany, namely, that plants might be so described as to be identified by description."

Euricius Cordus is chiefly interesting "as having been the father and educator of that most brilliant of early German botanists, Valerius Cordus." However, he wrote a booklet, the "Botanologicon", in which he exposed the folly and danger of trying to make the descriptions of Grecian medicinal plants always fit the plants that are native in Germany. Valerius Cordus, who died of a fever in Rome at the early age of 29 years, has been characterized by the historian Meyer as "a splendid and all too transitory phenomenon." The chief work of Valerius Cordus, entitled "Historia Plantarum", was not published until seventeen years after his death. The young Cordus described living plants in a very accurate, systematic, and independent fashion. In connection with his work Dr. Greene remarks:

"Cesalpino, of the end of the sixteenth century, will be praised in future milleniums for having founded Systematic Botany. But had Valerius Cordus lived to only twice his nine-and-twenty years, it is easy to conceive that the great Italian might have missed his laurels. Among the nature students of four hundred years ago I know not who else is so far from accepting things on other people's guess or hearsay as Valerius Cordus; in whom I have not yet read a line that savors of the fabulous or superstitious; and that, for the period, is much to say of any author."

In face of the erroneous and more or less superstitious notions as to the reproduction of ferns that were then current even among the best-educated, Cordus boldly ventures the following in regard to the trichomanes fern:

"It grows copiously on moist shaded rocks, although it produces no stem, or flower or seed. But it reproduces itself by means of the dust that is developed on the back of the leaves, as do all kinds of ferns; and let this statement of the fact once for all suffice."

And the following paragraph from Dr. Greene's work, relating to one of the observations made by this clear-seeing and clear-thinking German youth, who died as long ago as 1544, will be of historical interest to many economic botanists of the present day:

"The plant physiologist of to-day, interested in the functions of the root tubercles of leguminous plants may find in Valerius Cordus the earliest mention of these organs. I do not find him taking note of them except as occurring in the cultivated lupine of Europe. Accustomed to give a full account of every kind of root, even to its medicinal usefulness or uselessness, he says of that of the lupine that it is 'slender, woody, white and without useful properties, parted into a few slender fibers upon which there sometimes grow small tubercles.' "

Part I. of Dr. Greene's "Landmarks" covers a most interesting and hitherto inadequately treated period in the history of botany. The work will be needed by all libraries that contain Julius von Sachs' well-known history and by all botanists who feel an interest in the recorded beginnings of their science.

Marshall A. Howe

FIELD MEETINGS FOR 1910

In the *American Naturalist* for January, 1899, Dr. Arthur Hollick has pointed out the great influence of the geological formation on the forest conditions of New Jersey. All the territory to the north of a line stretching from Perth Amboy to Trenton is predominately of deciduous trees, mostly of northern extraction and affinities. South of the line from Long Branch to Salem (roughly the pine-barren country) the forest is predominately coniferous. The region between these he has called the tension zone, from the fact that the trees of each opposing zone are in this middle zone apparently striving for predominance. Some of the field meetings this summer will be held with a view to ascertaining how far Dr. Hollick's observations obtain among the rest of the vegetation in this region. An effort will be made to extend the range of some of the typically southern or coniferous plants northward, and to trace the migratory tendencies of the northern plants southward. Observations will be made also on plants with apparently no very definite habitat preference.

The meeting of Saturday, August 13, will be in the museum building of the New York Botanical Garden and will consist of a lecture at 4:00 P. M. by Mr. Norman Taylor on "Influences which Govern Local Distribution of Plants." This will deal with the above and similar ecologic problems.

August 20. Monmouth Junction, N. J. Train leaves Hudson Terminal Station (Penna. R. R.) at 9:35 A. M. Cost of trip about $2.00. This is at the edge of the deciduous zone and the adjoining tension zone.

August 27. Runyan, N. J. Train leaves Hudson Terminal Station (Penna.) at 9:05 A. M. Returning train leaves at 5:57 P. M. Cost of trip about $1.50. This is directly in the middle of the tension zone.

September 3. Freehold, N. J. A seven-mile walk is planned which will extend from Freehold to Farmingdale crossing from the tension to the coniferous zone during the walk. Train leaves Liberty Street (Central R. R. N. J.) at 8:30 A. M. Return train from Farmingdale leaves at 3:56 P. M. Cost of trip about $2.75.

September 10. Windsor, N. J. Train leaves Hudson Terminal Station (Penna. R. R.) at 9:05 A. M. Returning train at 5:03. Cost of the trip about $2.00. This is in the middle of the tension zone, but further down than Runyan.

The chairman of the field committee will act as guide on all the above trips and in each case will meet party at destination. Other trips have been planned as follows:

September 17. Arlington, N. J. Train leaves Hudson Terminal Station (Erie R. R.) at 12:45 P. M. Return as desired. Cost of trip about 30 cents. Guide, Mr. O. P. Medsger.

September 24. Mt. Hope, N. Y. Train leaves 155th Street and Eighth Ave. (Putnam Division, N. Y. Central) at 9:15 A. M. Returning trains leave at 4.14 and 6.02 P. M. Cost of trip about 50 cents. Guide, Mr. Chas. VanLoan.

October 1. Special excursion for mosses to Alpine, N. J. Party will take the one o'clock boat from Peene's wharf, Yonkers, N. Y. Cost of trip about 30 cents. Guide, Mr. Williams.

October 8. West Orange, N. J. via Orange. Train leaves West 23rd St. (D. L. & W. R. R.) at 9:10 A. M. Thence as directed by the guide, Mr. Wilson.

October 15. Special excursion for asters to Wakefield, N. Y. City. Party will meet at the terminal of the Third Avenue elevated at 1:00 P. M., where they will be met by the guide, Dr. Rydberg.

Members of the club are urged to verify the train times given above. In case of change it is understood that the train leaving nearest the advertised time will be the one used.

The Field Committee,
NORMAN TAYLOR,
Chairman

PROCEEDINGS OF THE CLUB

MAY 10, 1910

The meeting was called to order at the American Museum of Natural History at 8:25 P. M. Mr. E. B. Southwick occupied the chair. The attendance was twenty-four. After the reading and approval of the minutes of the preceding meeting, Mr. Norman Taylor spoke on "Native Trees of the Hudson Valley." The following abstract was prepared by the speaker.

"There are about 125 different kinds of trees in the area. Excluding highly technical and little known species, and those so rare as to escape common notice, there are about 68 species of trees common in some part of the valley, often throughout it. A short popular account of most of these, illustrated by lantern-slides, aimed to bring out the salient features of the different kinds, and to draw attention to their principal economic or cultural uses."

Adjourned.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS *

BY W. F. GANONG

SOME REFLECTIONS UPON BOTANICAL EDUCATION IN AMERICA

I come now to the fourth of the reasons why our science teaching is defective, and that is the most vital of all. *Our method of training teachers is wrong.* I believe it is true that in general our educational advances work down from above—from university to college, from college to high school and from high school to the grades; and in a general way each of these institutions is the finishing school for teachers of the grade below. Now the work of our universities is for the most part admirable in every way, but they are not good training schools for college teachers. One of the greatest of our college presidents lately remarked that the principal obstacle in the way of making a college what it ought to be is the difficulty nowadays of securing the right kind of teachers. "We have to take them as the universities supply them," he said, "and then make them into good college teachers afterwards." The defects of the universities in this respect are two-fold. First they are training students only for their own kind of activity, in which everything centers, very properly, in research; and second, they are omitting to teach divers matters very essential for the college teacher to know.

That our universities make research the central feature and great leading method of their training of graduate students is

*Address of the retiring president of the Botanical Society of America, delivered at Boston, December 28, 1909. Reprinted by permission from *Science*, March 4, 1910. See TORREYA for May and June.

natural, logical and correct, so far as training for their own kind of activity is concerned; but it ignores the fact that only a minority can remain in that work. The justification of the training of all by a method which is correct only for a minority is usually expressed in this form, that he is the best teacher who is an active investigator. Now if this is qualified by the proviso "other things being equal," it is approximately true; but in fact other things very rarely are equal, and in the matter under discussion they are profoundly unequal. In my opinion the imposition upon all university students of the university research ideal is doing vast harm to our teaching in college and therefore in high school. For one thing, it sends out ambitious young men imbued with the feeling that they must maintain their research at all costs, or else forfeit the good opinion of their teachers, the possibility of membership in the best scientific societies, and especially any chance for a call to university work, though this latter point should not be given great weight, since to a person with a liking for teaching a good college offers as attractive a career as a university. In consequence there is a continual pressure on the teacher to subordinate his teaching to research. Now in college and high school this is wrong, ethically and practically. A college teacher is never engaged for research, but for a very different purpose, and it is his first duty to carry out that purpose to the very best of his ability. If there is any man who can carry on active investigation and at the same time do college or high school work as well as if he were concentrating wholly on that, the man is fortunate, and so is the institution which has him. But in fact this can rarely be true. For one thing, the limitations of time and strength prevent it in most cases; and for another the qualities and temper required for the two activities are not only different but somewhat antagonistic. Research requires concentration and much consecutive time fixed by the nature of the work, while the teacher must be ready for constant interruptions, and must regulate his time to fit the schedules of his students. To one immersed in the critical stage of an investigation the little troubles of students seem absurdly trivial, if not stupid, and under their application for aid he is almost more than human if he can keep a sweet temper and not answer with repellant brusqueness. To the good teacher, the troubles of students are never trivial, but rather are welcome as means to the advancement of his particular interests. Futhermore, I believe that the research ideal imposed on all men trained in the universities is the cause not only of much injury to teaching, but of much unhappiness to teachers. For if the teacher be conscientious, and gives his first strength to his teaching, he is soon doing his research upon the ragged ends of his nerves. I venture to say that many a teacher to-day is wishing he could afford to abandon all attempts at abstract research and turn whole-souled to his teaching and matters connected therewith. And when, indeed, he does so, he finds his happiness and his usefulness alike immensely augmented. I know this is true, for I have been through it. It took me many long years to free myself from the feeling that I must continue research or else sacrifice the good opinion of my colleagues. But I am free, and in the two or three years I have been so the added keenness of my pleasure in my teaching, and in various activities related thereto, has been such as to make me feel like a Sinbad who has dropped his old man of the sea. And if there are any among you who believe that I stay in a society given to research only under false pretenses, I ask you to have patience a little, for I purpose to try to convince the society that its rules ought so to be altered as to make teaching, of approved merit and service, a sufficient qualification for membership. Meanwhile I advise all of my colleagues engaged in collegiate work to join in my declaration of independence. Let us show the universities that teaching hath her victories no less than research.

But now I am going to qualify a little. When I say research I mean abstract research, of the university type, the kind which has place on the skirmish line of the forefront of advancing knowledge. In truth I agree that he is the best teacher who is also an active investigator, but I maintain that in the case of college teachers the investigation ought to have some kind of connection with the teaching. This is entirely possible, for a vast and fruitful field for research lies open in educational organization, in the introduction of more logical, useful and illuminating topics, experiments and methods, in the fitting of science better to the growing mind, in local floras and the natural history of common plants, in ways for better collation and diffusion of knowledge. After all, it is the spirit of the investigation that is the matter of value to the teacher, not the results. A contemplation of the status of much of the investigation put forth by busy teachers somehow seems to suggest a saying of one of our senior botanists, who was in his youth somewhat of a botanical explorer, and always a genial wit. Apropos of the making of bread in camp he has been heard to remark "it may not result in very good bread, but it's great for cleaning the hands." In investigation as elsewhere, results are most surely and economically won by experts, selected, trained and devoted to that work. The college teacher would do better not to waste his strength on a field in which he can be little better than an amateur, especially when there lies open another in which he can himself be an expert, and that is in educational-scientific investigation.

From this which the university ought not to do, I turn now to things which it leaves undone. It is not giving to those who are to be college teachers certain knowledge and training which are indispensable to good teaching. Thus, it does not insist that they shall know the common facts about the familiar plants around them. The old type of botanical course, consisting in the study of the morphology and identification of the higher plants, is gone forever, not because it was not good, but because the expansion of knowledge has given us something still better. Yet the knowledge involved in the old course is indispensable to every teaching botanist, and I would have a requirement made that no person could be recommended as a competent botanical teacher for a college until he had spent at least two summers of active field work on the critical study of some flora. Again, most of our university-trained teachers know nothing more of the historical or biographical phases of the sciences than they may have picked up incidentally. Yet for purposes of teaching, a knowledge of the history of the science itself, and of its relations to other great matters, is vastly important, in part for the favorable background it offers for the projection of our present-day knowledge, and in part for the purpose of placing the dramatic, heroic and humanistic aspects of the science at the disposal of the teacher. Again, the teacher may go forth from the university without any other than the most fragmentary knowledge of laboratory administration, although there is a rapidly developing technique of efficient and economical management of laboratory construction, furniture, apparatus, supplies, materials, manipulation; and the lack of any training in these is one reason why our science is so often disgraced, and our influence weakened, by slovenly botanical laboratories. Again, the teacher takes up the instruction of young people without any knowledge whatever of the results, very valuable, all imperfect though they still are, which have been won in the scientific study of the psychology of the adolescent mind. And finally he receives no training in the collation and exposition of scientific knowledge, a subject of such importance that I shall speak of it in a moment apart. Training in investigation he also needs, of course, and that he now gets with ample efficiency. We need a standardization of preparation for college and high-school teaching of the sciences, with appropriate titles or degrees. We are as yet far enough from such a condition, but not wholly without some progress to record. For one university, Chicago, in its school of education, has a department of botany and natural history, administered, by the way, by one of our members and colleagues whose accomplishments in the past give promise of great service to come.

But now once more I wish to qualify a little. While I believe that a training in common knowledge of plants, in the history of our science, in laboratory administration, in the psychology of youth, in the collation and exposition of knowledge, as well as in investigation, is indispensable to the best botanical teaching, and should be included compulsorily in the training of botanical teachers, I do not blame the universities for not providing such instruction, nor am I sure that it is a correct or economical university function. But there is one thing of which I am sure, and it is this, that there is a place in which such training is practicable and wholly appropriate and that place is the graduate department of the college.

Just here I wish to turn aside for a moment to consider a bit more this matter of training in the collation and exposition of knowledge. The expansion of science in our day has been so vast, the literature has become so voluminous, the specialization of method and thought are so extreme, that it is becoming a serious question how the results of new research, when not of a sensational nature, can be quickly, accurately and adequately incorporated into the general mass of our knowledge and made available to the intellectual or economic uses of our race. Every scientific man has witnessed the ignoring of new truth long after its announcement, and the repetition of old error long after its disproval, not alone in popular information and literature, but even in the best scientific text-books; and this mal-adjustment between scientific research and general knowledge waxes constantly greater. The trouble is plain; we have no recognized collators of knowledge, scholars whose business it is to stand between the investigator and the general user of knowledge and to interpret correctly the results of the one to the other. The need for such service was pointed out long ago by Francis Bacon. In his prophecy of the future development of scientific knowledge, veiled under his story of "The New Atlantis," he describes the division of duty among the scholars of Salomon's House. He says:

"Then after divers meetings and consults of our whole number, to consider of the former labours and collections [an obvious prophesy of our scientific meetings], we have three that take care, out of them, to direct new experiments, of a higher light, more penetrating into nature than the former. These we call Lamps. . . . Lastly, we have three that raise the former discoveries by experiments into graeter observations, axioms, and aphorisms. These we call Interpreters of Nature."

To-day we have our lamps, and their light shines steadily and benignantly forth. We call them universities. But where are our interpreters of nature? Though we need them, we have them not. They should be our colleges. In all of the great body of intellectual endeavor there is no greater weakness and no greater opportunity for service, than in the interpretation to all men of the results secured by research, not in science alone, but in other departments of knowledge as well. It is the absence of such interpreters which leaves room for the charlatans of knowledge, the mendacious reporter who uses his bit of college information to give a specious semblance of truth to his investigations or exaggerations, and the nature fakir whose literary skill is his sole qualification. This interpretation of knowledge is no easy matter. Compilation will not do, for the interpreter must repeat observations and experiments far enough to give him a personal and familiar grasp of the materials. Nor even is a first-hand knowledge of the materials enough; he must also be able to set them forth in exposition with a combination of pedagogical clearness and literary force. So little developed is the interpretation of knowledge in comparison with its acquisition that although we have many strong journals devoted to research we have almost none devoted to interpretation and exposition. We have two or three popular journals, carried on by the devotion of loyal individuals, but with all the conditions for success against them. A suitable journal for the collation, interpretation and diffusion of botanical knowledge can only be conducted by an institution whose credit is involved in its permanence and efficiency. It should be marked by dignified form, artistic dress, and literary grace, with departments covering so completely their fields that no person with a serious interest in the science can possibly afford, and much less be willing, to be without it. Such a journal must of course be heavily subsidized, or endowed, especially at first; but there is not at present any place in the educational structure where an endowment would tell so heavily. It would be worth more to education than the endowment of any professorship that I can think of, even a professorship of botanical education in my own college. Such a journal should issue from a college, not a university. I would like to edit it, and I have the plans worked out in complete detail; but I shall not undertake it unless the business foundation can first be made secure.

Not only does the training of interpreters of nature, and of other knowledge as well, whether as teachers, as writers, through the editing of suitable journals, or other activities, seem wholly appropriate to a college, but I think it would offer the colleges themselves a mission which would react grandly on their general efficiency. There is an agreement that the first function of the college is the training of young people in the qualities which go to make more effective members of organized human society. But there is also a general feeling that somehow this is not by itself quite sufficient, for while it offers a worthy and amply difficult educational service, it does not provide a sufficiently-absorbing intellectual interest. Our colleges require, for the maintenance of high intellectual tone, both of students and of teachers, some more vigorous intellectual resistance than under-graduates alone can offer. It is in response to this feeling that some colleges have established graduate work, but in all cases, so far as I know, of the investigation or university type. For such work, however, our students should be sent to a university, which can provide far better than any college the facilities, companionship and atmosphere essential to its successful pursuit. To encourage young people, who are never well informed upon these matters and who do not understand the differences between institutions, to come to a college for work of the university type, is little better than attracting them under false pretenses. It would be much better for our educational system if the colleges would do no graduate work at all, unless they can offer something which they can do better than the university. In the training of their own and high-school teachers, and other interpreters of knowledge, they have, from the very nature of their activities and the presence right at hand of the best of all practice schools, a work which they can do better than the university. I hope ere long to see, in one of our greater colleges, the establishment of the first graduate school devoted to the training of these interpreters of knowledge.

But now I have reached the bounds which custom and courtesy allow to a speaker for this kind of address, and although I think with regret of the many large matters I fain would include to make my account of this subject complete, I must come to a close. I shall add but one thing, which is this—a summary of the objects for which we should work.

1. A continuous and adequate system of nature study in the schools, so complete and so good as to send every student into the high schools with no prejudice against science, and with a solid foundation of natural fact knowledge.

2. A four-years' course in the high school in the standard sciences, upon exactly the same basis of efficient teaching and educational dignity as any other subjects whatever, being required in so far as they are required, and elective in so far as they are elective.

3. A system of education in the college which will preserve the golden principle of the elective system—viz., the fact that the mind like the body derives greater good from an exercise in which it can take an interest than from one in which it does not—while pruning away the absurdities that have been allowed to graft themselves thereon. The logical system is the group system, in which the student is free to choose his group, but having once chosen it, finds his studies arranged on a plan approved as wise by educational experience. We must not expect a majority ever to choose the science groups, but those who do should receive a training qualitatively equal to that in any subjects whatever, and, above all, thoroughly but humanistically scientific.

4. A critical review and retesting of our present educational methods and material, with a view to the elimination of the impracticable, the replacement of the mediocre, and the introduction of the better, to be sought through critical educational research.

5. A system of training of teachers which shall recognize that college teachers and university investigators are not one and the same, but fellow craftsmen, entitled to equal honor for equal achievement. The training of the university investigator belongs to the university, but of the college teacher to the college, which should establish the suitable instruction in the practical and humanistic phases of the subject. And since the college teacher is from his profession primarily an interpreter of knowledge, he should make that his particular field; and the colleges should cherish and develop, as their particular function, all activities connected therewith.

These things, I believe, will make the sciences free from their present educational disabilites. It is true they will not give us perfection. But what is perfection, and who wants it? Perfection, so I fancy, for I never have seen it, is in this like truth, that there is more pleasure in seeking than in finding it. Besides, man, for whom we are doing it all, is imperfect, though the extent thereof depends upon the point from which we view him. If one were to look down upon him from the place of the angels towards which he likes to believe he is ascending, he must seem a very poor creature, deserving only of pity. But if one looks up after him from the place of the beasts from which we know he has risen, then he looms as a very grand figure, worthy of credit and honor. After all, perfect or imperfect, good, bad or indifferent, he is the very best thing of which we are sure. It behooves us, therefore, to make the most of him.

SMITH COLLEGE

NEWS ITEMS

Mr. John Burroughs has recently received an honorary degree, LL.D., from Yale University.

Dr. Ernst A. Bessy, of the Louisiana State University, has been made professor of botany at the Michigan Agricultural College.

Dr. J. E. Kirkwood has been advanced to professor-in-charge of the new department of botany and forestry at the University of Montana.

Professor H. H. Rusby, while continuing his rubber investigations in Mexico, is collecting economic and medicinal material for the New York Botanical Garden.

At the New York Botanical Garden the four o'clock lectures which will be continued into September include the following: "Edible Mushrooms," by W. A. Murrill, August 6; "Influences which Govern Local Distribution of Plants," by Norman Taylor, August 13; "Botanical Cruises among the Bahamas," by Dr. M. A. Howe, August 20; "Grasses and their Economic Importance," by George V. Nash, August 27; "Poisonous Mushrooms," by Dr. W. A. Murrill, September 3; and "European Influences in the History of American Botany," by Dr. J. H. Barnhart, September 10.

THE TORREY BOTANICAL CLUB

Meetings the second Tuesday and last Wednesday of each month alternately at the American Museum of Natural History and the New York Botanical Garden

PUBLICATIONS. Bulletin. Monthly, established 1870. Price $3.00 per year; single numbers 30 cents. Of former volumes only 24-36 can be supplied entire. Certain numbers of other volumes are available, and the completion of sets will be undertaken.

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

Torreya. Monthly, established 1901. Price $1.00 per year.

All business correspondence relating to the above publications should be addressed to William Mansfield, Treasurer, College of Pharmacy, 115 W. 68th St., New York City.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 36 published in 1909, contained 720 pages of text and 34 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 24–36 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–36 three dollars each.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–11 and 13 are now completed; Nos. 1 and 2 of Vol. 12 and No. 1 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

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115 W. 68TH STREET
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A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

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TORREYA

August, 1910

Vol. 10 No. 8

ADAM IN EDEN OR NATURE'S PARADISE *

Extracts by Jean Broadhurst

Years ago, before the museum building of the New York Botanical Garden was completed, Professor Lucien M. Underwood showed me some of the quaint and rare books in the library. Among them none interested me more than an old herbal written by William Coles and printed "at the Angel in Cornhil near the Royal Exchange in 1657." A. Bronson Alcott says that "the old *herbals,* too, with all their absurdities, are still tempting books", and so I found this one by Coles, which he naïvely calls Adam in Eden or Nature's Paradise. Since then my guests at the Garden have always been introduced to this time-browned volume with its little, incongruous, gummed label; and the interest shown has suggested the printing of these extracts, that all may have access to an expurgated edition of this rare old book.

Botanists may be interested in the plant descriptions; some are "descriptions which do not describe" and some are strikingly simple and distinctive. How little was generally known of the non-flowering plants is shown by the description of the polypody fern where the sori or fruit dots are ingeniously explained.

The derivation of many of our common words is suggested in such unusual spellings as *wood bind* for *woodbine, onely* for *only,* and *then* for *than;* and the rare use of the possessive apostrophe raises a question as to the time of its general introduction into the English language and what spellings may the advocates (and the opponents) of simplified spelling not champion where names are spelled in three ways in one paragraph!

* Illustrated with the aid of the Catherine McManes fund.

[No. 7, Vol. 10, of Torreya, comprising pages 145–168, was issued Aug. 1, 1910]

The general cure-all qualities ascribed to some of the plants suggest a modern patent medicine advertisement; and the recipes call so often for wine and beer as to suggest that then, as to-day, not a little of the invigorating effect was due to the alcohol used.

The book consists of nearly seven hundred pages and contains descriptions of three hundred forty-three plants, which not only cure such human ills as the hichet (hiccough) and the loosening of the teeth, stay hunger, and prevent weariness, but serve various other useful purposes, such as making hens lay, keeping puppies small, and increasing public revenues.

Each plant is described under five headings, the *names,* the *kinds,* the *form,* the *places and time,* and the *virtues* or the *signature and virtues.* By signature, is meant the sign put upon the plant by an all-wise Creator to show man its uses, such as thorns to indicate its thorn- or splinter-drawing power, an ear-shaped leaf to point out its ability to cure deafness, and sticky or slimy juice to show that it should be used to "glue together" cuts and wounds.

The extracts given below include a few of the plants commonly known to-day in America. The aim has been to present for these well-known plants typical descriptions and recipes, preserving so far as possible the leisurely style and naïveté so characteristic of the whole book. Useless repetition has been avoided by the frequent omission of entire sections (such as *names, form,* and *signature*); when part of a section has been omitted it is indicated by asterisks in the usual way.

Other striking differences between ADAM IN EDEN and the books of to-day are the closely-printed title page, lavishly adorned with red ink; the effusive dedication and lengthy introduction, enlivened by several poems dedicated to the author himself; and the conclusion, most naïve of all, where Mr. Coles openly asks for encouragement, laments the lack of time as "a thing I have much wanted ever since I undertook this business", and with a pun bids farewell to the gentle and apprehensive reader.

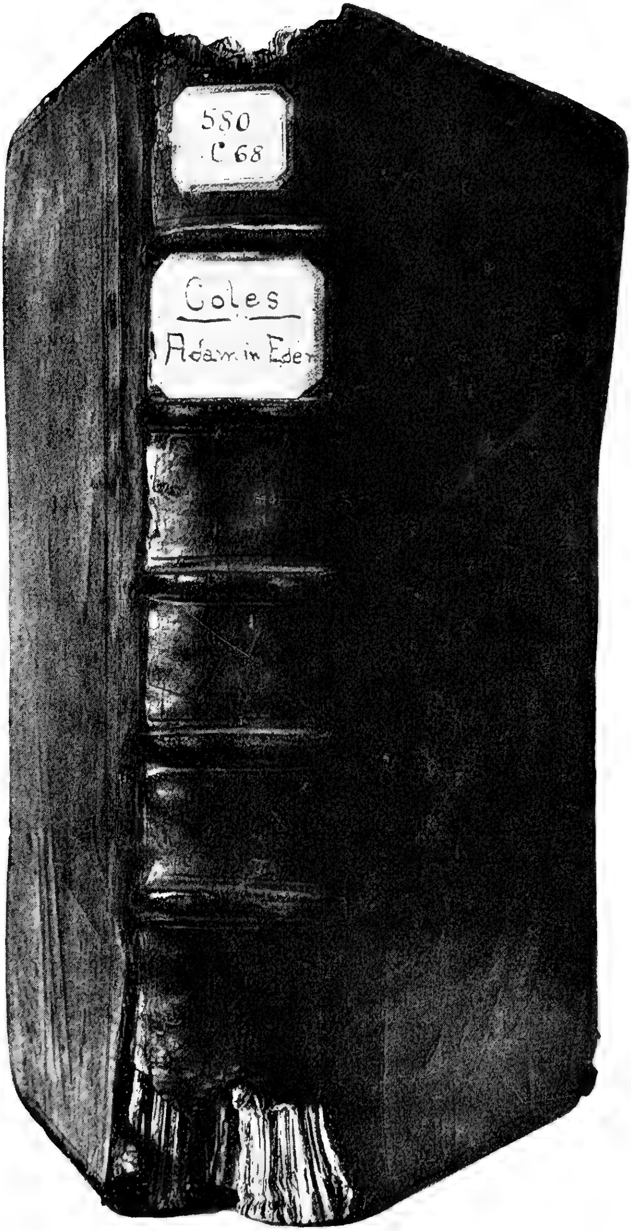


FIG. 1. Photograph of Adam in Eden in the library of the New York Botanical Garden.

ADAM IN *EDEN*: OR, NATURES PARADISE.*

THe Hiſtory of *Plants,* Fruits, Herbs and Flowers. with their ſeveral *Names,* whether *Greek, Latin* or *Engliſh*; the places where they grow; their Deſcreptions and Kinds; their times of flouriſhing and decreaſing; as also their several *Signatures, Anatomical appropriations,* and particular Phyſical Vertues; Together with neceſſary *Observations* on the seaſons of Planting, and gathering of our *English Simples* with Directions how to preserve them in their compositions or otherwise. A *Work* of such a *Refined* and *Uſeful* Method that the Arts of Phyſick and Chirurgerie are ſo clearly laid open, that *Apothecaries, Chirurgions,* and all other ingenuous Practitioners, may from our own Fields and Gardens, beſt agreeing with our *Engliſh* Bodies, on emergent and ſudden occaſions, compleatly furniſh themſelves with cheap, eaſie, and wholſome *Cures* for any part of the body that is ill-affected.

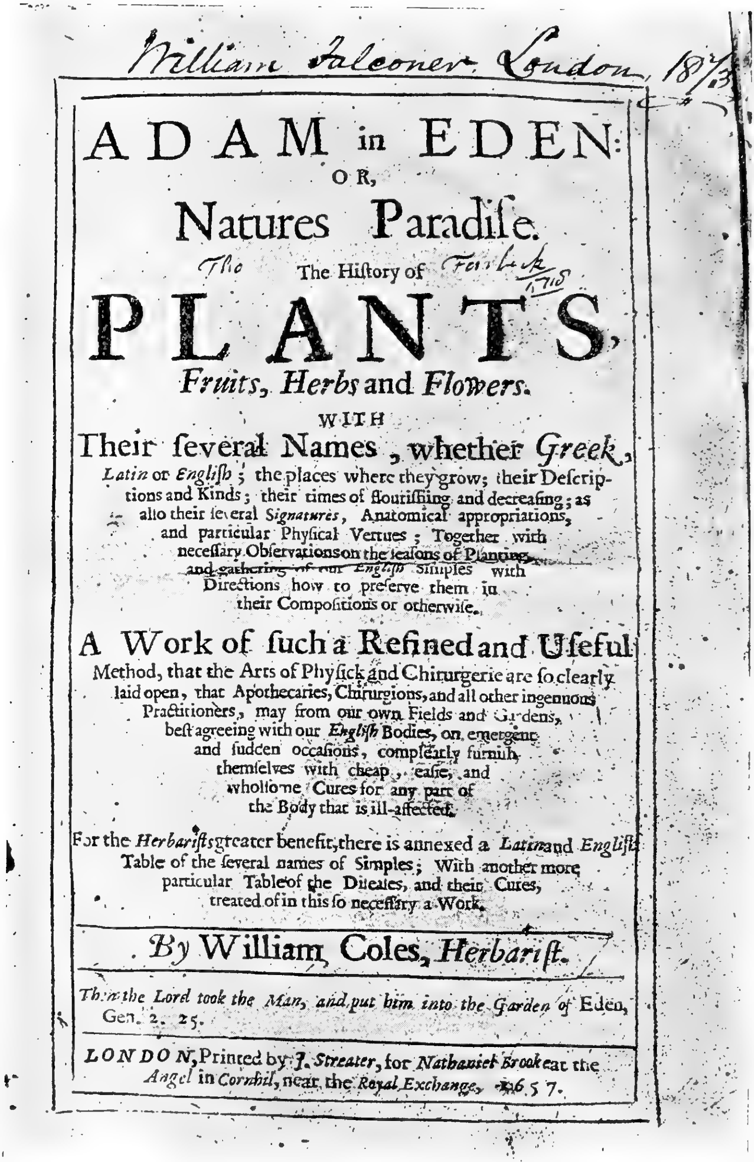
For the *Herbarists* greater benefit, there is annexed a *Latin* and *English Table* of the several names of *Simples;* With another more particular *Table* of the *Diſeaſes,* and their *Cures,* treated of in this ſo neceſſary a *Work.*

By *William Coles,* Herbarist.

Then the Lord took the man and put him into the Garden of Eden, Gen. 2. 25.

London, printed by J. Streater, for *Nathaniel Brooke* at the *Angel* in *Cornhil,* near the *Royal Exchange,* 1657.

* The original is in red and black ink; see the illustration on the next page. Permission to make this and the other photographs was given by Professor N. L. Britton, the director of the New York Botanical Garden.



William Falconer London 1873

ADAM in EDEN:
OR,
Natures Paradise.
The History of
PLANTS,
Fruits, Herbs and *Flowers.*
WITH
Their several Names, whether *Greek*, *Latin* or *English*; the places where they grow; their Descriptions and Kinds; their times of flourishing and decreasing; as also their several *Signatures*, Anatomical appropriations, and particular Physical Vertues; Together with necessary Observations on the seasons of Planting, and gathering of our *English* Simples with Directions how to preserve them in their Compositions or otherwise.

A Work of such a Refined and Useful Method, that the Arts of Physick and Chirurgerie are so clearly laid open, that Apothecaries, Chirurgions, and all other ingenuous Practitioners, may from our own Fields and Gardens, best agreeing with our *English* Bodies, on emergent and sudden occasions, compleatly furnish themselves with cheap, easie, and wholsome Cures for any part of the Body that is ill-affected.

For the *Herbarists* greater benefit, there is annexed a *Latin* and *English* Table of the several names of Simples; With another more particular Table of the Diseases, and their Cures, treated of in this so necessary a Work.

By William Coles, *Herbarist.*

Then the Lord took the Man, and put him into the Garden of Eden, Gen. 2. 25.

LONDON, Printed by *J. Streater*, for *Nathaniel Brooke* at the *Angel* in *Cornhil*, near the *Royal Exchange*, 1657.

Fig. 2. Title page of Adam in Eden.

To The TRULY NOBLE, AND Perfect Lover Of LEARNING, Sir William Paston, *Knight* and *Baronet.*

Moſt Honoured Sir,

N*Otwithſtanding the generall Dedication of this Herball which you will find at the Foot of my Epiſtle to the Reader, I have thought it abſolutely neceſſary to apply my ſelfe to your Worſhip in Particular, humbly beſeeching you to give me leave to commit it to your more immediate Protection, that in caſe it ſhould meet with any malevolent Spirits, that ſhould have any thoughts to caſt forth their venemous detractions and aſperſions upon it, the Luſter of your name appearing in the Front, might cauſe them to vaniſh, no otherwiſe then the nocturnall spirits doe at the approach of the sunne. That which imboldened me, though a ſtranger to you, to preſume ſo much upon your goodneſſe was the generall repute, that you have really deſerved by thoſe propitious Aſpects, that the nobleneſſe of your Nature hath vouchſafed to caſt upon thoſe, that bend their endeavor towards the advancement of any deſigne tending to the publique good, eſpecially if it be in order to the laudable ſtudy of Phyſick, wherein you have approved your ſelfe a good Patriot, aſ well as by thoſe happy diſcoveries you have communicated to the World; but more eſpecially in that rare cure of the* Gout, *which your Charity hath diſpensed with ſo much ſucceſſe* * * * *And amongſt the reſt, Students in the Herbary Art are as profitable Members as any other, for beſides that they are Trumpets of Gods glory, ſetting forth itſelfe so wonderfully in theſe Vegetables, they are alſo by ſome called the Handes of God becauſe they are his Inſtruments to apply thoſe things unto Mankind that he hath created for their preſervation. And in this reſpect Phyſick may be ſaid to be more effectual than Divinity it ſelfe, for though the Charmer or Preacher charme never ſo wiſely, yet if the Auditor be not* compos mentis, *but like the Deafe Adder, he will lose his labour. But ſuch are the Powerfull vertues of Herbs adminiſtered by a skillful Profeſſor, that they will even reſtore thoſe that have loſt their Senſes, and ſo not only make them capable of good Counſell* *and wholſome inſtruction, but cauſe both mind and body to reſume their priſtine Integrity. And thus in all Humility, I lay it down at your Worships feet, not without ſome hopes that you will be pleaſed to accept it, and to pardon the boldneſſe of*

Sir

Your most humble
Servant,
W. COLES.

To the Reader.

Courteous Reader,

TO make thee truly ſenſible of that happineſſe which Mankind loſt by the Fall of *Adam,* is to render thee an exact *Botanick,* by the knowledge of ſo incomparable a Science as the Art of Simpling, to re-inſtate thee into another *Eden,* or, *A Garden of Paradiſe* * * * for I dare boldly aſſert, that if there be any one that is become ſo much an Herbariſt, as to be delighted with the pleaſant Aſpects of Nature, so as to have walked a few turns in her ſolitary Places, traced her Allies, viewed her ſeverall imbroidered Beds, recreated and feaſted himſelf with her Fragrances, the harmleſſe delights of her Fields and Gardens; He it is, that hath embraced one of the greateſt of terreſtriall Felicities. Hence, it is, that Emperours, Princes, Heroes, and Perſons of the moſt generous Qualifications, have trod on their Scepters, ſleighted their Thrones, caſt away their Purples, and laid aſide all other exuberancies of State, to court their Mother Earth in her own Dreſſings; Such Beauties there are to be diſcerned in Flowers, ſuch Curioſities of Features to be found in Plants. When God Almighty would have *Adam* to partake of a perfection of happineſſe, even then when he ſtood innocent, he could find none greater under the Sun then to place him in a Garden. * * * With my Prayers for the proſperity of the Nations, together with my beſt deſires for the good succeſſe of mine Endeavours, I take

Leave and rest. Thine,
W. COLES.

To Th' *Ingeniously Learned,* Mr W. Coles,

on this *His* worthy *Labour,* intituled, *The Paradise of Plants,* or, *Adam in Eden.*

Sir, My *Affection,* not my Avarice,
Hath made *m'Intrude* into your *Paradiſe:*
Where, to amazement, I have gladly seen
Earth's fairest *Beauties,* dresſed in Lovely-green:

So *glorious,* so full of *Eloquence,*
They both *surprize,* and *captivate* the *Sense*
So *Ravishing,* I cease to wonder more
Why *Dioclesion,* the *Emperour,*
Put off his *purple,* and *resigned* up all,
To lead his *Life,* within a *Garden-Wall:*
So *various,* as if they meant to *Vie*
Their different *Faces,* with *Humanitie:*
So *Numerous,* we'd think the *Heav'nly-Scheme,*
Had not a Parent, for Each *Plant* of them;
(Whereas, though *Earth* their Common Mother be,
They All from *Heav'n,* derive a pedigree.)
But O their vertues! Thofe do strike one *Mute*
Th'are pas *exprefsion, some, paft finding out:*
Or peftered with an inconvenience, which
Makes Him that *knows 'em* but a *knowing-witch*
And that's one Reason th'are so clofely hid,
(*Nature's* whole *System* so inveloped)
And we (*Poor Mortalls*) thus exposed to trie
Endleffe Conclusions for their Energie.
Nor shoulde w'm any measure, this attain;
But that some Vocal *Signatures,* explain
The end of their *Production,* and *Restore*
To us, in part, what *Adam* knew before
In which grave work, a number have *done well*
But very few, had fortune to *excell:*
And those that did, the Anciens greatly Priz'd,
Rewarded high, nay, sometime *Idoliz'd*
* * * But now! what shall we say
What owe we to You, that we have *Smooth'd the Way,*
And *cut it shorter,* by whole shelv's of Books,
That serve, but to *confound* 'em Overlooks
Their *Bulkie Vol'ms?* So Methodiz'd the Art,
That now 'tis Apposite Man's ev'ry Part
Whose *Triple Regions* have their *Plants* at hand,
His *Limbs,* their proper Med'cines, at command.
* * * I could (almost)
Believe *the Wise*-man's *Books* were never *Lost,*
(Such is *Knowledge,* doth from hence accrew!)
Or (were they so) I'm fure th'are found in you.
Go on (Brave Soul!) and *Perfect* this *Design,*
Whil'st we *confpire,* to make *your* glory fhine;
And (with *Respect* to *Learning*) fancy still
That *Coles* hath writ, as *faer* as any *Quill*

S. Wharton.

TO

His Esteemed, William Coles, *upon his New Methodized History of* PLANTS.

SOme may condemn your forwardnesse, that you
Venture thus soon into the publick view;
But by the wisest sort 'tis understood,
No man can be too hasty to do good.
And may all those that enviously do brouze
Upon your Leaves, fare like the Vicars * Cowes;
The fault will be their own, yet still 'tis true,
In *Yew* there's poyson; though there's none in You:
For you have scrutiniz'd Dame-Natures store,
To find out Remedies, that may restore
Expiring Health, when the cold Hand of Death,
Is ready to extort our vitall breath.
And as Diseases subtilly do part
Themselves in Squadrons; some invade the heart,
Others the Head surprise; and others strive
If not to kill, to make Us dye alive.
So you your Plot ingeniously have laid,
To raise stout Forces with small Charges paid,
To charge their severall Parties in each part,
And Nature marches Hand in hand with Art.
Kind Nature alwayes hath held forth her Book,
But few have thought it worth their pains to look
Within those precious Leaves, wherein each cure
Is plainly legible in *Signature*.
You have reviv'd that Knowledge, and by Her,
You will be thought her best *Interpreter*.
Ile say no more; your Books themselves will praise,
And every Garden yield you verdant *Bayes*;
And they that find the good, with all their Souls,
Will wish *New-Castle* may send all such *Coles*.

* *See the Art of* Simpling, Chap. 19.

Anthracius Botanophilus.

TO

FIG. 3. A sample poetical tribute.

A Table of the *Appropriations,** ſhewing for what Part every *Plant* is chiefly medicinable throughout the whole Body of Man; beginning with the *Head;* quoted according to the chapters contained in this Book.

For the Head in generall.

Wallnuts,	1
Peony,	2
Poppy,	3
Squills.	4
Larch Tree its Agarick and Turpentine.	5

For the Eares.

Aſarobacca.	25
Ground Ivy,	26
Ivy,	27
Poplar-Tree,	28
Nightſhade,	29
Sow-sennell,	30
Sow-thistles,	31

For the Teeth.

Pine,	51
Pomegranate,	52
Maſtick,	53
Maſter-work,	54
Corall	55
Corall-wort	56
Henbane,	58
Wild Tanſy,	59

For restoring Hair.

Quinces,	14
Moſſe,	15
Maidenhare,	16

For the Mouth in generall.

Medlars,	41
Mulberries,	42
Mints,	43
Purſlane,	44
Golden Rod,	45

For the Dryneſſe of the Mouth.

Fleawort,	60

For the diſeases of the Throat, as Roughneſs, Quinſy, Kings Evill, &c.

Throatwort,	61
Date-tree,	62
Garlick,	72
Liquorice,	73
&c.	

ADAM in EDEN

OR,

The Paradise of Plants

THe Method which I ſhall follow in this enſuing Treatiſe, ſhall be according to that which Anatomiſts uſe in Mans body, which they divide into four parts, VIZ. *The upper middle, and lower Regions; and lastly, the Limbs. Firſt treating of thoſe plants which are appropriated to the Head, and to the ſeverall parts thereof. Secondly, of thoſe which*

* These are selections only from the first page of the Table of Appropriations. Other "Appropriations" not given in this selection are: For the Eyes, For the Brain, For the Nose, For the Scurvey, For ſhortness of Breath, For the Heart, Qualms, Faintneſſe, &c., For cooling and ſtrengthening the Stomack, For the Liver, For the Spleen, and For drawing out Splinters.

are appropriated to the Breaſt, and the parts therein contained. Thirdly, of thoſe which do more properly appertain to the ABDOMEN *or lower Region. And fourthly, of thoſe which particularly belong to the Limbs. In all when I ſhall obſerve thoſe* PLANTS *which have any ſpecial Signature; And I shall begin the Wall-nut-Tree, becauſe the fruit of it doth reſemble the Head in ſeverall particulars.*

CHAP. I.

Of the Wall-nut Tree.

ALthough the Wall-nut-Tree is generally known to moſt ſorts, yet left, in this reſpect, our *Treatiſe* ſhould ſeem lame, I ſhall take pains to deſcribe the form of it; but firſt I ſhall give you the Names and Kinds as I find them spoken of, both by the Ancient and Modern Botanicks.

The Kinds

Parkinſon and others reckon up eight kinds thereof: 1. Our ordinary Wall-nut. 2. The greateſt Wall-nut. 3. The thin-ſhelled Wall-nut. 4. The long Wall-nut. 5. The Wall-nut which beareth twice a year. 6. *St. Johns* Walnut, or the late-ripe Wall-nut, which ſhooteth not forth any leaves, till it be Midſummer. 7. The white Wall-nut of *Virginia.* 8. The black Wall-nut of *Virginia.* But becauſe all theſe kinds differ little in their vertue, I will deſcribe none here but the ordinary Wall-nut.

The Forme.

The *Wall-nut* is a lusty Tree both for height and bulk, and ſpreadeth forth many large Arms and Boughs, and muſt make a goodly ſhadow, when the leaves are on, which conſiſt of five or ſix faſtened to one rib, with one ſtanding on the top, like thoſe of the Aſh, but that they are much larger: * * * It beareth catkins or Aglets, which come forth before the nuts, of a yellowiſh colour, which open into ſmall flowers, and falling away, the round Nuts come in their places, two or three usually ſet together; but ſome times half a dozen or more, which are covered with a double ſhell; * * * Of the whole fruit growing on the Tree, there is this common old Riddle, which almoſt every child can ſay. Its

As high as an Houſe, As little as a Mouſe;
As round as a Ball, As bitter as Gall;
As white as Milk, As soft as Silk.

The Wood is much uſed by Joyners, to make Tables, Stools &c. It is very durable if it be kept dry, but rots preſently in the weather.

1

ADAM in EDEN:

OR,

The Paradiſe of Plants.

THe Method which I ſhall follow in this enſuing Treatiſe, *ſhall be according to that which Anatomiſts uſe in Mans body, which they divide into four parts,* viz. *The upper, middle, and lower Regions; and laſtly, the Limbs. Firſt treating of thoſe Plants which are appropriated to the Head, and to the ſeverall parts thereof. Secondly, of thoſe which are appropriated to the Breaſt, and the parts therein contained. Thirdly, of thoſe which do more properly appertain to the* Abdomen *or lower Region. And fourthly, of thoſe which particularly belong to the Limbs. In all which I ſhall obſerve thoſe* Plants *which have any ſpecial Signature; And I ſhall begin with the* Wall-nut-Tree, *becauſe the fruit of it doth reſemble the Head in ſeverall particulars.*

CHAP. I.

Of the Wall-nut Tree.

ALthough the Wall-nut-Tree is generally known to moſt ſorts, yet leſt, in this reſpect, our *Treatiſe* ſhould ſeem lame, I ſhall take the pains to deſcribe the form of it; but firſt I ſhall give you the Names and Kinds as I find them ſpoken of, both by the Ancient and Modern Botanicks.

The Names.

It is called by *Dioſcorides* and the other Ancient Greeks, Καρύα, becauſe they ſay, the ſmell of the Leaves cauſeth the Head-ach, deriving it from Κάρα, or Κόρη, which in that Language ſignifieth an *Head*; and it hath ſometimes the Epithite Βασιλικὰ adjoyned, becauſe it was brought out of *Perſia* into *Greece* by ſome of the *Gracian* Kings. It is called alſo by ſome of the Modern Greeks, Διὸς βάλανος, *Jovis glans*, and ſo the Latines from them *Diu-glans*, by contracting the word, and ſubſtracting the firſt Letter they called it *Juglans*. We Engliſh, call it the *Wall-nut-Tree*; and of ſome, *Walſh-nut-Tree*. The Nut is called in Greek Κάρυον βασιλικὸν; in Engliſh, *Wall-nut*; In Latine, *Juglans & Nux* Κατ' ἐξοχὴν.

The Kinds.

Parkinſon and others reckon up eight Kinds thereof: 1. Our ordinary Wall-nut. 2. The greateſt Wall-nut. 3. The thin-ſhelled Wall-nut. 4. The

B Long

FIG. 4. The first descriptive page.

The *Place* and *Time*

The place of its first Nativity was in Perſia, whence either the whole Tree hath been brought into divers other parts, or else the Nuts, which being put into the ground, do produce the Tree: for there is no other way of propagating it, unless it be of the *Virginian kinds.* It groweth commonly in *England* and some other places, in Orchards, Gardens, and ſometimes in the ſtreets and by the way ſides where the Boys be continually pelting at them. There is a Fable in *Æſop* of a woman which asked the Wall-nut-Tree growing by the way ſide, which was pelted at with ſtones and ſticks, by them that paſſed by, why it was ſo fooliſh to bring forth fruit, ſeeing that it was ſo beaten for its pains, to which the Tree rehearſed theſe two Proverbial Verſes: * * * The *Engliſh* whereof I could tell you but that I fear the women of this prepoſterous age would be angry.* True it is, that this Tree, the more it is beaten, the more Nuts it bears; and therefore good Husbands, after they have beaten down the Nuts, do with long Poles, beat the empty boughs of the Tree; and I have obſerved, that thoſe Trees which have grown in the ſtreets, have been full, when thoſe which have growen in the back have had ſcarce any, which I could impute to nothing else, * * *

The *Signatures* and *Vertues.*

Wall-nuts have the perfect Signature of the Head: The outer husk or green Covering, represent the * * * outward skin of the skull, whereon the hair groweth, and therefore ſalt made of thoſe huſks or barks, are exceeding good for wounds in the head. * * * The *Kernel* hath the very figure of the Brain, and therefore it is very profitable for the Brain, and resists Poyſons; For if the kernel be bruiſed, * * * and laid upon the Crown of the Head, it comforts the brain and head mightily.† * * * And true it is, that two dry Wall-nuts, and as many Figs, and twenty leaves of Rue, bruiſed and beaten together, with two or three Corns of ſalt were King *Mithridates* Medicine againſt poyſon, which after he had long uſed daily, at last he ſought to poyſon himself, but could not. And no marvel for the water of green Wall-nuts, taken about Midſummer, being drunk two or three ounces, cooleth and reſisteth the Peſtilence. * * * A peece of the green huſk, put into an hollow Tooth, eaſeth the pains thereof. Some uſe the green husks * * * to ſeaſon their meat; but if ſome dryed Sage in Pouder be put into it, it will give a ſeasoning and reliſh not to be deſpiſed of poor folks. The Oyl of Wall-nuts * * * maketh ſmooth the hands and face, and taketh away * * * black and blew marks that come of blows and bruiſes, * * *. It is averred by ſome that if a Wallnut be * * * put into a chicken, it will cauſs it to be roaſted a great deal the ſooner.

* Translated popularly they are:

A woman, a donkey, and a walnut tree,
The more they're beaten, the better they be.

† "Very good" was written in pencil on the margin opposite this sentence.

2 *Adam in* Eden, *Or*,

long Wall-nut. 5. The Wall-nut which beareth twice in a year. 6. St. *Johns* Wall-nut, or the late-ripe Wall-nut, which shooteth not forth any leaves, till it be Midsummer. 7. The white Wall-nut of *Virginia*. 8. The black Wall-nut of *Virginia*. But because all these kinds differ little in their vertue, I will describe here none but the ordinary Wall-nut.

The Forme.

The *Wall-nut* is a lusty Tree both for height and bulk, and spreadeth forth many large Arms and Boughs, and must make a goodly shadow, when the leaves are on, which consist of five or six fastned to one rib, with one standing on the top, like those of the Ash, but that they are much larger: the bark is somewhat green in the younger boughs; but in the Trunk, it is tending to the colour of Ashes, and is full of clefts for the most part; It beareth Catkins or Aglets, which come forth before the Nuts, of a yellowish colour, which open into small flowers, and falling away, the round Nuts come in their places, two or three usually set together; but sometimes half a dozen or more, which are covered with a double shell; the outermost, green, soft, thick, of a strong smell, the juice colouring black; under which there is a wooddy shell, wherein a white sweet *Kernel* is contained, enclosed with a yellowish, bitter peeling, which commeth off easily while it is fresh, but will not do so when it is old: the inner pulp thereof is white, sweet, and pleasant to the tast, when it is newly gathered; for after it is dry it becommeth oily and rank. Of the whole fruit growing on the Tree, there is this common old Riddle, which almost every Child can say. Its

As high as an House, As little as a Mouse;
As round as a Ball, As bitter as Gall;
As white as Milk, As soft as Silk.

The Wood is much used by Joyners, to make Tables, Stools, &c. It is very durable if it be kept dry, but rots presently in the weather.

The *Place* and *Time.*

The place of its first Nativity was in *Persia*, whence either the whole Tree hath been brought into divers other parts, or else the Nuts, which being put into the ground, do produce the Tree; for there is no other way of propagating it, unlesse it be of the *Virginian* kinds. It groweth commonly in *England*, and some other places, in Orchards, Gardens, and sometimes in the streets, and by the way sides, where the Boys lie continually pelting at them. There is a Fable in *Æsop*, of a Woman which asked the Wall-nut-Tree, growing by the way side, which was pelted at with stones and sticks, by them that passed by, Why it was so foolish as to bring forth fruit, seeing that it was so beaten for its pains, to which the Tree rehearsed these two Proverbiall Verses:

Nux, Asinus, Mulier, simili sunt lege ligati
Hæc tria nil recte faciunt, si verbera cessent.

The *English* whereof I could tell you, but that I fear the Women of this preposterous Age would be angry. True it is, that this Tree, the more it is beaten, the more Nuts it bears; and therefore good Husbands, after they have beaten down the Nuts, do with long Poles, beat the empty boughs of the Tree; and I have observed, that those Trees which have grown in the streets, have been full, when those which have growen in the back sides have had scarce any, which I could impute to nothing else, but that those in the street were beaten and throwen at, more then the other: they blossom early before the leaves come forth, and the fruit is ripe in *September*, except St. *Johns Wall-nut*, which ripeneth not till *October*.

The

FIG. 5. The second descriptive page.

CHAP. II

Of the Piony.

The *Kindes.*

THe Sorts of *Pionyes* which I have met with, are in number 11. 1. The male *Piony.* 2. The Female *Piony.* 3. Double Red Piony. 4. The double white Pyony. 5 The Spanifh Dwarf Piony. 6 Columbine leafed Pyony. 7. The party coloured Piony. 8. The female white Piony. 9. The female yellow Piony. 10 The doubtful female Piony. 11. Certain, fingle, and double female Pionies, that fprang with Clufius, of the feed of the double Red, which is not usual. All thefe forts, except the female, are Plants fo fcarce, that they are poffeffed but by a few, and thofe great Lovers of Rarities in this kinde and therefore I shall trouble you onely with the defcription of that.

The *Forme.*

The * * * *Piony* rifeth up with many ftalks, * * *. At the top of the ftalks, are growing fair large red flours, like the great double Rofe of Provence; but that it is of a darker red, having alfo in the midft, yellow *Threds* or *Thrums* like them in the Rofe, which fome take to be the feed though falsely, which being faded and fallen away, there come in their places, two, three, or four rough crooked *Pods,* bending a contrary way, as fome Rams Horns do.

The *Signature* and *Vertues.*

The Heads of the Flower of *Piony,* being not yet blown, have some Signature and proportion with the Head of man, having sutures and little vains difperfed up and down like unto thofe which environ the brain, * * * the Roots are moft effectuall; for if they be frefh taken up and hung about the neck of children they cure it [Falling-fickneffe]; but the fureft way both for them, and efpecially thofe which are elder if to take the roots * * * and infufe it in a fufficient proportion of Sack, for four and twenty hours at leaft, being firft wafhed clean, and ftamped very small, then ftrain it, and drink a good draught firft and laft, morning and evening, for feverall dayes together, before and after the full of the moon; * * * The distilled water, or Syrup, made of the flowers, worketh the same effect that the Root and Seed do, though more weakly. Take the roots of *Piony,* and peel off the outward skins: take alfo Periwinckle leaves, ftamp and ftrain them into black Cherry-water, and let the Patient for three mornings fafting, drink a good draught thereof; but if he mend not at three times, let him drink longer. This Receit was approved by the Lady *Cage.*

CHAP. III.

Of Poppie

The *Names.*

THe general name * * * in plain *English* is, Because it doth ſo ſtupifie thoſe that eat it, that they can not go about their buſineſſe, or becauſe the uſe of it doth * * * at length make men inſenſible.

The *Kindes*

There be severall sorts of *Poppies,* some tame and of the garden as 1. The white garden Poppy * * * 3. Little red Poppy or Corn-rose* * * * 5 Murry coloured Poppy. * * *

The *Forme.*

Spatling Poppy * * * hath divers weak tender stalks, full of joynts, about a foot or half a yard long, uſually lying on the ground, whereon grow many pale whitiſh green leaves, two always ſet together at the joynts, one againſt another; * * * at the tops of the ſtalks upon many ſlender foot-ſtalks, ſtand divers white flowers, composed of five small leaves apeece, with a deep notch in the middle of every one of them * * *.

The *Signature and Vertues.*

The Heads of the Poppies with their crowns do ſomewhat repreſent the Head and Brain, and therefore the decoctions of them are uſed with good ſucceſſe in ſeveral diſeaſes of the Head. The Garden Poppy Heads with the seeds, made into a Syrup, procureth rest and ſleep in the ſick and weak, * * * Mr. *Culpepper* ſaith, that it is the juyce of the white Poppy growing in *England,* which they sell for *Opium* in the Shops, though they pretend to have it out of the Eaſtern Countries, where they gather it only from the heads of the great white Poppy; but certainly his Pen run before his Wit, when he ſaid it grew beyond the moon: for there is no queſtion, but that it is ſo gathered in thoſe parts * * * It was the head of this Poppy which the Greeks * * * [thought] to foreſhew, as they conceived, the ſuccesſ of their love: For theſe Flowers, the tops being cloſed together with ones fingers, ſeem like little Bladders, which being broken againſt ones other hand, make a noiſe like unto the Bladders of little Fiſhes, being broken: If they gave a good report, they concluded they ſhould be ſucceſſful; if not, they preſently let fall their suit: so ſuperſtitious were thoſe people, as ſome in our own dayes be. * * *

* The common poppy of the wheat or "corn" fields, doubtless.

CHAP. VII

Of Sage.

The *Signature* and *Vertues.*

THe leaves of sage which look as if they were ſcorched by blaſting, do by Signature give help to thoſe parts of a mans body that seem to be as it were dead by ſome blaſting, in reſtoring the natural heat and vigour to the part: in which quality it excelleth, giving a friendly and beneficial Comfort to the Vital Spirits. This herb hath many rare properties, but three eſpecially which are contained in the following Verſes,

Sage helps the Nerves, and, by its powerfull might,
Palſies and Feavers ſharp it puts to flight.

Sage is of excellent good uſe also, to help the memory by warming and quickening the Sences, and the Conserve made of the flowers is uſed to the ſame purpoſe; The eating of Sage in the moneth of *May* with Butter, Parſly, and ſome ſalt is very commendable for the continuation of health to the Body; * * *

CHAP. VIII

Of Rosemary

The *Place* and *Time*

THe ordinary Roſemary, as alſo that with the gilded Leaves are no Strangers here in *England,* for they are to be found in most gardens, though their natural ſoil be in *France, Spain,* and other hot Countries. In that part of *France* which is called *Provence,* it groweth of itſelf without ſetting, and is uſed for a common fuel. There is so great plenty of it likewiſe, in *Spain,* that the Odour of it, is many times ſmelt by thoſe in the Ships that paſſe by, many leagues off from the Land. * * *

The *Vertues*

* * * The Chymicall Oyl drawn from the Leaves and flowers is a Soveraign help for all the diſeaſes aforeſaid, if the Temples and Noſtrills be but touched with a drop or two, it helpeth the head and brain, and ſo it doth any cold-benummed Joynt, Sinew, or member, * * *

CHAP. XII

Of the Lilly *of the* Vally

The Kinds.

OF this Lilly I find but two sorts. 1. Lilly-Convally with white flowers. 2 Lilly-Convally with red flowers.

The *Forme,*

The Lilly of the Valley hath leaves, ſomewhat like unto other white Lillies, or rather like unto the leaves of the ſmallest water Plantains, among which doth a ſlender and ſmall ſtalk ſpring up; in the top of which grow forth little ſsmall white flowers, like little bells, with turned edges, and of a pleaſant ſmell; which being paſt there come ſmall red berries, much like the berries of *Aſparagus;* wherein the ſeed is contained. The root is ſmall and ſlender, creeping farre abroad in the ground.

The Temperature and *Vertues.*

The Lillies of the Valley * * * ſtops the paſſages of the Leproſy beginning that the ſame ſpread no further abroad. * * The water alſo aſſwageth the swellings of the stingings of Bee and Waſps, if it be applyed to the part. * * * The wine is more precious than Gold; for if any one that is troubled with the *Apoplexy* drink thereof, with ſix grains of Pepper, and a little Lavander water, they ſhall not need to fear it that moneth; * * * Six ounces of the water of the flowers, helpeth thoſe that are poyſoned or bit with a mad dog, and being drunk fourty daies, it doth away the falling Sckneſſe. * * * *Gerard* ſaith, That a glaſſe being filled with the flowers of *May* Lillies, and ſet in an Ant-hill with the mouth cloſe ſtopped for a months ſpace, and then taken out, you ſhall find a Liquor in the Glaſſe, which being outwardly applyed helps the Gout very much.

(*To be continued.*)

A NEW TERRESTRIAL ORCHID

In November, 1903, during an excursion to the vicinity of Camp Longview in the southern end of the Everglades, Mr. J. J. Carter, Mr. A. A. Eaton, and the writer discovered a peculiar orchid in the pine woods along the trail about two miles northeast of the point where the trail crosses Long Prairie. The plant was first observed by Mr. Carter, and only two plants were found.

The material was divided and one part sent to Mr. Oakes Ames' Botanical Laboratory, while the other was sent to the New York Botanical Garden, with the hope that the specimens might continue to grow and flower in one or both of these institutions, as the plants found had well developed buds, but no open flowers. Unfortunately both specimens were damaged by cold weather before they reached their destinations, and they both died. Fortunately, however, the best plants were sent to Mr. Ames who made careful camera lucida drawings of the parts of the flower-bud. Mr. Ames tentatively referred the plants to *Tetramicra Eulophiae* Reichenb. f. in a paper published in the Proceedings of the Biological Society of Washington **19**: 2. 1906.

In September of the following year, 1904, Mrs. Britton collected specimens of the same orchid on New Providence, Bahamas; and the dissections, and the field notes made by Dr. Britton, correspond almost exactly with the dissections and notes made by Mr. Ames.

Mr. Eaton's continued exploration of the Everglade Keys in 1903 and Mr. Carter's and the writer's further exploration of that region in 1904 failed to reveal further specimens, although diligent search was made. However, while we were in the pine woods in the vicinity of Long Prairie in October, 1906, Mr. Carter again found two plants at a point about two miles south of the locality where he discovered similar plants in 1903.

Further study of the plant proves it to be a complete novelty. I take pleasure in naming it for Mr. J. J. Carter, of Pleasant Grove, Pennsylvania, who was the first one known to lay eyes on it.

Carteria gen. nov.

Caulescent herbs with clustered fleshy tubers and erect simple stems. Leaves various, the basal ones firm, narrow, with plicate blades, the cauline ones mere sheathing scales. Flowers several, erect, axillary to scale-like bracts. Perianth colored. Sepals nearly equal, narrow, longer than the petals. Petals decidedly narrower than the sepals. Lip short, sessile, slightly 3-lobed at the apex, with the middle lobe much longer than the lateral ones, the body with 5 longitudinal crests. Capsules erect.

Carteria corallicola sp. nov.

Stems 2–3.5 dm. tall, rather slender, fleshy: basal leaves 2–7 cm. long; blades nearly linear, narrowed at both ends, often curved: spike of flowers rather inconspicuous, erect: lateral sepals linear-lanceolate to broadly linear, 6.5–7.5 mm. long, green or greenish-yellow: petals linear or nearly so, yellowish-green or greenish-white: lip oval to orbicular-oval, 6–7 mm. long, the body yellowish, with the crests extending to the base of the middle lobe, the lobes magenta, or magenta-pink at the tips: anther magenta: mature fruit not seen.

In pinelands, Everglade Keys, Florida. Also in the Bahamas. Type collected about two miles northeast of the point where the old trail crosses Long Prairie, October 31, 1906, J. K. Small, J. J. Carter, A. A. Eaton.

Carteria is related to *Triphora*, but differs in the position of the flowers, and the lip, as described above, and in the short column, the prominently 3-lobed stigma which is thick and spongy at the base, and the inconspicuous anther-connective.

J. K. Small

REVIEWS

Collins' The Green Algae of North America *

American students of the fresh-water algae and of the marine Chlorophyceae have welcomed the appearance of Collins' descriptive work on the green algae of North America, which treatise they have now been able to put to a practical test for about a year. This dignified book of four hundred octavo pages and eighteen plates begins with an Introduction, in which are discussed the scope of the work, the present status of our knowledge of this group of plants, and methods of collecting, preserving, and studying the algae. The author has used the term "green algae" in the broad familiar sense, instead of trying to make it conterminous with the "Chlorophyceae" of most modern authors. However, the Desmidiaceae are omitted as constituting a proper specialty of their own on account of their numbers and peculiar characters and the Characeae are left out owing to their slight affinities with the green algae in the narrower sense. The class Heterokontae, proposed by Luther in 1899 and adopted a little

* Collins, Frank Shipley. The Green Algae of North America. Tufts College Studies (Scientific Series) **2**: 79–480. *pl. 1–18.* Jl 1909.

later by Bohlin, Blackman and Tansley, West, and Oltmanns, has been accepted as a group coördinate with the Chlorophyceae, though the author has followed Luther, and Oltmanns, in keeping the Vaucheriaceae in the Chlorophyceae rather than Bohlin, and Blackman and Tansley, in transferring them to the Heterokontae. The Flagellates are excluded and the Conjugatae find themselves again under the Chlorophyceae, as with West.

Keys to the families, genera, and species add much to the working value of the book, as do, also, the one hundred and sixty good figures illustrating most of the principal genera. References to the more important literature and to exsiccatae assist the reader to further information as to points of special or critical interest.

A carping critic might find now and then in Mr. Collins' work a few features to mention unfavorably, but that would doubtless be more or less true of every book of the sort that was ever published or that ever will be published. Some of the keys to the species, notably that to the species *Penicillus*, omit the more distinctive and diagnostic specific characters or translocate them in such a way that the student would be often misled in an attempt to determine species by their aid. *Rhipocephalus oblongus* (Decaisne) Kützing, known only from the Bahamas, is omitted altogether. This is evidently a distinct species, often much resembling *Penicillus capitatus* in habit and much weakening the generic distinction of *Rhipocephalus* from *Penicillus*. And there are in the work slips and inaccuracies of a less important character, such as the accidental attributing of figure 148 (*Acicularia Schenckii*) to Börgesen rather than to the present reviewer. But occasional omissions and lapses are of course inevitable in a work of the size and scope of the present one. In bringing together in a single volume and in the English language the descriptions of the green algae of North America, Mr. Collins has done much to stimulate and facilitate the study of this interesting group of plants and American students of the algae will not be slow in acknowledging their great indebtedness to him.

MARSHALL A. HOWE

OF INTEREST TO TEACHERS

Biological Geography

Under this heading the Association of American Geographers, at the Boston meeting in December, tabulated the following statements for part of the discussion at the round table conference on the organic side of geography, its nature and limits:

The factors of a plant habitat are all more or less geographical, but the investigation of some, such as light, pressure, polarity and gravity belongs in high degree to the expert in structural and physiological botany.

The relation of plants to other factors, as water, is of the highest importance to the geographer and offers a common field of investigation.

It makes small difference who does this work, and whether he is called a botanist, an ecologist, a geographer, a geographical botanist, or a botanical geographer.

In any case the results are available both to the botanical expert and to the geographer for their special purposes.

The distribution of animals is zoö-geographical. The investigator may be a geographer or a zoölogist, or both combined.

Insect and germ life in relation to public health, both in tropical and temperate regions, require medical, biological, and geographic experience in the investigator. The subject therefore has a place in geographic investigation and education.

Animal life is related to agriculture and to food. Commercial geography should go further in recognizing advances in animal industry, and in taking account of importations, game protection and the control of disease.

The student who is more zoölogist and less geographer or more geographer and less zoölogist would be capable of certain work, but the investigator must have training in both fields.

The aims they state are practical rather than theoretical, and directed toward securing the best available conception of the earth and its life which is possible to the present generation.

NEWS ITEMS

Fred MacAllister has been appointed instructor in botany at Cornell University.

At Northwestern University William Logan Woodburn has been appointed instructor in botany.

Dr. R. M. Harper is continuing his work on the peat deposits of Florida for the State Geological Survey.

Charles H. Shattuck (Ph.D., Chicago) has been appointed professor of forestry in the University of Idaho.

Professor H. A. Edson, of the University of Vermont, has accepted a position with the Bureau of Plant Industry.

Lord Strathcona, the chancellor of Edinburgh University, has given $50,000 to endow a chair of agriculture in that institution.

Prof. C. Stuart Gager, director of the new Brooklyn Botanic Garden, has joined Dr. N. L. Britton, director-in-chief of the New York Botanical Garden, on his Cuban exploration trip.

H. S. Jackson, assistant in plant pathology at the Oregon Agricultural Experiment Station, has been appointed professor of botany and plant pathology at the Oregon Agricultural College.

J. B. Carruthers, assistant director of agriculture at Trinidad, died in July. Mr. Carruthers formerly held similar positions in Ceylon and with the Federated Malay States.

Warren C. Norton has been made assistant in botany at the North Carolina College of Agricultural and Mechanical Arts; B. B. Higgins, of that institution, has been made assistant at Cornell University.

Dr. Charles Hugh Shaw, formerly professor of botany at Temple College, Medico-Chirurgical College (Philadelphia), and Ursinus College, and assistant professor in the University of Pennsylvania, was drowned August 8 near Revelstoke, British Columbia. Dr. Shaw has for several seasons conducted botanical expeditions into the Selkirks.

Five research fellowships in the Henry Shaw School of Botany, each carrying an allowance of $500 per year, have been established through the action of the trustees of the Missouri Botanical Garden ; they are to be known as the Rufus J. Lockland research fellowships, in honor of the late president of the board.

Edward W. Berry, of the Johns Hopkins University, will spend September and October in collecting fossil plants from the Cretaceous and Tertiary of the Gulf region from Florida to Louisiana, and northward through Arkansas, Tennessee and Kentucky. It is hoped that these collections will have an important bearing upon the correlation of the containing deposits and will serve as a basis for subsequent monographic studies.

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BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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TORREYA

September, 1910

Vol. 10 No. 9

POTENTILLAE OF THE ARCTIC–ALPINE ZONE ON PIKE'S PEAK

Five species of *Potentilla*, with their near relative *Dasiphora fructicosa*, appear within this zone on Pike's Peak.

P. saximontana Rydb. is by far the most abundant and conspicuous. It occurs everywhere and exhibits many variations of habit due to its environment. Ordinarily of a caespitose habit, in well-watered situations it becomes more branching and erect; in dry wind-swept areas a plant often consists of a single prostrate caudex. It blooms through the entire growing season and may be found even late in October in protected spots. Dr. Rydberg said of the specimen I submitted to him for identification: "*P. saximontana* Rydb. approaching *rubripes;* I am afraid the two species run too much into each other and probably are but one." The other species of the group "Rubricaules" of the Flora of Colorado which have been reported from Pike's Peak evidently were the variations of this species.

P. viridior Rydb. is often similar to *P. saximontana* in habit but differs in its narrower, darker petals and larger leaf surface. It blooms earlier in the same localities and typical plants are taller and "stemier" with the leaves darker green above. According to Dr. Rydberg the leaves of the plants of this locality seem to be whiter beneath than those of the type plant. This species is quite frequent along trails and rivulets up to 12,200 feet.

P. filipes Rydb. is quite variable and not found above 12,000 feet. This species is *P. pulcherrima* of the Flora of Colorado but the altitudinal range should be extended upward 2,000 feet, for it occurs in dense patches on grassy banks well above timber

[No. 8, Vol. 10, of Torreya, comprising pages 169–192, was issued August 29, 1910.]

line. Leaves with seven and nine or even more leaflets are common, especially where the struggle for existence is keen as in dry, gravelly spots, and some leaves even assume a pinnate form under these conditions.

P. dissecta var. *glaucaphylla* Lehm. is abundant along stony water-courses up to 12,500 feet and is the earliest spring-blooming species. It is the only smooth-leaved *Potentilla* within the zone and the leaves are toothed only at the apex in marked contrast to the many lobes and divisions of the leaves of the other species. The species itself does not appear within the zone.

P. bipinnatifida Dougl. occasionally may be found well above timber line. It is abundant at 11,000 feet and at that altitude is a robust and branching plant. Above timber line it occurs only along the trails and is a small plant with contracted leaf surface and few flowers. In these situations it blooms in late August and seldom exhibits perfect development.

Dasiphora fructicosa (L.) Rydb. appears up to 12,500 feet and is especially noticeable among the alpine flowers for its shrubby habit. While it becomes quite dwarf and prostrate at the altitudinal limit, its bright yellow flowers make it always conspicuous and unmistakable.

BLANCHE SOTH

MANITOU, COLORADO

ADAM IN EDEN OR NATURE'S PARADISE*

EXTRACTS BY JEAN BROADHURST

CHAP. XIII

Of Misselto

The Forme.

MIſſelto is an excreſcence ariſing from the branch or arm of the Tree whereon it groweth with a woody ſtemme, parting it ſelf into ſundry branches; * * * within the berry is contained a ſmall black kernell or ſeed, which hath been put into the ground, and other places, but was never yet known to grow, it being indeed without any root.

* Illustrated with the aid of the Catherine McManes fund. Continued from August, 1910.

The Place and Time.

This excrefcence groweth upon Apple-Trees, Pear-Trees, Crab-Trees, * * * but that which groweth upon the Oak, is very rare in *England.* * * * Ordinary Mistleto flowreth in the Spring; but the Berries are not ripe untill *October,* and abide on the Branches all the Winter, unlefs the Thrufhes and other Birds devour them. It is one of thofe things wherewith countrey people adorn their houfes at *Christmas,* and is celebrated in this old Caroll,

> *Holly,* and *Ivy, Misselto,*
> *Give me a red Apple, and let me go* &c.

The Signature and Vertues.

Clusius * * * gives orders that it fhould not touch the ground after it is gathered, and alfo faith, That being hung about the neck, it remedies Witch-craft.

CHAP. XIV

Of the Quince Tree.

The *Signature and Vertues*

THe Down of Quinces doth in fome fort refemble the hair of the Head, the Decoction whereof is very effectual for reftoring of Hair that is fallen off by the French Pox, and being made up with Wax, and laid on as a Plafter, it bringeth hair to them that are bald, and keepeth it from falling, if it be ready to shed: * * * The Juyce of raw Quinces is held as an Antidote againft the force of deadly poyfon, not suffering it to have any force in the body; for it hath been often found to be moft certain true, that the very fmell of a Quince hath taken away all the ftrength of the poyfon of white *Hellebore,* which the Hunters of *Spain* and *Navarre* make to kill wilde Beafts, by dipping their Arrow-Heads therein. It is alfo certain, that if Quinces be brought into an house, where grapes are hung up to be kept dry all the year, they will affuredly rot. * * * The Marmalade of Quinces is toothfom, as well as wholefom, and therefore I cannot blame fuch Gentlewomen which are feldom without it in their Clofets.

CHAP. XV

Of Mosses.

The Kindes

THe Sorts of thefe are very numerous: * * * I fhall therefore for brevity fake, fet down thofe which I find to be ufeful and let the reft alone; and the firft is Our common ground-Moffe. 2. Cup-Moffe. 3. Club-Moffe. 4. Oak-Moffe. 5. Apple-Tree Moffe. 6. Moffe of a Dead Mans Skull. * * *

The Places and Time.

The common Moffe groweth more or leffe everywhere, but especially in fhadowy places, and is ufed in flating of houfes, in fome Countries. * * * but the last which is the Moffe of a dead Mans Skull is oftner brought out of Ireland * * *

The *Signature* and *Vertues.*

A Decoction of the long Moffe that hangs upon Trees, in a manner like hair, is very profitable to be ufed in the falling off of the hair, and this it does by Signature. * * * My Lord *Bacon* faith, that there is a fweet Moffe growing upon Apple-Trees, which is of excellent ufe for Perfumers, who if they knew it, would greedily catch after it. The Moffe that groweth upon dead Mens Skulls * * * becaufe it is rare, and hardly gotten * * * [is] more set by, to make * * * Weapon-Salve * * * but as *Crollius* hath it, it should be taken from the Skulls of thofe which have perifhed by a violent death.

CHAP. XXVIII

Of the Poplar Tree.

The Names.

BEcaufe Ivy is a plant that feldom groweth but where Trees grow, I have placed a tree next it, and that is the Poplar Tree: their leaves being alfo fomewhat alike; * * * In *Englifh* Afpe, and Afpentree, and may alfo be called, *Tremble,* after the French name; becaufe the leaves wag, though there be no wind: and therefore the Poets and others have feigned them to be the matter, whereof womens tongues were made, which feldom ceafe wagging. * * *

The Virtues.

* * * The young clammy buds, or eyes, before they break out into leaves bruifed, and a little Honey put to them, is a good medicine for a dull fight by Signature.

CHAP. XXXIII

Of the Flower de Luce.

The Names

THe Greeks [have named] it *Confecratrix,* all great and huge things being counted by the Ancients to be Holy; but it was called Iris, * * * from the Rainbow whofe various colours the flowers thereof doth imitate. * * * I have heard it called Roft Beef, for that the leaves being bruifed fmell fome-what like it. The Flowerdeluce is called in Englifh *Iris* but moft commonly *Orris.*

The kinds

So many of the forts as I find fet down in *Parkinfons* Theater of Plants, I here fet down; which are eight. 1. The greater Broad leafed Flowerdeluce. 2. The Greater Narrow leafed Flowerdeluce. * * * ; to which I adde, 1. *Iris tuberofa* the knobbed Flowerdeluce; 2 the common Flowerdeluce; 3. Water flags or wild Flowerdeluce.

The Form.

The Common Flowerdeluce hath long and large flaggy leaves, like the blade of a fword with two edges, amongft which fpring up fmooth and plain ftalks, half a yard long or longer, bearing flowers towards the top, compact of fix leaves joyned together: whereof three that ftand upright are bent inward one toward another, and in thofe leaves that hang downward there are certain rough and hairy Welts, growing or rifing from the nether part of the leaf upward, almoft of a yellow colour, The Roots be long, thick and knobby, with many hairy threds hanged thereat; but being dry is without them, and white.

The *Signature* and *Vertues.*

* * * Take of the roots in powder half an ounce Cinnamon and Dill of each two drachms, Saffron a fcruple, mix them well together, lay them on a Scarlet Cloth moiftened in White wine, and apply it warm * * * . The green roots bruifed and applyed to black and blew marks in the skin taketh them away * * * ; but it is better to apply it with red Rofe water, and a little Lin-Seed Oyl,

or oyl of Parmacity in manner of a Pultis * * * An Electuary made hereof, * * * is very good for the Lungs, and helps cold infirmities of them, as Asthmas, Coughs, difficulty of breathing, &c. You may take it with a Liquoris ſtick, or on the point of a knife, a little of it at a time and often.

CHAP. XXXIIII

Of HORS-TAIL

IT is * * * of the forme of a Horſetail, which the ſtalk of leaves, being turned downwards, doth reſemble. By other names it is likewiſe called * * * *Aſprella* becauſe of its ruggedneſſe which hath not formerly been unknown to country Houſwives, who with the rougher kind hereof, called in Engliſh Shavegraſs, did, as now with Elder Leaves, but more effectually, ſcowre their Pewter, Braſs, and Woodden Vessels; and there-fore it hath been by ſome of them called Pewterwort: but I think that piece of Thriftineſſe with many other are laid aſide, which might profitably be revived, * * * Fletchers alſo and Combe makers poliſh their work therewith.

The Form.

The greater Horſetail that groweth in wet grounds, at the firſt ſpringing hath heads ſomewhat like to thoſe of Aſparagus, and after grow to be hard, rough, hollow ſtalks, joynted at ſundry places up to the top, a foot high: ſo made as if the lower part were put into the upper, whereat grow on each ſide a buſh of ſmall long Ruſh like hard leaves, each part reſembling an Horſetail, at the tops of the ſtalks come forth ſmall Catkins like unto thoſe of Trees; the root creepeth under ground having Joynts at ſundry places.

The Places and Time.

Many of the foreſaid ſorts grow generally up and down this Land, but ſome of them are not ſo frequent as others * * * : Small party coloured Horſetail, or Horſetail Coralline (whoſe leaves being bitten, ſeeme to be compoſed of Sand, from their grating between the teeth) groweth on a bog by *Smochal,* a wood nigh Bathe. * * * You may gueſſe where the reſt grow by their titles; they do all ſpring up with their blackiſh heads in *Aprill,* and put forth their blooming Catkins in *July,* feeding for the moſt part in *Auguſt,* and then periſh down to the ground, riſing afreſh in the Spring.

CHAP. XXXVI

Of Willow

The Names.

AFter fo many Herbs, it will not be amifs to bring in a Tree, which though in form hath little, yet in vertue hath fome affinity. The Willow * * * groweth with that fpeed, that it feemeth to leap. There is a greater fort, which is called in Englifh *Sallow, VVithy,* and *VVillow,* and there is a leffer fort called *Ofier,* fmall *VVithy,* and Twig Withy * * * it is neceffary to bind Faggots, or any other Commodities that ftand in need thereof.

The Kindes.

Many are the forts of this Plant, which Authors reckon up, whereof I fhall set down only thofe which I conceive to grow in our own Country, and they are 1. The ordinary great white Willow-Tree. 2. The ordinary black Willow. 3. The Rofe Willow. 4. The hard black Willow. * * * 17. The black low Willow. 18. Willow Bay. I fhall defcribe only the firft, that by it you may gueffe at the reft.

The Vertues and Signature.

The leaves and Bark of Willow, but efpecially the Catkins, are ufed with good fucceffe to ftaunch bleeding of wounds, * * * and [the bark] being mixed with Vinegar, it taketh away Warts and Corns and other the like callous flesh, that groweth on the hands or feet * * * . This Plant is not propagated by Seed, but any ftick thereof, though almoft withered, being fixed in the Earth, groweth: which Signature doth truly declare, that a Bath being made of the decoction of the Leaves, and Bark of Willow, reftoreth again, withered and dead members to their former ftrength, if they be nourifhed with the fomentation thereof.

Of Cinckfoile

The Vertues

COmmon Cinckfoil is held to be effectuall for * * * preferving againft venomous and infectious Creatures and Difeafes * * * which it performeth, if the juyce be drunk in Ale, or red Wine, or the Roots or Leaves applyed to the Nofe. Some hold, that the one leaf cures a *Quotidian,* three a *Tertian,* and four a *Quartan,* which is a meer whimfey; but the truth is, if you give a fcruple of it (which is twenty grains) at a time, either in White-wine, or White-wine Vinegar: you shall feldom miffe the Cure of an Ague in three fits, be it what it will, even to admiration, as Mr. *Culpepper* affirmeth. * * * The distilled water of the Roots and Leaves * * * , if the hands be often wafhed therein, and fuffered every time to dry of it felf, without wiping, it will in fhort time help the Palfie, or fhaking of them.

CHAP. LXIII

Of Mints

The Forme

MInt is fo well known that it needeth no defcription, yet it deferving one no lefs than other plants, I fhall not be fo injurious as to let it paffe without one, though it be the fhorter Garden mints which is the third kind above mentioned cometh up with ftalks four fquare of an obfcure red colour, fomewhat hairy, which are covered with round leaves nicked on the edges, like a Saw; of a deep green colour: the flowers are little and red, and grow about the ftalks circlewife, as thofe of Penny Royal: the root creepeth aflope in the ground, having fome ftrings on it, and now and then in fundry places it buddeth out afrefh, and will over-run the ground where it is fet, if it be let alone any long time.

The Vertues.

* * * Two or three branches thereof taken with the Juyce of Pomgranates, stayeth the Hiccoughs * * * It is a fafe medicine for the biting of a mad Dog, being bruifed with falt, and laid thereon. The powder of it being taken after meat helpeth digestion and those that are Splenetick * * * .

CHAP. XLV

Of Golden-Rod

The Vertues

THis Herb is of efpecial ufe in all Lotions, * * * : The decoction thereof, likewise helpeth to faften the teeth that are loofe in the Gums. * * * *Gerard* faith, that the dry Herb that came from beyond the Seas, was formerly fold for half a Crown an Ounce; but sence it was found to be fo plentiful on *Hampsteed-Heath,* and other places in *England,* no man will give half a Crown for an hundred weight of it. And here I may take an occafion, as

Gerrard doth, to ſpecifie the inconſtancy, and sudden mutability of the people of this Age, who eſteem no longer of anything (how precious ſoever it be) then whilſt it is ſtrange and rare, verifying that common Proverb, *Far fetcht, and dear bought, is good for Ladies.*

CHAP. LI

Of the Pine Tree.

The Signature and Vertues.

CRollius, in his Book of Signatures, ſaith that the woody ſcales, whereof the *Pine Apple* is compoſed, and wherein the kernels lie, do very much reſemble the foremoſt teeth of a Man; and therefore Pine leaves boyled in Vinegar make a good decoction to gargle the mouth for aſſwaging immoderate pains in the teeth and gums, * * * The Kernels of the Apples are wholſome, and much nouriſhing whilſt they are freſh, and although they be somewhat hard of digestion, yet they do not offend * * *

CHAP. LXVII.

Of Fox-glove.

SOme * * * make it to be a kind of *Mullein,* but certainly it is not, neither was it known to any of the ancient Greek, or Latine Writers. *Fuſchius* makes, as if he were the firſt that called it *Digitalis,* being induced thereunto, by the hollow form of the Flowers, which are like Finger-ſtalls. * * * It hath no other name in Engliſh, that I know, but *Foxglove,* unleſſe some call it Foxfinger.

The Vertues.

The uſe of this Plant, if not the Plant it ſelf, was altogether unknown unto the Ancients, it being not ſo much as once mentioned in their Medicines; but that is no excuse to the Phyſicians of our times, who, notwithſtanding the admirable properties thereof, do in a manner neglect it. The *Italians,* with whom it is in greater eſteem then with us, * * * have an uſuall Proverb with them concerning it, *Aralda* ſalveth all Sores; for they uſe it familiarly to heal any freſh or green wound * * * But the Reaſon why I treat of it in this Place is, because it hath been by later experience, found to be very available for the King's Evill, the Flowers being ſtamped together with freſh Butter and applyed to the place * * * .

A Table of the *Appropriations*, shewing for what Part every *Plant* is chiefly medicinable throughout the whole Body of Man; beginning with the *Head*; quoted according to the Chapters contained in this Book.

FIG. 6. The table of appropriations.

CHAP. LXX

Of Wheat.

The Vertues.

THe bread that is made of Wheat being applyed hot out of the Oven for an hour, three daies together, to the Throat that is troubled with Kernels or the Kings Evill, healeth it perfectly; and Slices of it, after it is a little ſtale being ſoaked in Red Roſe Water, and applyed to the eyes that are hot, red, and inflamed, or that are bloodshot, helpeth them. The flower of Wheat * * * and mixed with Vinegar and Hony, boyled together healeth all freckles, ſpots, and Pimples on the face: Wheat-flowre being mixed with the Yolk of an Egge, Honey, and Turpentine, doth draw, clenaſe, and heal * * * . The Leaven of Wheat Meal hath a property to heal and to draw; and in eſpeciall it rarifieth the hard skins of the feet and hands; as alſo Warts, and hard knots in the fleſh, being applyed with ſome salt. * * * *Pliny* ſaith, That the Corns of Wheat, parched upon an Iron Pan, and eaten, is a preſent remedy for thoſe that are chilled with cold. * * * *Diſcorides* ſaith, That to eat the corns of green Wheat hurteth the ſtomach * * * but chewed and applyed to the biting of a mad Dog, it cureth it.

CHAP. LXXIII.

Of Liquorice

The Kindes.

TO this kind four ſorts may be referred. 1. Common Liquorice. 2. *Diſcorides,* his Liquorice. 3. The moſt common Liquorice *Vetch.* 4. Another Liquorice *Vetch.*

The Vertues.

The Root of Liquorice is good againſt the rough hardneſſe of the Throat and Breaſt, it openeth the Pipes of the Lungs * * * and ripeneth the Cough * * * The Scythians are ſaid, by chewing this in their mouths to keep themſelves from thirſt in their long journeys through the deſerts for ten or twelve daies; and ſtayeth hunger alſo * * * .

CHAP. LXXIX

Of Elecampane.

HAving appropriated feverall Simples, to the infide and outfide of the Throat, The Breaft comes next in Order to be provided for, both internally and externally, to which there is nothing more proper than Elecampane * * * : fome think it took the name from the tears of *Helen,* from whence it fprung, which is a Fable; others fay it was fo called becaufe *Helen* firft found it available againft biting and ftingings of venemous Beasts; and others think it took its name from the Ifland *Helena* where the beft was found to grow. * * *

The Kindes.

To this Plant, which otherwife would be fingle, do fome refer the Flowers of the Sun, as 1. The greater flower of the Sun. 2. The lefser flower of the Sun. 3. The Male flower of the Sun. 4. The Marigold Sunflower.

The Forme.

Elecampane fhooteth forth many large leaves lying neer the ground, which are long and broad, but fmall at both ends; fomewhat foft in handling, of a whitifh green on the upper fide; and gray underneath, each fet upon a fhort ftalk: From amongft which, rife up divers great and ftrong hairy ftalks, two or three foot high with fome leaves thereon compaffing them about at the lower ends, and are branched towards the tops bearing divers great and large flowers like unto thofe of the flower of the Sun, of which it is faid to be a kind, as I faid before; both the border of the leaves and the middle Thrum being yellow, which is not wholly converted into large seed, as in the flower of the Sun; but turneth into Down with fome long fmall brownifh feed among it, and is carried away with the wind: the Root is great and thick, branched forth divers waies, blackifh on the outfide, and white within, of a very bitter tafte but good fent, efpecially when it is dryed, no part elfe of the plant having any fmell.

The Places and Time.

This is one of the Plants, whereof England may boaft as much as any: for there growes none better in the world then in England; let Apothecaries and Druggifts fay what they will. It groweth in meadows that are fat and fruitful as in *Parfons* Meadow by *Adderbury* as I have been told, and in divers other places about *Oxfordfhire.* It is found alfo upon the Mountains and fhadowy places that be not altogether dry: it groweth plentifully in the fields on the left hand as you go from *Dunftable* to *Puddle* hill. Alfo in an Orchard as you go from *Colbrok* to *Ditton* Ferry, which is the way from London to *Windfor and* in divers places in Wales, particularly in the Orchard of Mr. *Peter Piers* at *Guiernigron* neer St. *Afaphs.* The flowers are in their beauty in *June* and *July*, the beft time to gather the roots is in Autumn, when the leaves fall: yet it may be gathered in the Spring before they come forth.

The Vertues.

Elecampane * * * helpeth fhortneffe of Wind * * * . A decoction of the Root is good againft poyson and bitings of Serpents * * * bruised and put into Ale or Beer, and daily drunk, cleareth, ftrengtheneth, quickeneth the fight of the Eyes wonderfully. * * * *Pliny* faith that *Julia Augufta* let no day pafs without eating fome of the root * * * which it may be fhe did to help digestion, to expell Melancholy and forrow, and to caufe mirth * * * for all which it is very effectual.

CHAP. LXXXII

Of Reeds, *but especially of the Sugar Cane or* Reed.

The Forme.

THe Sugar cane is a pleafant and profitable Reed, having long ftalks feaven or eight foot high, joynted and Knee'd like the common walking Canes, but that the Leaves come forth of every joynt on every fide of the ftalk one, like unto wings long narrow and fharp pointed. The Cane it felf or ftalk is not hollow as other Canes and Reeds are; but full and ftuffed with a spungious fubftance, in taste exceeding fweet. The root is great and long creeping along within the inner cruft of the earth, which is likewife fweet and pleafant, but leffe hard or wooddy then other Canes or Reeds; from which do fhoot many young Cions which are cut away from the main or Mother plant; becaufe they fhould not draw away the nourishment from the old ftock; and fo get unto themfelves a little moifture, or elfe fome fubftance not much worth, and caufe the ftock to be barren, and themfelves little the better: which fhoots de ferve for plants to fet abroad for increafe.

The Places and Time.

The Sugar Cane groweth naturally in the Eaft and Weft *Indies,* the *Barbadoes, Madera,* and the *Canary* Islands, and *Barbary* also. It is planted likewife in many parts of Europe at this day * * * fome fhoots have been planted in England but the coldneffe of the climate quickly made an end of them. * * * The Sugar cane is planted of the year in thofe hot countries where it doth naturally grow, by reafon they fear no frofts to hurt the young fhoots, at their firft planting * * * .

The Vertues.

Sugar is good to make fmooth the roughneffe * * * of the Lungs, cleareth the voice and putteth away hoarfnefs and the Cough; and fo doth Sugar Candy. Sugar or White Sugar Candy, put into the Eye, taketh away the dimneffe, and the blood fhotten theirin * * * . This is the Phyfical ufe of Sugar, which hath obtained now a daies fo continall and daily ufe; that it is almoft accounted not Phyficall, and is more commonly ufed in Confections, Syrups, and fuch like; as also preferving, and conferving fundry fruits * * * to write all which, is befides our Intentions. Now for our ordinary Reeds * * * . The frefh leaves bruifed, or the roots applyed to thofe places that have Thorns, Splinters, or the like in the flefh do draw them forth in a fhort fpace * * * ; the Ashes made of the outer rind of the ftalk, mingled with Vinegar, helpeth the falling of the hair. If the flower or woolly fubftance happen into the ears, it fticketh theirin fo faft, as that by no means it will be gotten forth again, but will procure deafneffe withal. Some have obferved that the Fern and the Reed are at perpetuall enmity, the one not abiding where the other is: which may be, as my Lord *Bacon* faith, not becaufe of any Antipathy in the plants; but because they draw a like nourifhment, and fo ftarve one the other; whereas there is such amity they fay, between Afparagus and the Reed, that they both thrive wondrous well, which is becaufe they draw a different Juyce. Reeds are alfo put to many neceffary ufes, as to thatch houfes, to ferve as walls and defence to Gardiners in the cherifhing of their plants, to Water-men to trim their boats, to Weavers to wind their yarn on and for divers other purpofes: Nay thofe that grow in the *Indies* by reafon of the heat of thofe Climates grow fo great and tall, that they ferve inftead of timber, both to build their houfes and to cover them.

CHAP. XCVI

Of Periwinckle.

The Kinds.

THere be divers Sorts or Kinds of *Periwinckle,* whereof fome be greater, others leffer; fome with white Flowers, others Purple, and double, and fome of a fair blew Sky Colour.

The Forme.

The common Sort of *Periwinckle* hath many Branches, trailing or running upon the ground, ſhooting out ſmall Fibers at the Joynts as it runneth * * * and with [the leaves] come alſo the Flowers (one at a joynt standing upon a tender Foot-ſtalk) being ſomewhat long and hollow, parted at the brims, ſometimes into four, ſometimes into five leaves, of a pale blew colour. The Root is not much bigger then a Ruſh, buſhing in the ground, and creeping with his Branches far about, whereby it quickly poſſeſſeth a great compaſſe, and is therefore moſt uſually planted under hedges, where it may have room to run up upon the ſticks, which it doth encompaſſe, and bind over and over, and is perhaps from thence called *Vinca Per winca.*

The Vertues.

* * * It is likewiſe good againſt the biting of Adders, being bruised, and applyed to the place, eſpecially if the infuſion thereof in Vinegar be taken inwardly. *Parkinson* ſaith, it is a tradition with many, that a wreath made hereof, and worn about the Legs, defendeth them from the Cramp; by which words he ſeemeth in my judgment, to doubt of the truth thereof; but indeed, he needed not ſo to do; for I knew a friend of mine who was very vehemently tormented with the cramp, for a long while, which could be by no means eaſed, till he had wrapped some of the Branches hereof about his Legs * * * . Mr. *Culpepper* writeth that *Venus* owns this Herb, and saith, That the Leaves eaten by Man and Wife together, cauſe love, which is a rare quality indeed if it be true.

(*To be concluded.*)

SHORTER NOTES

The Catherine McManes Fund.—The fund announced in Torreya two years ago which has since provided the unusual number of illustrations has been renewed; one hundred dollars has been given for the coming year and another hundred is promised for the year following. This fund has made it possible to print many papers for which the authors demanded illustrations, and it is hoped that the fund will help make Torreya more desirable, both to readers and contributors.

The geographical distribution of *Lespedeza striata*. This native of eastern Asia was introduced into North America during the first half of the last century, and at once established itself as a naturalized member of our flora. Just how early the species was introduced appears to be uncertain, but the popular belief held throughout the Southern States, namely that the plant was brought into that section during the Civil War period, is erroneous, although it was doubtless then disseminated in various sections where it had not been before observed. The late Professor Porter found it thoroughly naturalized in middle Georgia as early as 1846 while he was a resident of that state. Its advent was probably unnoticed by the native residents on account of the relative inconspicuousness of the plants, and how long previous to 1846 the plant may have been established as a member of our flora Professor Porter was not able to learn.

During the first half of the last century the plant seems to have spread slowly; however, during the second half, it advanced north, northwest, and west, apparently establishing itself permanently wherever it gained a foothold.

On account of local means of dispersal *Lespedeza striata* spread westward more rapidy than northward The end of the last century saw it established in Texas, Kansas, and Illinois, while it was not until the beginning of the present century that it got a firm hold in southern Pennsylvania.

The geographical range for the species given in the several floras within whose limits it occurs are too narrow, and should read Pennsylvania to Kansas, Florida, and Texas.

J. K. Small

REVIEWS

Ganong's Teaching Botanist*

Progressive teachers of botany already possess well worn copies of the first edition of this pioneer contribution to the pedagogy of their subject. The second edition, "rewritten almost throughout", is brought abreast of the advance of the past decade in botanical education, and will, no doubt, be even more warmly welcomed than was the first edition.

The title not only names the book, but designates the class of readers to whom it is addressed, and to whom it will make its

*The Teaching Botanist. By William F. Ganong, Ph.D. Second edition. Pp. xi + 439; plates 2; figures 40. $1.25. The Macmillan Co., New York. 1910.

strongest appeal. The book will not commend itself to that type of university professor who regards research and the direction of it as the chief end of man, and his teaching as only a necessary evil, essential in order to hold his position and justify his salary. Undoubtedly the pendulum has reached the end of its swing in this direction, and there has already begun a return to the more stable and desirable condition where efficient teaching of the science is regarded, not only as worth while for its own sake, but absolutely essential to the greatest growth and development of the science.

That there are at present more vacancies in botanical positions in the United States than there are competent men to fill them, is due in large measure to the fact that a more than amateurish presentation of introductory and even advanced courses by men absorbed in research, and "teaching" under protest, has failed to make a strong appeal to young men and women of ability. It is not, for a moment, meant to be here implied that research should be considered as secondary in importance to teaching, nor that some men should not give all their time and energy to investigation, nor that it would not be an educational blunder for some men to engage in the instruction of beginning classes rather than in enlarging the boundaries of our knowledge. But, on the other hand, it is maintained, as emphatically as possible, that teaching should not be considered as secondary in importance to research; and that one who devotes his time and talents to the problems and needs of botanical education should no longer be considered to have "done nothing" in his position.

It is an almost self-evident truth that the teacher should have the spirit of research, but if his inclinations lead him to make a contribution to the improvement of botanical education this should be considered by every one interested in any phase of botany as important and valuable a service as the discovery of a new chromosome or a new mendelian ratio.

The writer believes that there is no error more widespread or more erroneous than that knowledge of a subject, alone and of itself, confers teaching power or is the sole need in the preparation of a teacher. "The Teaching Botanist" is a protest against this point of view, and a positive, constructive contribution toward the solution of the problem of more effective botanical teaching.

Chapter I. should be learned by heart and taken to heart by every earnest teacher. The chapter-headings are substantially the same as those in the first edition, while the appendix includes the "Unit Course in Botany Formulated by a Committee of the Association of Colleges and Secondary Schools of the North Central States", as well as the "Course of the Botanical Society of America and the College Entrance Examination Board".

Teachers of all grades, experienced and inexperienced, cannot fail to derive both profit and inspiration from this admirable volume.

C. Stuart Gager

The Brooklyn Botanic Garden

OF INTEREST TO TEACHERS

Some Fallacies of Botany Teachers

Among the fallacies enumerated by Joseph Y. Bergen in *School Science and Mathematics* for December, 1909, the following paragraphs seem of special interest.

"There is beginning to be a vigorous demand, perhaps most noticeable in parts of the middle west, for a highly 'practical,' *i. e.*, economic, kind of instruction in botany and zoölogy. It is felt that, for one thing, the teaching should be so shaped as to make use of the commonest garden and field plants to illustrate plant anatomy and physiology. Of course no teacher in his senses would hunt up a rare greenhouse orchid to demonstrate a point which could be equally well shown by the use of a garden lily, a hyacinth, or an onion. But, * * * there is a very specious fallacy in the unqualified insistence on the use of common material. * * * The cabbage is a most familiar plant, therefore let us make stomata easy for him by giving him cabbage leaves to histologize. Now a single trial would convince any unbiased teacher that the familiar cabbage leaf is not nearly as easy a subject for the study of stomata as are easily peeled leaves, like those of the iris, or firm ones for cross sectioning, like those of

Cycas. So, too, the fact that the common bean is a highly useful plant and *Sedum* or *Trillium* is not would still leave the bean flower much the poorest of the three with which to begin the study of floral structures.

"A still more radical phase of the movement toward economic biology appears in the demand for lessons on all sorts of topics bearing on horticulture and farming, from injurious insects to plant breeding. Doubtless in some country high schools a good deal of such work can be made thoroughly interesting and profitable. And in any schools such matter, in very moderate amounts, may properly be assigned for supplementary reading. Leaving out business and other technical courses, however, when one begins to make economic consideration the measure of educational values he begins to pile up absurdities. As soon as the teachers of geography, history and geometry are willing to bend most of their respective efforts toward instruction regarding commercial routes, the alternation of periods of activity and depression in the world's business, and mensuration, it will be time for biology teachers to consider favorably corresponding pseudo-utilitarian innovations. But if the most valuable crop that any country can produce is intelligent men it must follow that any kind of study which is preëminently suited to cultivate habits of careful observation and orderly thinking in school children is especially important. Then that kind of biology which gives young people some adequate conception—partly obtained from their own field and laboratory studies—of the animal and plant inhabitants of the earth, is better worth while than that which primarily leads to more abundant hay, grain, butter and pork making. In other words, we can develop the faculties of a boy faster and further (and therefore do more for the world) by setting him to work on the structure and functions of the corn plant than by making him count and weigh the kernels of a half dozen ears of as many improved varieties of corn. Such counting and weighing, unless they form part of an extended, systematic investigation carried on by the student, have no more educational value than keeping tally of the loads of coal sent out by a fuel company.

"There has been among teachers of botany an idea, now fast vanishing, that ecology is at once the easiest and the most interesting department of the science. * * * High school pupils can learn a few useful facts about such matters as heliotropic and geotropic movements of plants, the occurrence and meaning of deciduousness among trees, insect pollination, competition, the concept of a plant formation and a plant association. Further they cannot profitably go.

"Though the belief that plant ecology is 'easy' is obsolescent, an equally pernicious notion that plant physiology is 'hard' still prevails. It has, in some instances, gone so far as to lead to something perilously near to the complete omission of the subject from the text-books and the class work. Of course the more recondite matters, such as the causes of the movements of liquids in the plant body, the precise function and *modus operandi* of stomatal movements, the details of sexual reproduction in many groups, and a host of other topics are difficult enough to tax the energies of a Pfeffer, a Strasburger, or a DeBary. But there are so many simple, manageable things for the young beginner to work out! It is far easier for him to discover for himself the fact and roughly to measure the amount of transpiration, to prove the dependence of starch production on light, and roughly to ascertain the temperature limits within which germination of a given kind of seed is possible than to learn by his own observations anything worth while about fibro-vascular bundles or even to master the details of pollination in *Asclepias* or most orchids.

"A few words should here be said about the very prevalent idea, that since plants have been evolved from the unicellular condition to that of the most complicated assemblage of structures found among seed plants, the pupil's knowledge of them should be gained along the same road. Perhaps with students of twenty this might be true, though one of the best all-round teaching professors of botany whom I have known, found that his classes of college beginners in the subject could not do anything like the year's work when they began with the cell as a unit that they could and did when they began with readily visible and somewhat familiar forms. It is doubtful whether the

English-speaking world has ever known a more successful teaching biologist than Huxley and there are still some of us who remember how he reversed the order of treatment in his Biology, after a thorough trial of the evolutionary order in the first edition. . . .

"To me it has always seemed a wrong done to the learner to give him a specially coined Greek derivative where a single English word or a manageable compound will serve. Seed-plant, rootstock, sac-fruit, for those who are not and are not to become technical botanists, are just as good terms as spermatophyte, rhizome, and ascocarp, while they are far easier to learn and to remember. It is indeed a pity that we have not a host of simple terms like the German *Keimblatt*, *Markstrahl*, and so on, but let us use what we have."

Upham's Introduction to Agriculture is designed for the eighth grade, but it contains much that is more simply told than in many of our high school text-books. Any high school teacher of botany (and zoölogy) will find it a very helpful addition to the class library.

A double flowering dogwood is reported in *Science* (June 10) by F. L. Stevens and J. G. Hall. There is an "excessive development of the small bracts that subtend the individual flowers of the ordinary head" and a "suppression of all the individual flowers except the central one which appeared entirely normal."

In *Science* for August 12, Professor T. D. A. Cockerell makes a plea for the better care of types—for their more careful housing and for stricter rules concerning the loaning of type specimens to individuals and to institutions. Professor Cockerell considers a type " from its nature, in some sense the property of the scientific world."

In Buller's Research on Fungi (1909) spore ejection was proven by means of a beam of light. It is stated that "ejection is independent of hygroscopic conditions, takes place but slowly at 0°, and is stopped by anesthetics and by lack of oxygen. It is therefore a phenomenon of protoplasmic activity, not a mere result of hygroscopic tension."

In *Science* (July 8) Albert Schneider referring to the botanical garden symposium papers (A. A. A. S. of Boston) pleads for "practical significance" in the experimental work of botanical gardens; he also insists that in such gardens and experiment stations the major part of the work should be establishing and developing new plant industries.

Recently a Montclair (N. J.) magistrate imposed a twenty dollar fine on an electric light employe who cut the tops from two trees to make room for wires. Such conscious and wilful law-breaking is too rarely thus treated; and consequently, as the New York *Tribune* says, "with all our Arbor Day formalities and all our praiseworthy talk of conservation, the destruction of trees as the victims of laziness or sordidness goes on at a discreditable rate."

Governor Hadley of Missouri is one of a group of progressive western men who are planning to establish farm colonies of families who have the capacity and the ambition essential to make a success of farming, but who never can, under present conditions of living, obtain the capital required for the transfer from the city to the country.

A colony would include several forty acre farms with a central model farm. According to the *Outlook*, that would be occupied by a director, an expert agriculturist. Dr. F. van Eeden, the Dutch sociologist and writer, is planning a colony of Dutch farmers near Wilmington (N. C.), which will also be a practical illustration of social organization.

The future wheat supply of the United States from the point of view of (1) increase in wheat acreage and (2) increase in acre yields is discussed by Professor M. A. Carleton in a recent *Science* (August 5). The first may be reached by an expansion in the farm area or by devoting a larger percentage of the present farm area to wheat. Professor Carleton calculates that by 1950 the "improved farm area" will reach 760,000,000 acres, and that there will also be a gain in the percentage of farm land devoted to wheat, giving 76,000,000 acres of wheat land. In the last forty years there has been a gain of 1.8 bushels to an acre; by 1950 a yield of 16.8 bushels per acre is predicted—a gain of 2.7 bushels per acre. The methods of increasing the acre yield: (1) the introduction of better adapted varieties, (2) hybridization and selection in existing varieties, and (3) better methods of cultivation are discussed. Professor Carleton states that the most important introduced wheats were those of the Fife (brought from eastern Europe through Scotland and Canada into the northern states of the plains) and from Crimea or Turkey (brought from the Crimea and established in the middle states of the plains). The combined output of these two types of wheat now comprises nearly the entire wheat production of the country. These wheats have not only extended the area to the north and west but have increased the acre yield. Credit is given the U. S. Department of Agriculture for much improvement in existing varieties by selection and by hybridization. Yet, that and the improvement due to progressive farming methods are deemed but in their infancy.

Recent study by K. F. Kellerman and J. R. Robinson, of the Bureau of Plant Industry, shows that the presence of magnesium carbonate (0.25 per cent. or over) is "positively inhibitive to nitrifying action; *i. e.*, toxic to the bacteria so important to the nutrition of plants". Calcium carbonate is favorable up to two per cent. Fairly pure calcium carbonate should therefore be used in liming soils already containing magnesium.

At the third International Botanical Congress held in Brussels in May some new rules on nomenclature were formulated. Linnaeus's Species Plantarum, 1753, is to be retained as the starting point for the myxomycetes, lichens, and liverworts; but more recent authorities are to be used for fungi (1801, Persoon, and 1821–32, Fries); for algae (Linnaeus in part; 1848, Rolfs; 1886–

88, Bornet and Flahault; 1900, Hirn; and 1892–93, Gomont); and for mosses (1801–30, Hedwig).

NEWS ITEMS

The death of Samuel Bowdlear Green, dean of the school of forestry and the University of Minnesota, has recently been announced.

E. Dwight Sanderson, of the New Hampshire Agricultural Experiment Station, has been made dean of the College of Agriculture, West Virigina University.

Professor Edward W. Berry, associate professor in paleobotany at Johns Hopkins University, has recently been appointed geologist on the United States Geological Survey.

Arthur W. Merrill, of the Baron de Hirsch School, has been made director of the secondary school of agriculture to open in Vermont at Lyndon Institute, Lyndon, Vermont. A two-year course in scientific agriculture, planned to prepare young men for "successful farming under Vermont conditions" is offered to residents of the state. The school has been made possible through a gift by Theodore N. Vail; and two methods of paying expenses—by cash or by work—are offered the students.

The fall lectures at the New York Botanical Gardens are to be given at four on Saturdays, as usual. The program includes: Orchids, Wild and Cultivated, by Mr. G. V. Nash, September 17; The Botanical Gardens of Europe, by Dr. W. A. Murrill, September 24; Some Floral and Scenic Features of Jamaica, by Dr. M. A. Howe, October 1; Carnivorous Plants, by Professor H. M. Richards, October 8; Autumn Flowers, by Dr. N. L. Britton, October 15; Plant Diseases and their Control, by Mr. F. J. Seaver, October 22; Explorations in Santo Domingo, by Mr. N. Taylor, October 29; The Flora of Switzerland, by Professor E. L. Burgess, November 5; Some Economic Plants of Mexico, by Professor H. H. Rusby, November 12; and Cuba, Its Flora and Plant Products, by Dr. N. L. Britton, November 19.

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BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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A FEW MORE PIONEER PLANTS FOUND IN THE METAMORPHIC REGION OF ALABAMA AND GEORGIA

By Roland M. Harper

In a few comparatively recent papers* I have announced the discovery in the Piedmont region and mountains of Alabama and Georgia of several species of plants previously supposed to be confined to the coastal plain, or nearly so; and as every county in Alabama and all but a few of the more inaccessible ones in Georgia have now been visited by botanists, it seemed a short time ago as if the possibility of additional discoveries of this kind must be almost exhausted. But in June of this year, when I had occasion to spend a few days among the mountains of eastern Alabama and western Middle Georgia, I found that this was by no means the case.

On the 6th and 7th of the month named I was on the Blue Ridge where it forms the boundary between Talladega and Clay Counties, Alabama, a few miles south of Cheaha Mountain, the highest point in that state.† (All the plants mentioned below as occurring on this ridge were seen on the southeastern slope, in Clay County, within a few miles of Erin and Pyriton.) On the 8th and 9th I explored parts of the Pine Mountains of Meriwether County, Georgia, within a few miles of Bullochville (Warm Springs) and Woodbury, where I had found many interesting things in 1901 and 1908.

There are some interesting similarities and differences between

*For Alabama, Torreya **6**: 111–117; Bull. Torrey Club **33**: 523–536. 1906; for Georgia, Bull. Torrey Club **30**: 294. 1903; **36**: 583–593. 1909.

†Its altitude is supposed to be 2,407 feet. Some interesting notes on the vegetation of this ridge can be found on pages 58–64 of Mohr's Plant Life of Alabama.

[No. 9, Vol. 10, of Torreya, comprising pages 193–216, was issued September 23, 1910.]

these two ranges of mountains. Each consists for the most part of a single prominent ridge trending approximately northeast and southwest, and they are also alike in being formed of sandstone rocks (presumably pre-Cambrian in age, for they contain no fossils), and having long-leaf pine more abundant than any other kind of tree on their slopes. The Pine Mountains, however, are about 1,000 feet lower than the Blue Ridge and half a degree farther south (being the southernmost mountains in the eastern United States).

Some of the most interesting finds in the way of coastal plain plants in both states were made in wet ravines on the mountain slopes. These ravines all contain small clear streams, beginning gradually near their heads and varying in length with the wetness of the season, and of course descending rapidly in the usual manner of mountain rivulets. The bottoms and sides of the ravines are strewn with loose subangular rocks of various sizes,

FIG. 1. *Pinus palustris* on rocky slope of a ravine on a spur of the Blue Ridge northwest of Pyriton, Alabama. June 7, 1910.

but there are very few cliffs or waterfalls, at least in the smaller ones, their slopes being comparatively uniform. This is probably because the mountains are composed of essentially homogeneous rocks, without well-defined stratification, faults, etc.

In most parts of eastern North America ravines contain vegetation approaching the climax type, but here succession has not progressed very far, as shown by the large proportion of evergreens, etc. The vegetation of these mountain ravines bears about the same relation to that of the adjacent pine-covered slopes as that of branch-swamps in the wire-grass country of Georgia does to the surrounding pine-barrens,* and there are quite a number of species common to the corresponding habitats in the two otherwise very dissimilar regions. Analogous relations also exist between the dry mixed forests and the banks of streams on the Cumberland Plateau (Lookout Mountain, Sand Mountain, etc.) of Georgia, Alabama, and Tennessee, where succession has progressed a little farther, and the long-leaf pine has long ago disappeared, if it ever grew so far inland.

The following species (arranged in approximate order of abundance, etc.) were seen in mountain ravines in both states, in the week under consideration.

TREES: *Acer rubrum*, *Magnolia glauca*, *Liriodendron*, *Ilex opaca*, *Persea pubescens*, *Oxydendron*, *Pinus Taeda*.

SHRUBS AND WOODY VINES: *Alnus rugosa*, *Kalmia latifolia*, *Smilax laurifolia*, *Decumaria barbara*, *Myrica carolinensis*, *Symplocos tinctoria*, *Azalea nudiflora*. (Just about half the woody plants are evergreen.)

HERBS: *Osmunda cinnamomea*, *O. regalis*, *Lorinseria areolata*, *Galax aphylla*, *Carex crinita*.

In addition, *Fagus*, *Xolisma ligustrina*, *Viburnum nudum*, and *Dryopteris Noveboracensis* were noted in several such places in Alabama, and might have been seen in Georgia as well if I had examined as many ravines as I did in Alabama on this trip. Several species which were seen less frequently will be mentioned below.

Quite a number of other pioneer bog plants were found on June 9 in a moist meadow about half a mile east of Woodbury, Georgia, the same place where I had made some interesting

*See Ann. N. Y. Acad. Sci. **17**: 62. 1906.

discoveries nearly nine years before.* Several species of more climax tendencies, though nevertheless mainly "austroriparian" in distribution, were found on the same day along the Flint River where it cuts through the Pine Mountains in a series of rather narrow gorges, and in the swamp of one of its tributaries, Cane Creek, on the north side of the mountains about two miles east of Woodbury.

The following annotated list of noteworthy plants also includes two species which were observed from a train between Birmingham and Pell City, Alabama, on June 4.

Halesia diptera L. Several unmistakable specimens (with full-grown fruit) of this little tree were seen on the banks of the Flint River in Meriwether County, Georgia, at the southeastern corner of an amphitheater-like valley about three miles in diameter known as "the Cove." It was not known outside of the coastal plain before, though Dr. Mohr had reported it from the vicinity of Auburn, Ala.,† which is pretty close to the fall-line.

Osmanthus americanus (L.) B. & H. Common in a wet ravine in the Pine Mountains near Nebula, a small station a few miles south of Warm Springs. This species was entirely new to the known flora of Middle Georgia, and even in Alabama I had not seen it so far above the fall-line.‡ Its leaves at this station were rather narrower than they usually are in its favorite habitat, coastal plain hammocks. Some of the trees bore an abundance of young fruit.

Ilex coriacea (Pursh) Chapm. (*I. lucida* T. & G.). In the same ravine; not common, but some of the bushes were over ten feet tall, which is about as large as this species ever grows. This does not seem to have been reported from outside of the coastal plain before, though Dr. Mohr cited specimens from one of the fall-line counties of Alabama, not very far from this new station.

Persea pubescens (Pursh) Sarg. Seen in one mountain ravine in Alabama, and in two or three in Georgia, both near the Flint River and near Nebula. Unmistakable specimens were collected near the latter place on June 8. Dr. Mohr knew this in Alabama

*See Bull. Torrey Club **30**: 294, 326. 1903.

†Contr. U. S. Nat. Herb. **6**: 66. 1901.

‡See Bull. Torrey Club **33**: 536. 1906.

only from three extreme southern counties, Escambia, Baldwin and Mobile; and Professor Sargent in his Manual of Trees, 1906, restricts it to "Pine-barren swamps, . . . in the immediate neighborhood of the coast."

Nymphaea fluviatilis Harper. What I take to be this species was seen from the train, in the Cahaba River near Henry Ellen, in the eastern edge of Jefferson County, Alabama. In 1908 I had seen the same thing nearly as far from the coast in Middle Georgia.*

Myrica carolinensis Mill. As this was not known outside of the glaciated region and coastal plain until 1906, it might be worth while to mention here that small inconspicuous specimens of it, about knee-high, are not rare in damp ravines on the slopes of both the Blue Ridge and the Pine Mountains.

Pogonia divaricata (L.) R. Br. Rare in boggy places in mountain ravines in Clay County, Alabama, with *Osmunda cinnamomea* and several less common plants. Dr. Mohr knew this handsome orchid no farther inland than Tuscaloosa County, but Dr. Gattinger found it in the mountains of East Tennessee.

Pogonia ophioglossoides (L). Ker. Although this is known from many scattered stations between the glaciated region and the coastal plain,† it is by no means a common plant in the highlands, and I had never seen it in Middle Georgia until I found several specimens in bloom in the meadow near Woodbury, previously mentioned.

Smilax laurifolia L. I have already reported this from the highlands of both states, but not from either of the mountain ranges under consideration, so it may be worth mentioning that I found it quite common in most of the wet ravines, as indicated in the foregoing habitat list.

Tillandsia usneoides L. In former years I had seen this characteristic coastal plain epiphyte along rocky banks of rivers a mile or two above the fall-line near Tallassee, Ala., and Columbus, Ga.,‡ but finding it among the Pine Mountains, over twenty miles from the fall-line in a straight line (and probably twice as

*See Bull. Torrey Club **36**: 589. 1909.

†See Rhodora **8**: 29. 1906.

‡See Bull. Torrey Club **33**: 527–528; Ann. N. Y. Acad. Sci. **17**: 266 1906.

far by water), was quite unexpected. It grows in the gorge of the Flint River, at about the same place already mentioned under *Halesia diptera*, on various trees, principally *Quercus alba*. Some of it was forty or fifty feet up in the air, and some low enough to be reached from the ground, but it was not at all abundant. It happened to be in bloom at the time I saw it, and it is probably holding its own pretty well.

Lachnocaulon anceps (Walt.) Morong. In the moist meadow near Woodbury; rather rare. Previously known only from the coastal plain and Lookout Mountain.*

Rhynchospora rariflora (Mx.) Ell. With the preceding, not rare. Previously known only from the coastal plain, but its occurrence here is perhaps not so surprising since it has recently been reported from New Jersey.†

Panicum gymnocarpon Ell. In the swamp of Cane Creek, Meriwether County, Georgia. Previously known only from the coastal plain, from Georgia to Texas. With it I noticed two other species of somewhat similar distribution (though already known from a few stations outside of the coastal plain), namely, *Commelina hirtella* Vahl and *Trachelospermum difforme* (Walt.) Gray.

Anchistea virginica (L.) Presl. Seen from the train, in a sort of meadow just east of Brompton, St. Clair County, Alabama. The only other stations between the glaciated region and coastal plain on record for this species seem to be those in Cherokee and Chilton Counties, Alabama, and Pike County, Georgia, described in my earlier papers.

TALLAHASSEE, FLORIDA

A FOSSIL FIG‡

BY T. D. A. COCKERELL

Among some specimens collected by my wife at Station 14, in the Miocene shales of Florissant, I find two which, on careful inspection, prove to be figs. The genus *Ficus* has been recog-

*See Torreya **6**: 114; Ann. N. Y Acad. Sci **17**: 268. 1906.

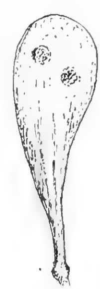
†W. Stone, Torreya **8**: 16–17. 1908.

‡ Illustrated with the aid of the Catherine McManes fund.

nized in the Florissant flora from the leaves, two species being described, *F. florissantella* Ckll. and *F. arenaceaeformis* Ckll. A remarkable confirmation of the existence of *Ficus* there was made when Mr. C. T. Brues found among the insects collected long ago by Scudder a veritable fig-insect, which he described* as *Tetrapus mayri*, dedicating the species to Gustav Mayr, who was a great authority on the subject, and originally described *Tetrapus*. Now we have the figs themselves, and although it is very likely that they should be associated with one of the species described from the leaves, it is impossible to say which, so I give them provisionally a separate name.

Ficus Bruesi n. sp.

Fruit long-pyriform, about 33 mm. long and 11 mm. wide, as shown in the figure; basal part slightly plicate. As preserved, the fruits are dark brown. The type specimen shows two round gall-like bodies, shown in the illustration, but from the dark color of the specimen inconspicuous in the actual fossil. One of these, in particular, contains an object which seems to have the indistinct outline of an insect, and I really believe that these objects are the *Tetrapus* developing within the fig.


Fruit of *Ficus Bruesi.*

The fig is remarkable for its elongated form, but similar species exist to-day. It is probably on account of this character that the name *longipes* has been applied to different species inhabiting Madagascar, Assam, and Mexico.

Other fossil figs have been found, one (*F. neurocarpa* Hollick, 1903) being as old as the Dakota Cretaceous.

Some fossil species of *Ficus* found in Colorado need new names, as follows:

Ficus coloradensis n. n.

Ficus irregularis Lx., Bull. U. S. Geol. and Geog. Surv. Terr. **1875** : 368. 1876. Not *F. irregularis* Miq., Ann. Mus. Bot. Lugd. Bat. **3** : 224. 1867; nor Steud., Nom. ed. **2** : 636

*Bull. Mus. Comp. Zool. LIV, 17. 1910.

Ficus ovaliformis n. n.

Ficus ovalis Lx., Bull. U. S. Geol. and Geog. Surv. Terr. **1875** : 387. 1876. Not *F. ovalis* Miq., Ann. Mus. Bot. Lugd. Bat. **3** : 298 1867.

Ficus denveriana n. n.

Ficus spectabilis Lx., Ann. Rept. U. S. Geol. and Geog. Surv. Terr. **1872** : 379. 1873. Not *F. spectabilis* Kunth & Bouché, Ann. Sc. Nat. Sér. III. **7** : 235. 1847.

Also the following from Alaska:

Ficus Dalli n. n.

Ficus membranacea Newberry, Pr. U. S. Nat. Mus. **5** : 512. 1883. Not *F. membranacea* Wright, Sauvalle, Fl. Cub. 149. 1873.

LOCAL FLORA NOTES—VI *

By Norman Taylor

Juglandaceae

1. *Juglans cinerea* L. This has not been found south of Newark, N. J., so far as our specimens show. In the catalog of New Jersey plants it is reported as rare in Monmouth and Ocean Counties. Has it ever been found south of this in our range?†

2. *Juglans nigra* L. In the New Jersey catalog the plant is said to be common, except in the pine-barrens. Has it since been found in this area? The Philadelphia botanists give no stations for it, and all our specimens are from regions north of the pine-barren country.

3. *Hicoria laciniosa* (Michx.) Sarg. Our only specimen is an old one from Sellersville, Bucks Co., Pa. General works credit

*Continued from Bull. Torrey Club **37**: 429–435. 1910.

†The local flora range as prescribed by the Club's preliminary catalog of 1888 is as follows: All the state of Connecticut; Long Island; in New York the counties bordering the Hudson River, up to and including Columbia and Greene, also Sullivan and Delaware counties; all of New Jersey; and Pike, Wayne, Monroe, Lackawanna, Luzerne, Northampton, Lehigh, Carbon, Bucks, Berks, Schuylkill, Montgomery, Philadelphia, Delaware, and Chester counties in Pennsylvania.

the tree to eastern Pennsylvania, central and western New York, and also to the middle West. It has apparently never been found in New Jersey. What is the true range of this species, which is certainly rare and local east of the Allegheny Mountains?

Betulaceae.

1. *Carpinus caroliniana* Walter. None of the numerous specimens are from localities in the pine barrens, and the New Jersey catalog excludes it from this region. How near to the pine-barrens has the plant been found? Is it known from Burlington Co., N. J.?

2. *Cory'us rostrata* Ait. So far as New Jersey is concerned this shrub is not known south of the terminal moraine, although specimens from Chester Co., Pa., bring it considerably south of the glaciated region in that state. From where in New Jersey, particularly in the south-central sections near Middlesex and Mercer Counties, has the plant been collected?

3. *Betula papyrifera* Marsh. Our specimens limit this species to the country north of a point which is approximately the northern state line of New Jersey, with two exceptions, Plainfield and Elizabethport, N. J. These two New Jersey records bring the plant much further south than its apparent distribution center, which is in the Catskills, and the hill counties of Pennsylvania. Does the plant grow between these points? Has it ever been found in Berks or Bucks Co., Pa.?

4. *Betu'a lutea* Michx. Our only two specimens are from the Catskills. Other records, for the most part substantiated by specimens, credit the plant to Lehigh, Monroe, and Pike Counties in Pennsylvania. Beyond this nothing seems to be known of its distribution within the range.

5. *Betula pumila* L. The flora of Pennsylvania, the Philadelphia catalog, and all our specimens exclude this plant from the whole state of Pennsylvania. Several stations in northern New Jersey and one in northwestern Connecticut complete our representation of this species. The exclusion from the high mountain parts of Pennsylvania and from the Catskills is almost inconceivable. It should be found in many cold bogs in the glaciated

part of our range, but for lack of evidence this is only conjectural.

Fagaceae

1. *Castanea pumila* (L.) Mill. There are no specimens from the range. The Philadelphia Club's catalog credits it to Gloucester, Salem, and Mercer Counties in New Jersey, and it is recorded from Chester County, Pa. Beyond this nothing is known of its range in our area.

2. *Castanea dentata* (March) Borkh. Has the chestnut ever been collected in the pine-barrens? Otherwise it is common throughout our range.

3. *Quercus coccinea* Marsh. The distribution of this species given in general works indicates a wider distribution than our four specimens show. They are all from near New York City. This species is probably common throughout the region, but specimens are lacking.

4. *Quercus triloba* Michx. (*Q. digitata* of the manual). Our only specimens are from Cedar Creek, N. J., and one marked simply "Pine-barrens of New Jersey." It is credited to Long Island, but the specimen on which this was based is the following:

5. *Quercus pagodaefolia* (Ell.) Ashe. There is only a single specimen of this oak from our range. West Hempstead, L. I., is the only station known for it. Until recently it was not supposed to grow north of Virginia, but collections at Nantucket and the Long Island station given above have brought the tree within our range. It may reasonably be expected to grow in the intervening country between Long Island and Virginia and the coastal part of New Jersey should contain this plant.

6. *Quercus Phellos* L. With the exception of a specimen from Tottenville (Bentley Manor), L. I., our specimens all come from below Middlesex Co., N. J. Has this tree been found in the latter county or from adjoining country in Mercer County? Records are extant but no specimens to substantiate them.

7. *Quercus imbricaria* Michx. The only specimen is from Flushing, L. I., and looks as though it might have been taken from a cultivated plant. The tree is entirely unknown on Long Island except for this; and its only other stations in the range,

as shown by the books, are Philadelphia and Lehigh counties in Pennsylvania. Has the tree established itself on Long Island?

8. *Quercus Alexanderi* Britton. Until recently this tree was not supposed to grow in our range, but specimens from Poughkeepsie and West Point indicate an apparent migration down the Hudson Valley. Has any one taken specimens from elsewhere in the range?

9. *Quercus bicolor* Willd. (*Q. platanoides* of the manual). Our specimens and the published records all show this as a rare tree in the pine-barren region. How generally distributed in this region is this species?

10. *Quercus lyrata* Walt. Riddleton, Salem Co., N. J., is the only station represented by specimens. According to the New Jersey catalog it is "Common in the middle and southern counties." Any specimens from this region will be welcome.

Ulmaceae

1. *Ulmus Thomasii* Sargent. (*U. racemosa* of the manual). In the catalog of the New Jersey plants there is the following record: "Along L. & H. R. R. R. above Woodruff's Gap, a single tree observed—Porter and Britton, 1887." There is a specimen for this record and one doubtful collection from Weehawken, N. J., many years ago. Beyond this nothing seems to be known of its distribution in our range.

2. *Ulmus fulva* Michx. This species well illustrates a discrepancy in the distribution of a great many of our local plants, as given in general works. "Quebec to Florida," etc., is about the general range given for the tree, while the fact is that it grows in our region only north and west of the coastal plain region. There are at least 500 species in our area that follow this line of distribution, and are to be excluded from the coastal-plain region altogether.

3. *Celtis georgiana* Small. In the Flora of Southeastern United States (page 365) this species is described as growing from Maryland to Georgia, etc. Since its discovery it has turned up in a number of new stations, among them one from Newton, Sussex Co., N. J. The specimens are perfectly authentic and apparently

like the more southern material. The species was not previously known from this area.

Urticaceae

1. *Urtica dioica* L. Our specimens indicate that this nettle is only rather sparingly established in the area. Small colonies are known from almost throughout the range, following no very well defined law of distribution. Most of the specimens are from near some fair-sized settlement.

2. *Urtica gracilis* Ait. Much more abundant in the northern part of our range than southward. So far as New Jersey is concerned only two stations are known south of New Brunswick, Burlington and Gloucester Co. Has it ever been seen in the southern part of the state? Does it grow on Long Island?

3. *Urtica Lyallii* S. Wats. This species, very doubtfully specifically distinct from *U. dioica* L., is represented by a single specimen from Delaware Water Gap. The character of its relative length of petiole is about its only basis for specific recognition, and many specimens of *U. dioica* have varying-sized leaf-stalks.

4. *Parietaria floridana* Nutt. This species is credited to our range in Dr. Small's Flora of Southeastern United States (page 359). There are no specimens, and its distributional tendencies in the region are unknown.

New York Botanical Garden

A NEW SPECIES OF BLUE-BERRY FROM NEW JERSEY

By Kenneth K. Mackenzie

On Decoration Day, 1907, while botanizing with Mr. W. W. Eggleston at Tom's River, New Jersey, flowering specimens of a blue-berry allied to *Vaccinium corymbosum* L. were collected by me from a shrub growing immediately east of Jack's Fork along the southern edge of the Pennsylvania Railroad right-of-way. The shrub grew in a white-cedar swamp with *V. corymbosum* (then in full bloom) and *V. atrococcum* (A. Gray) Heller (about done flowering), and was in full bloom. It was so distinct in appearance that later in the year I secured fruiting specimens from the same bush. Since 1907 until this year I have not been in the pine-barrens at the proper season to study blue-berries in flower, but this year on May 15 I walked from Lakewood to Lakehurst especially to study them. The season was fully two weeks ahead of the season of 1907, and I found conditions exactly right for my study. Diligent search around Lakewood did not, however, reveal the plant I was hunting for, and it was not until I had reached the outskirts of Lakehurst that my search was rewarded. Here growing along the edge of the cranberry bog about a quarter of a mile north of the depot more shrubs were found. The result was not unexpected, for a number of plants grow around Lakehurst which do not seem to occur at Lakewood, and it is possible that the plant now under discussion is confined to those pine-barren bogs in which the peculiar white sands noticeable both at Tom's River and Lakehurst form the substratum.

An investigation of the collections at the New York Botanical Garden showed no flowering specimen of this shrub, but did disclose fruiting specimens evidently referable to it. Dr. Britton also informed me that he had long believed that the plant represented an undescribed species, but had never been able to secure complete material.

While an evident ally of *V. corymbosum* and having blue berries it is quickly distinguished as follows: *V. corymbosum* has a glistening white or pinkish-tinged conspicuous cylindrical to ovoid urn-shaped corolla 6–12 mm. long and 4–6 mm. wide, and two to three times as long as thick; and, as it occurs in New Jersey, always has some pubescence on the leaf-blades, at least near the base. The plant now under discussion has a dull white urn-shaped corolla 4–6 mm. long and 3–4 mm. wide and but one to two times as long as thick; and the leaf-blades are entirely glabrous even at flowering time. *V. atrococcum* with its strongly pubescent foliage, black berries, and greenish-white corolla is quickly separated. This distinct shrub of the pine-barrens is therefore here named and described as follows:

Vaccinium Caesariense sp. nov.

A shrub, 1–3 m. high similar in habit to *V. corymbosum* L. and *V. atrococcum* (A. Gray) Heller; much branched, the twigs green, warty, entirely glabrous. Leaf-blades ovate to elliptic-lanceolate, 4–7 cm. long, 1.5–2 cm. wide, entire, glabrous from the first, much paler beneath, short-pointed, round-tapering at base, half-grown at flowering time, the petioles 1–2 mm. long; flowers in short 6–12 flowered racemes, the ascending or spreading pedicels about equalling the corolla; bracts ovate-oblong, deciduous; calyx 5-lobed, glaucous, its broad lobes acute; corolla urn-shaped dull-white, 4–6 mm. long, 3–4 mm. wide, one to two times as long as thick, 5-toothed, the acute teeth erect or spreading; stamens 10 with hairy filaments; style slightly exceeding corolla; berries dark blue with a bloom, 6–8 mm. in diameter.

The following specimens, all from New Jersey, have been examined:

Tom's River, *Mackenzie* No. 2583, May 30, 1907, and No. 2780, July 28, 1907, same bush (type in Herb. K. K. Mackenzie; duplicates will be deposited in Herb. N. Y. Botanical Garden and Gray Herbarium); Lakehurst, *Mackenzie* Nos. 4544 and 4547, May 15, 1910; Tom's River, *Britton & Wilson*, June 30, 1900.

SHORTER NOTES

A Mountain Anychiastrum. When I described the genus *Anychiastrum* three species were known. These had been included in the two genera *Anychia* and *Paronychia*, and ranged through the coastal region of the Southern States, extending from North Carolina to Florida on the Atlantic side and from Florida to Louisiana on the Gulf side. I was considerably surprised, while studying the genus *Anychia* several years ago, to find specimens of an *Anychiastrum* mixed with those of *Anychia dichotoma*. The species may be described as follows:

Anychiastrum montanum sp. nov.

Plants annual or biennial, minutely pubescent. Stem branched at the base, the branches diffusely spreading, 0.5–2 dm. long, very slender, often wire-like, purplish, dichotomous: leaves numerous; blades spatulate to elliptic-spatulate, 4–11 mm. long, acute or acutish: stipules silvery: calyx becoming 1.5 mm. long; sepals ovate to oblong-ovate, abruptly pointed at the apex, but not cuspidate, glabrous: utricle included.

In dry soil, mountains of southern Pennyslvania, Virginia, North Carolina, and Georgia.

Mountains near Hyndman, Pennyslvania, *Small*, August 19–23, 1890 (type).

Stony Man Mountain, Virginia, *Steele*, August 30, 1901.

Eagle Mountain R. R., Virginia, *Steele*, August 18, 1903.

Julius' Creek Mountain, Virginia, *Steele*, August 26, 1903.

Andrews, North Carolina, *Huger*, September, 1900.

Georgia, *Gray*.

Related to *Anychiastrum Baldwinii* from which it differs in its glabrous and larger calyx, the sepals which are without prominent apical cusps, and the eciliate leaf-blades.

J. K. Small

OF INTEREST TO TEACHERS

The Term Biology

Among the students from the dozen or more colleges registering yearly at Teachers College the term biology is so commonly misused that the question may profitably, perhaps, be raised here. Biology is used as synonymous with zoölogy. Such students speak of wishing to take "biology and botany"; of having had "more botany than biology," etc.

The Century and Standard dictionaries give no authority for such usage. The Century dictionary definition follows: (1) The science of life and living things in the widest sense; the body of doctrine respecting living beings; the knowledge of vital phenomena. (2) In a more special sense, physiology; bio-physiology; biotics. (3) In a technical sense, the life history of an animal, especially used in entomology. (4) Animal magnetism. The Standard dictionary differs only in the first of the four uses of the word, and biology is defined as (1) The science of life or living organisms treating of the phenomena (structure, growth, development, distribution and functions) manifested by animals and plants or the causes of those phenomena; the study of living matter. An accompanying paragraph says "Systematic biology includes (1) zoölogy, (2) botany, and in some systems of classification, (3) anthropology.

Remarks by representatives of a limited number of teachers of botany have indicated an awareness of this misuse of the term, and a feeling that teachers of zoölogy are, perhaps unconsciously, responsible, through a loose use of the term in class room reference or through using the broader term in titles for courses which deal almost entirely with zoölogical subject matter.

On the other hand, one teacher of zoölogy feels that the real explanation lies in the fact that botanists are less aware of the progress in the zoölogical world, and limit illustration and amplification to the field of botany, while teachers of zoölogy draw freely from botany even in courses termed zoölogical, making the range of general subject matter as broad in courses in zoölogy as in those rightly called biology.

If this is so the remedy lies with the departments of botany. The *whole* field of biology is theirs, though they may actively labor in but part of it. If the fault lies in the attitude of the zoölogy departments the remedy is a simple one, and can be accomplished by an introductory definition of botany, with a few sentences showing its relation to the other divisions of biology.

In the August *Bulletin of the Torrey Botanical Club* Mr. Eugene P. Bicknell raises the question, "Have we enough New England blackberries?" Mr. Bicknell characterizes the blackberries as possessing "an extraordinary natural variability and undoubtedly, also, a facility in hybridizing which is perhaps not exceeded in any other genus of our flora." A list showing the probable hybrid derivation of many of the species is included.

The last "memoir" of the Torrey Botanical Club (XIV, part 2) is by Ormond Butler on Observations on the California Vine Disease. This disease, now on the decline, is found to be "due to some weakness in the functions of absorption and translocation of water becoming manifest when conditions favoring transpiration are marked." It is therefore not due to the presence of parasitic organisms, but to what has been called a "physiological disorder."

In the June *School Science and Mathematics* Mr. J. P. Brown makes a plea for the catalpa which he claims has been the object of unjust discrimination by the government. *Catalpa bignonoides* is soft, at least when young; but Mr. Brown claims that the older growths of even that are hard. Catalpas are rapid in growth, and furniture has been made of trees sixteen years old which the writer feels rank the catalpa with the hickory, black walnut, and oak in hardness and beauty.

An article on "Golden New England" by Sylvester Baxter (*Outlook*, September 24) gives the New England states a right to share that term with the familiar "golden west." The article emphasizes particularly the work and influence of the Massachusetts State Board of Agriculture and the Massachusetts State College of Agriculture. Cape Cod is shown to be good for some thing beside cranberries; and the possibilities along the fruit line are enthusiastically set forth.

Owners of white birch trees are urged to examine them for the bronze birch borer. Forest birches are less affected by this pest, probably because woodpeckers hold the borer in check there. Infected trees show, according to Professor J. G. Sanders, of the University of Wisconsin, "dead tops and upper branches, which usually bear the leaves of the past season." Such trees "should be examined for the winding galleries in the wood beneath the bark and for ridge-like swellings on the younger green branches." To control the pest, "infected trees should be cut and burned before May 1. Trees must be completely destroyed, regardless of their value, if infected. . . . It is useless to cut off and burn the dead portions of the tree, since the beetles have already abandoned them for new, green wood."

Experiments have been made by L. L. Harter to determine the starch content of leaves dropped in autumn (*Plant World* **13**: 144–7). Leaves of *Liquidambar Styraciflua* were tested four times between August 17 and October 28. The leaves used in the last test were picked from the ground soon after falling; the greenest of the fallen leaves were used. The amount of starch varied little more than one per cent. (the lowest 10.33 per cent., September 15, and the highest, 11.47 per cent., October 23). The starch percentage was based upon the dry weight of the leaves. Previous workers had shown an increase of starch content with the development of the red coloring matter, and a decrease before the leaves are dropped. It is suggested that the cool weather of autumn may stimulate the production of oxidizing ferments, and inhibit the action of diastase, thus making possible an accumulation of starch in the leaves.

The methods, content, and purpose of biologic science in the secondary schools is the title of a paper in the January and February numbers of *School Science and Mathematics.* The author, Dr. G. W. Hunter (DeWitt Clinton High School, New York City), shows from questionnaires representing 276 schools in 34 states (1) an unexpected balance in the distribution of the number of science courses in the four high school years; (2) that the largest number of courses are to be credited to the biologic sciences (not including human physiology); (3) the development of a unified course in general biology and in elementary science in the first year of many high schools; (4) that most of such courses are year courses in each biological science (300 to 200 half year or shorter courses); and that morphology, physiology, ecology and relation to man share almost evenly the claim to emphasis (physiology slightly ahead) and utility or utility and science training outrank science training alone. The adaptation of the course to the pupil who does not go to college is also discussed and several answers are quoted in this connection.

NEWS ITEMS

At Cornell, Charles S. Wilson has been promoted to professor of pomology.

Mr. William E. Lawrence has been appointed instructor in botany at the Oregon Agricultural College.

Dr. C. F. Clark of the New York State College of Agriculture has accepted a position with the Bureau of Plant Industry.

Miss Edith M. Twiss (Ph.D. University of Chicago) has been appointed assistant professor of botany in Washburn College, Kansas.

William Dana Hoyt (A.B., University of Georgia, and Ph.D., Johns Hopkins) has been appointed instructor in botany at Rutgers College.

Professor Josephine Tilden has returned from her year in the southern Pacific and resumed work at the University of Minnesota.

Professor Guy West Wilson, formerly of Upper Iowa University, has been appointed assistant in vegetable pathology at the North Carolina Experiment Station.

Dr. Herman A. Spoehr, assistant in chemistry in the University of Chicago, has been appointed a member of the staff of the Department of Botanical Research of the Carnegie Institution of Washington. By the aid of chemical methods Dr. Spoehr is to investigate at the Desert Laboratory at Tucson certain problems in plant physiology.

The second annual summer session of the school of forestry of the University of Georgia, in charge of Prof. Alfred Akerman, was held during 8 weeks in June, July, and August in the long-leaf pine forests in the eastern part of Alachua Co., Florida. The school secured the use for the season of a large tract of cut-over timber whose owners expect to restore it and make it a perpetual source of revenue by rational methods of forest management. In addition to the regular instruction in forestry, a course of lectures on plant geography was given by Dr. R. M. Harper (Florida State Geological Survey). Students from five states attended.

Professor John Macoun (Sussex Street, Ontario, Canada) is issuing a series of Canadian mosses. The set will number 500 in all; the price is $8.00 a hundred. Some subscriptions are still open, although about half of the series have already been issued. Collectors may also secure for the sum of five dollars a collection of one hundred British hepatics. This set, which includes many rare species, is offered by W. H. Pearson (18 Palatine Road, Manchester, England).

In the recent forest fires which raged for many days in northern California, Oregon, Washington, Idaho, and Montana incalculable damage was done to the forested government reserves and a number of forest rangers lost their lives. Even the more conservative newspapers reported some dozen fire fighters as dead or missing and an equal number of other citizens as killed by the fires. The fires, many of which were thought to be of incendiary origin and aimed by spite or private greed against government rangers and reservations, became gigantic conflagrations miles in length in some parts of the northwest. The efforts of the fire fighters proved futile in several cases, and the fires were extinguished only by the long-delayed rains. The later forest fires in Minnesota and Canada have been equally severe—both in the number of lives lost and in the amount of property destroyed.

THE TORREY BOTANICAL CLUB

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A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

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NORTHWARD EXTENSION OF THE RANGE OF A RECENTLY DESCRIBED GENUS OF UMBELLIFERAE

By Roland M. Harper

One day in the fall of 1907 I was talking with Dr. Forrest Shreve about the peculiar distribution of certain coastal plain plants, and reference was made to *Oxypolis filiformis* (Walt.) Britton,* which ranges from North Carolina to Florida and Mississippi in the pine-barrens, with an outlying variety (*Canbyi* C. & R., Contr. U. S. Nat. Herb. **7**: 193. 1900) in southern Delaware. Dr. Shreve then remarked that he had found this species the year before on the Potomac River near Hancock, Maryland; but I assured him that the occurrence of such a pine-barren plant among the mountains so far north was highly improbable,† and that his specimens were more likely *Harperella nodosa* Rose, a plant of very similar appearance, but easily distinguished by its involucres, fruit, time of flowering, and various other characters. This it is true was then known only from two counties in the coastal plain of Georgia and two in the coal region of Alabama,‡ but the Alabama localities were along streams in the Cumberland Plateau, which is a direct continuation of the mountains of western Maryland, and a great many species of plants are common to the mountains of these two states.

Not wishing to leave this interesting matter unsettled, I asked

*Formerly referred to the genera *Oenanthe*, *Sium*, *Tiedemannia*, and *Peucedanum*, in most cases with the specific name *teretifolia* (*um*).

†See Bull. Torrey Club **36**: 584 (first paragraph). 1909.

‡See Torreya **6**: 112–114. 1906. The genus (originally described in Proc. U. S. Nat. Mus. **29**: 441. 1905) was then known as *Harperia*, but this was found to be a homonym, and Dr. Rose soon changed it to *Harperella* (Proc. Biol. Soc. Wash. **19**: 96. 1906).

[No. 10, Vol. 10, of Torreya, comprising pages 217–236, was issued October 27, 1910.]

Dr. Shreve to send me a specimen of his plant on his return to Maryland, which he did; and I deposited it in the herbarium of the New York Botanical Garden. It was collected July 13, 1906, on gravel beaches of the Potomac River 1½ miles west of Hancock, Md. Its oldest umbel was only a few days past flowering, so that the fruit characters were not well displayed, but it was evidently not *Oxypolis*, and I could see nothing to distinguish it from *Harperella*. It is considerably slenderer than my best specimens of the latter from Georgia, but no more so than those from the mountains of Alabama.

There the matter rested until February, 1910, when a most interesting sequel developed. In trying to verify the report (current in botanical manuals) of the occurrence of *Oxypolis filiformis* in Virginia, I traced it back to Torrey & Gray (Fl. N. A. **1**: 630. 1840, under *Tiedemannia teretifolia*), who cited a specimen from Harper's Ferry (which was then in Virginia, but is now at the eastern corner of West Virginia), collected by Dr. W. E. A. Aikin. (This locality is given as the northeastern limit of the species in all editions of Gray's Manual between that time and 1869, when Mr. Canby discovered in Delaware the variety which now bears his name.) As Harper's Ferry is on the Potomac River in the mountains, like Hancock, and only 35 miles southeast of that place, I at once suspected that this plant must be about the same as Dr. Shreve's. On looking up the specimen in question, which is still preserved in the Torrey Herbarium, I found that what there is of it agrees very well with the one from near Hancock, even to being in the same immature stage. But it is such a poor specimen, that it is no wonder that no one ever noticed any essential difference between it and the specimens of *Oxypolis* among which it had presumably been lying for seventy years or so. The main stem had been bitten off (as was noted on the label), and curiously enough this was the case with most of the type specimens from Georgia; which would seem to indicate that cattle are rather fond of this plant. No indication of habitat was given on Dr. Aikin's label, but it is reasonable to assume that it was collected on the shore of one of the two rivers which come together at Harper's Ferry.

It seems rather strange that none of the numerous botanists who have explored the Allegheny table-lands between Maryland and Alabama between 1840 and 1905 should have found this plant. It ought to be in the proper condition for identification on the Potomac River in August or September, and in the Virginias and East Tennessee a little earlier in the season. Whether the Potomac River plant is what I suppose it to be or not, it deserves careful investigation, for it is certainly something far out of its usual range, if not an undescribed species.

Postscript. The foregoing was sent in to Torreya on September 17th. Since then Dr. J. N. Rose, the author of the genus in question, has visited Hancock at my suggestion—after one of his assistants had been to Harper's Ferry in August without finding the desired plant—and he writes me that on October 5th he found a small patch of it just above high-water mark on the bank of the Potomac near that place, and collected flowering and fruiting specimens. He finds it very similar to my specimens from the mountains of Alabama, but is not sure now that those are identical with the original material from the coastal plain of Georgia. This implies that there may be two species of *Harperella* instead of one; a suggestion to which the considerable difference in habitat between the mountain and coastal plain plants lends weight.

ADAM IN EDEN OR NATURE'S PARADISE

Extracts by Jean Broadhurst

(*Concluded*)

CHAP. CVII.

Of Tobacco.

The Names.

I cannot understand that *Tobacco* was known before the difcovery of the Weft-Indies, and if fo, it cannot be expected that I fhould tell you by what name the Greek writers called it, they being deceafed long before. It is called in Latin * * * *Nicotiana* from *John Nicot* a French man who being an Agent in *Portugal* for the French King, ſent some of it to the *French Queen,* whereupon it was alſo called *Herba Regina.* The Indians call it Picielt and Perebecenue; but in moſt other languages it is called Tobacco.

The Places and Time.

Though that Tobacco which beareth away the Bell from the rest be (as I ſaid) called *Spaniſh Tobacco,* yet there is, for ought that I can learn, but very little Tobacco growing in *Spain* if any at all, but is brought thither out f the provinces of America * * * . It growith alſo in Braſil, which is another Country of the Weſt Indies, whenſe the ſeed being brought into England and ſown hath proſpered very well in thoſe ſoils that have been fruitful, and especially about *VVinscomb* in Glouceſtershire, where I think the planting of it is diſcontinued now, becauſe the ſtore that came from thence was a hindrance to the publick revenue coming in for the Custome of that which is brought from beyond the Seas; Howbeit it is continued in many Gardens though in no great quantity * * * .

CHAP. CXI.

Of Wood-bind, or Hony-suckle.

The Kindes.

THere are divers Sorts of Wood-binds, ſome that are winding about whatſoever ſtandeth next them; and for the moſt part, known throughout the Land; others are ſtrangers, or not ſo well known: there are divers that wind not but ſtand upright; all of which being ſummoned together, are in number eight. 1. Our ordinary Wood-bind. 2. The German red Honiſuckle * * * .

The Places and Time.

The firſt groweth abundantly in this Land, almoſt in every Hedge. The ſecond came out of *Germany.* The third out of *Italy,* both of which are ſet againſt our houſe-ſides, to run about the Windows, where they keep the Rooms cool, and make a goodly ſhew without. The laſt was found by Dr. Penny * * * .

The Vertues.

A Decoction made of the Leaves, or the Flowers and Leaves of Honey-ſuckles, with ſome Figs, and Liquorice added there unto is very effectuall for the expectorating of flegme from the Cheſt and Lungs * * * A Syrup made of the flowers is good likewiſe to be drunk * * * , being drunk with a little wine. Mr. *Culpepper* saith, that it is fitting that a Conſerve of the flowers of it, ſhould be kept in every Gentlewomans Houſe, for he knew no better cure for an *Aſthma,* then this. * * * The flowers and leaves are of more uſe then the ſeed, yet they alſo help the ſhortneſſe and difficulty of breathing, and cure the Hicket.

CHAP. CXV.

Of Polypodie.

The Forme.

COmmon *Polypody* of the *Oak* is a ſmall Herb, conſiſting of nothing but Roots and Leaves, bearing neither Flower nor Seed. It hath three or four Leaves riſing from a Root, every one ſingly by themſelves, of about an hand breadth, which are winged, conſiſting of many ſmall narrow Leaves, cut into the middle Rib, ſtanding on each ſide of the ſtalk, large below, and ſmaller and ſmaller up to the top; not dented or notched on the edges at all, (as the Male Fern is) of a ſad green color, and ſmooth on the upper ſide; but on the under ſide, ſomewhat rough, by reaſon of ſome yellowiſh ſpots ſet thereon. * * *

The Places and Time.

There hath been of late dayes, ſuch a ſlaughter of Oaks, and other Trees, all over this Land, that ſhould I nominate any particular place, I might thereby ſeem to be a deceiver. I ſhall therefore tell you in generall, that it groweth as well upon old rotten Trunks or ſtumps of Trees, be it Oak, Beech, Hazel, Willow, or any other, as in the Woods under them, and ſometimes upon ſlated Houſes and old Walls, as upon a Wall and ſide of an House, in *Adderbury* Churchyard, and many other places. * * *

The Signatures and Vertues.

The rough ſpots that are on the under ſides of the leaves of *Polypody,* * * * is a ſign that it is good for the Lungs * * *. The Herb * * * is good for thoſe that are troubled with melancholy, or *Quartan* Agues, eſpecially if it be taken in Whey, or honeyed water, or in Barley water, or in the Broth of a Chicken * * * . The freſh Roots beaten ſmall, or the Powder of the dryed Root, mixed with Honey, and applyed to any Member that hath been out of joynt, and is newly ſet again, doth much help to ſtrengthen it. Applyed also to the Nose, it cureth the Diſeaſe called *Polypus,* which is a piece of fleſh growing therein. * * * *Crolius* ſaith, that becauſe it hath ſuch rough spots on the leaves, it healeth all ſorts of ſcabs whatſoever by ſignature. * * *

CHAP. CXXV.

Of Marigolds.

The Kinds.

THerebe near upon twenty ſorts of *Marigolds,* yet I ſhall trouble you with no more than ten at this time. 1. The greatest double Marigold. 2. The greater double Marigold. 3. The ſmaller double Marigold. 4. * * * 8. Jack an Apes on Horſe-back. 9. Mountain Marigold. 10. The wild Marigold.

The Places and Times.

All the Sorts afore-named are Inhabitants of the Garden, except the two laſt whoſe naturall places of being, may be diſcovered by their titles. They flower from April, even, unto Winter, and in Winter alſo, if it be warm * * *.

The Vertues and Signatures.

The Flowers of Marigolds, comfort and ſtrengthen the Heart exceedingly; * * * and little leſs effectuall in the ſmall Pox and Meazles, then Saffron. The Conſerve made of the Flowers, taken morning and evening, helpeth the trembling of the heart, and is very uſeful in the time of Peſtilence, when the air is corrupted. The Flowers either green or dryed, are uſed much in Poſſets, Broths, and Drinks, as a comforter of the Heart and Spirits, and to expell any Malignant or Peſtilentiall quality, that might annoy them, eſpecially amongſt the *Dutch,* where they are sold by the penny.

CHAP. CLV.

Of Daffodills.

The Names.

IT is called in Greek * * * that which benumbeth the hands of them that touch him * * * a *Pliny* and Plutarch affirm. And I take this to be the right Etymology of the word, though I am not ignorant of what the Poets have written hereof, especially *Ovid,* who deſcribeth the tranſformation of the fair boy Narciſſus, into a Flower of his own Name, ſaying, * * *

> As for his Body none remain'd, inſtead whereof they found
> A yellow Flower with milk-white Leaves, new ſprung out of the ground.

The Forme.

The common Daffodill hath long, fat, and thick leaves, full of a ſlimy juyce; among which riſeth up a bare thick ſtalk, hollow within, and full of juyce. The Flower groweth at the top, of a yellowiſh white colour, with a yellow Crown, or Circle in the middle. The Root is white, and of a Bulbus or Onyon faſhion, yet not without divers effects by which it is propogated.

The Vertues.

Beſides the Ornamentall uſe of *Daffodils* for decking *Garlands* and *Houſes* in the Spring-time, it hath many Physicall properties * * * . And their qualities in drying are ſo wonderful, that they glew together very great wounds: as alſo rifts, gaſhes, or cuts that happen about the veins, sinews, and tendons. * * * Being ſtamped with Honey, and applyed Plaiſter-wiſe, they help them that are burnt with fire, and are effectuall for the great wrenches of the Ancles, the Aches and pains of the joynts. * * * The diſtilled water of Daffodils doth cure the Palſie, if the Patient be bathed and rubbed with the ſaid liquor, by the fire, as hath been proved by that diligent searcher of nature, Mr. *Nicholas Belſon.*

CHAP. CLXVIII.

Of the Apple-Tree.

The Forme.

FOr formality ſake only, I shall tell you that the *Apple-Tree* doth generally ſpread his *Arms* and *Branches* more than the *Peare-Tree,* but riſeth not to that height: the leaves are ſomewhat round yet pointed at the end, and dented about the edges, being greene both above and below; the *Flowers* are *White* with ſome *Red* many times mixed with it, eſpecially about the edges. The *Fruit* is of divers ſizes, formes, colour, taſts, &c: within which being ripe, be divers black *Kernells;* the *Root* goethe straight down with some branches running aslope.

The Vertues.

Though *Apples* eaten before they be ripe, or afterwards immoderately and without preparation, are very unwholeſome; yet being gathered when they be ful ripe, and eaten with deſcretion they * * * make good digestion * * * . Being roaſted and eaten with Roſewater and Sugar, as thoſe of pleasanter kinds, as Pippins and Pearemaines, they are helpful to diſſolve *Melancholly humours, to expell* heavineſſe and procure *Mirth,* are good againſt the Pleuriſy. * * * The Bloſſomes of apples * * * are uſefull to thoſe which are troubled with a red *nofe* and face, they being diftilled * * * and the face wafhed morning and evening with the water. * * * A *rotten apple* applyed to *eyes* that are *blood* *fhotten* or *enflamed* with heat, or that are *black* and *blew* by any ftroake or fall, all day or all night, helpeth them quickly. * * *

CHAP. CCXXXII.

Of the *Haw-thorne.*

The Names.

IT being fo much controverted by Authors concerning the true Greek name of this Shrub, I fhall not undertake to decide it, but paffe it by without giving it any. * * *

The Kinds.

Antiquity was acquainted but with one fort hereof, yet now there be three taken notice of. 1. *The ordinary Haw-thorne.* 2. The low *Haw-thorne.* 3. *Englands Hawthorne,* which is in all parts like the common fort, but that it flowereth twice in a yeare, to the great admiration of fome wife and judicious men.

The *Signatures and Vertues.*

The powder of the Berries or the feeds in the Berries being given to drink in *Wine,* is generally * * * reported to be good for the Dropsy. The flowers fteeped three dayes in Wine, and afterwards distilled in glaffe, and the water thereof drunk, is a Soveraign Remedy for the Pleurisy, and for inward tormenting paines, which is alfo *signified* by the freckles that grow on this Tree. * * * The faid diftilled water is not onely *cooling* but *drawing* alfo, for it is found by good experience, that if Cloathes and Spunges be wet in faid water, and applyed to any place wherein *thornes, Splinters,* &c have entered and be there abiding, it will notably draw them forth, so that the *thorne* gives a medicine for its own pricking, as many other things befides do, if they were obferved. * * *

CHAP. CCXLIII.

Of Holly.

The Kinds.

THere may be faid to be three forts of Holly. 1. The Holly-Tree without prickles. 2. The Holly-bufh with prickly-leaves. 3. The Holly bufh with yellow Berries. Yet there be fome that affirme that with, and that without prickles, to be the ſame, having prickles when it is young and low, but when it is old and becometh great, it loſeth all the prickles, except that at the end, and ſometimes that alſo.

The Vertues and Signature.

* * * The decoction of the Rootes, but eſpecially of the Barke of the Rootſ, as *Matthiolus* faith, being applyed by way f fomentation to thoſe *places* that have been put *out of Joynt,* doth help them much * * *; and alſo to *conſolidate* the *broken bones.* * * * The powder of the leaves dryed in an Oven and the pricks taken off, being drunk in Ale, is commended againſt the *Stitches* and *pricking paines* of the *ſide,* which the prickles growing on the leaves to alſo ſignify. The Sap or juice that droppeth out of the wood being laid on the fire, being dropped into the *Eares* of thoſe which are inclined to deafneſſe, removeth that *infirmity.* * * * The leſſer branches may be used to adorne *Houſes* and *Churches* alſo, at Chriſtmas as well in this as in former age without any ſuperſtition at all; theſe that are of a bigger and longer ſize are very neceſſary for Carters to make Whips, and the ſame may be uſed as Riding-rods, as is known to every one; But that which may ſeeme a little ſtrange, is this. One, that I knew, had a Holly-Tree growing in his Orchard of that bigneſſe that being cut down, he caused it to be ſawed out in Boards and made himself thereof a *Coffin,* and if I mistake not left enough to make his wife one alſo: Both the parties were very corpulent, and therefore you may imagine the Tree could not be ſmall.

CHAP. CCLXXXII

Of the Water Lillie.

The Forme.

THe great common white water Lilly hath very large round Leaves, in the ſhape of a buckler, thick, fat, full of juyce, and of a dark green colour, which, ſtanding upon long, round, and smooth footſtalks, full of a ſpongious ſubstance, alwayes flote upon the water, ſeldome or never growing above it: from amongſt which, there riſe up from the Root other thick and great ſtalks * * * each of them ſuſtaining one onely large white flower thereon, green on the outſide, but exceeding white within, conſiſting of divers rowes, of long and ſomewhat thick, and narrow Leaves, ſmaller and thinner, the more inward they be, with many yellow thrums or threds in the middle, ſtanding about a ſmall head, which after the leaves are fallen off, becometh like unto a Poppy Head * * *.

The Vertues.

* * * Both the simple and compound Syrupes, which are made of white Water Lilly flowers, and may be had at Apothecaries, are fine and cooling they allay the heat of choller, provoke Sleep, ſettle the brains of Frantick perſons * * * and ſo doth the Conſerve made of the ſaid flowers, the diſtilled Water of the ſaid flowers is very effectuall for all the diſeaſes aforesaid, both inwardly taken and outwardly applyed, and is very much commended for the taking away of Freckles, Spots, Sunburn * * * .

CHAP. CCXCI.

Of Anemonies

The Names.

IT is called in Greeke * * * from the Wind, becauſe it was anciently believed, that theſe kinds of Flowers did never open themselves, but when the wind did blow. * * *

The Kindes

To reckon up every particular Member of this exceedingly numerous Family, were almoſt an *Herculean Labour,* and is thought would gravell the moſt experienced Floriſt in *Europe,* and therefore, I shall not undertake it, but mention a few * * * 1. The purple Paſque flower. 2. The red Paſs flower. 3. The double Paſs flower. 4. The Paſs flower of *Denmark.* 5. The Wood *Anemone* or Wind-flower. 6. *Anemone* or Windflower with a tuberous Root. 7. The Fleſh-coloured Anemone. 8. The blew Anemone.

The Vertues.

There is ſome other uſe for *Anemonies,* beſides the ſetting forth of a garden, * * * Being made into an Oyntment, and the Eye-lids anoynted with it, it helps the *inflamations* of the *Eyes,* whereby it is apparent that the heat of one draweth out the heat of the other, as *fire* will fetch out the *fire,* when any one happens to be burnt, if they burn the ſame place a ſecond time * * * .

CHAP. CCCXXXIX

Of the Daisy.

The Kindes.

THere be divers ſorts of Daiſyes, as well in our Gardens, as growing beyond the Seas; yet becauſe the time will not permit me to enquire after them, I ſhall give you onely thoſe that grow naturally with us, they being of greateſt uſe for our intended purpofe, and they are three: 1. The great Daifyes, which fome call Ox-Eyes, and White Moons. 2. The middle fort of Daifyes. 3. The little Daify.

The Places and Time.

The *first,* which is *Great Daify, Oxe-Eye* or White-Moone, groweth almost every where by the hedge fides, in the borders f fields, and other waft ground, and many times in meadows, that lye anything high: the f*econd* groweth in the like places, but not fo frequently: the place of the *third* can hardly be miftook, for it groweth upon every Common and other place almoft: The two firft flower in *May* and *June,* and then muft be gathered, for they laft not long; but the *last* beginneth to flower in the Spring, and holdeth on moft part of the Summer.

The Vertues.

The Leaves of the great *Daify* or *Maudlin wort* made up into an Oyntment, or Salve, with Wax, Oyl, and Turpentine, is moft *excellent* for *Wounds,* * * * A Decoction made hereof * * * and the places fomented and bathed therewith warm, giveth great eafe to them that are troubled with *Palfy, Sciatica,* or other Gout. * * * The *little Daisies,* when the greater cannot fo well be gotten, may be used with good fucceffe for all the purpofes aforefaid, as alfo to help the Agues, the decoction of them in Wine or Water being drunk. It is faid that the Roots hereof being boyled in milk, and given to little Puppies, will not fuffer them to grow great.

The Conclusion.

A*Nd thus,* Gentle Reader, *by the afsiftance f the Almighty, have I gone through the generall* anatomy *of* Mans Body, *with the moft ufuall* Difeafes, *and diftempers of every part, from the* Crown *of the* Head, *to the* Sole *of the* Feet, *and appropriated fuch* Simples (*which I have in a manner* Anatomized alfo) *unto them, as I held to be moft convenient for the reftoring them againe to their* Eafe *and right* Temper. *I conceive that there is no body that understands my well-meaning endeavours, that will think, that such* Plants, *which are not expreffed in this Worke, have not come with in my cognizance, and therefore I fhall not need to be very* exact *in making any* Apology, *or laying down my* Reafons *for the* omiffion *of them: yet if there be any inclined to fuppofe fo, let them know* that *I wilfully paffed over fome of them, and that there were fome which the time (a thing which I have much wanted ever fince I undertook this bufineffe) would not permit me to insert. And let them know alfo, that the prefent defigne was not an* univerfall Hiftory *of* Plants, *for then how voluminous muft we needs have been? but onely f thofe which are more ufefull, and may be gotten at the* Apothecaries, *or* Druggifts, *if they grow not neer every ones habitation: Yet perhaps* *hereafter, if Life, Health, and Leifure ſhall give way, I ſhall with a little* encouragement *deviſe ſome breef* appendix, *wherein I ſhall compriſe the names at least, of all ſuch as are here wanting. But for the preſent, I ſhall bid the apprehenſive* Reader *to* Fare-well, *and I hope I ſhall not only to bid, but alſo be a means to make him ſo to doe.*

FINIS.

A Table of the Engliſh Names in which the Numbers are to be referred to the Chapters *

A Table†

* Selections only, including interesting names, synonyms, or spellings.

† Selections only; the numerous references given for freckles, headache, black and blue marks, heart comforted, etc., are interesting.

SHORTER NOTES

NOTES ON *Chrysobalanus Icaco* L.—A large portion of the sand dunes between the beach and Biscayne Bay opposite Miami, Florida, is covered by a growth of the Cocoa Plum. The plant there grows in approximately circular or somewhat irregular patches, the stems and branches radiately arranged and partially prostrate and partially curving upward. The flowers and fruits are borne mainly at the circumference of the patches, or near it. The plants produce fruits of three colors, namely yellow, purple, and red. The color of the fruits is always decided, and a given patch, so far as I have observed, produces but one color of fruit, each patch invariably bearing either yellow, purple, or red fruits. Except for this color-difference and a relative difference in the size of the fruits, the yellow the largest and the red the smallest, the plants appear to be identical. J. K. SMALL

A NEW SPECIES OF *Proserpinaca*.—So peculiar are most of the plants of the New Jersey pine-barrens and so local are many of them that novelties are to be expected; but I must confess I was somewhat surprised to find that a large amount of material collected by me as *Proserpinaca palustris* L. was not that species, but a plant quite intermediate in character between it and *Proserpinaca pectinata* Lam.

As is well known, the first-named species has those emersed leaves which bear fruit in their axils oblong-lanceolate and merely serrate or serrulate, and the submerged leaves are pectinate or pectinate-pinnatifid; in the second named species all the leaves are strongly pectinate-pinnatifid, being divided to the rachis. The pine-barren plant has all the emersed leaves pectinate with broad margined rachis, the submerged leaves being pectinate-pinnatifid. The emersed leaves are in fact exactly half way between those of the two species above referred to.

The plant seems distinct and may be designated and described as

Proserpinaca intermedia

Glabrous, the stems decumbent at base, rooting, about 3 dm. high, simple or somewhat branched. Leaves of two kinds; blades of submerged ones pectinate-pinnatifid, divided to the rachis; blades of emersed ones oblong-lanceolate, pectinate, the stiff segments entire, acute, the central part of blade one-third of its width; flowers sessile in axils of emersed leaves, one to few together; sepals triangular, acute, convergent; fruit 4 mm. long and about as wide, sharply angled, the faces flat or slightly concave, wrinkled or rugose.

Specimens examined:

NEW JERSEY. Boggy soil along Pennsylvania right of way about half way between Barnegat Pier and Island Heights Junction, Ocean County, *Mackenzie* 2890, Sept. 1907 (type in Herb. K. K. Mackenzie; duplicates will be deposited in Herb. N. Y. Bot. Garden and Gray Herbarium);

GEORGIA. Wet pine barrens east of Douglass, Coffee County. *Harper* 1527, July 19, 1902; in small branch swamps in pine-barrens near Fitzgerald, Irwin County, *Harper* 2210, May 18, 1904.

KENNETH K. MACKENZIE

REVIEWS.

Osborne's Vegetable Proteins*

Dr. Osborne has done a great service to chemists and to those interested in the chemistry of plants by the publication of this monograph upon the proteins of vegetable origin. This subject has been his life-work and surely there is no one, here or abroad, better qualified to write upon it. The proof of this is the fact that the book is largely an outline of his own work and conclusions. Dr. Osborne treats first of the general characteristics of these proteins, the manner of preparation, their general physical and chemical properties, their decomposition products, and their classification. The last chapter is exceedingly interesting,

*Osborne, Thomas B. The Vegetable Proteins. Pp. 125. Longmans, Green, & Co., London and New York. 1909.

being a treatment of the physiological relations of the proteins of plants. In this place he introduces a discussion of the toxalbumins such as ricin, the exceedingly poisonous constituent of the castor-bean, and he also treats of the precipitin and agglutinin reactions of the proteins. At the end, the author has compiled a bibliography of more than six hundred titles, all dealing with the literature of the subject. This bibliography is sure to be indispensable to all future investigators in this field.

The botanist should be interested in this subject because any light that can be thrown on the composition and physiology of the proteins of plants, especially those from seeds, would help to clear up the important phenomena of germination and so forth. Furthermore, the isolation of sharply-defined and characteristic proteins from different plants and especially the fact that plants closely related botanically yield proteins that may be grouped together chemically, all go to show that morphological differences go hand in hand with deep-seated chemical differences, a supposition that ought to be studied much more closely than in the past. The newer immunity reactions of the blood-serum of animals ought to serve as a very delicate test for the relationship of plant constituents just as it has proved so useful in the study of normal and abnormal substances in the case of man and the animals.

To the chemist, Dr. Osborne's book should bring the results of an exact chemical study of the proteins, substances whose importance in both plants and animals can hardly be overestimated. The complexity and cell associations of those substances prevent their isolation in a pure state. Fortunately, however, the vegetable proteins can be prepared in a much greater state of purity than almost any of the proteins of animal origin. The result is that studies made upon proteins from plants are very likely to be productive of great advances in our knowledge of the structure and properties of proteins in general. The constancy of the composition and properties of certain of the plant proteins are so great as to lead one to think that definite chemical individuals are being studied. This is a reassuring thought to a chemist working upon proteins who, too often, is afloat in unknown waters with the usual beacon-lights of chemical identity gone, I mean such data as melting points, crystalline form, and so on. Finally, it seems that the publication of work such as that of Dr. Osborne on the border-land of botany and chemistry may bring together the two sister sciences which, too long, have trod paths that are somewhat parallel but still too widely separated.

Ernest D. Clark

Columbia University

PROCEEDINGS OF THE CLUB

May 25, 1910

The Club met at the Museum of the New York Botanical Garden at 3:30 p.m. Dr. M. A. Howe occupied the chair. Twelve persons were present. The minutes of the last meeting, May 10, were approved.

A letter was read from the recording secretary of the New York Academy of Sciences in which he stated that he knew of no arrangements whereby the expenses of popular lectures given by the affiliated societies at the American Museum of Natural History could be met by the funds of the Academy. It was voted that the treasurer of the Club meet the bills incurred at the meetings of March 8 and April 12.

First on the announced scientific program was a paper entitled "Moss Notes" by Mr. R. S. Williams, of which the following is an abstract prepared by the speaker.

"*Leucobryum* or white-moss is so called from the structure of the leaf which is about like *Sphagnum* in having the chlorophyll-cells surrounded by hyaline, empty, porose cells, thus giving a whitish appearance to the moss. The fruit, of course, is very different from *Sphagnum*, much resembling that of *Dicranum*. Leucobryums are chiefly tropical although the type of the genus, *L. glaucum*, is widely distributed over Europe and in North America from Labrador to Florida and westward to the Mississippi valley. There have been over 120 species described, many of which can scarcely be considered as well defined. Out of some eighteen or twenty species credited to North and Central

America and the West Indies, I have been unable to distinguish more than seven or eight that seem fairly distinct. The fruit is very similar in the different species and of little specific value. The leaves consist largely of a very broad costa, several layers of cells in thickness, and this costa viewed in cross-section furnishes some of the best characters in separating the species. One of the most interesting features of the genus is the inflorescence. It has usually been described as dioicous and both Schimper and Braithwait figure male plants, three or four cm. high, growing in separate tufts. In the five or six species I have examined where antheridia occurred I have only found minute male plants one to rarely five or six mm. high and these were always growing on fruiting plants attached to tomentum enclosed by perichaetial leaves of infertile archegonia, or more rarely on the inner side of the tubulose stem leaves. It would be interesting to discover whether or not a distinctly dioicous inflorescence ever occurs, with male plants of large size."

The second paper of the afternoon was by Mr. E. D. Clarke on "The Rôle of the Oxidizing Ferments in Plants."

The following abstract was prepared by Mr. Clarke:

"The oxidizing ferments or enzymes are very widely distributed in both the higher and lower plants. Since all other enzymes seem to be produced by plants or animals for some definite purpose in the life of the organism, it was natural that speculation should arise regarding the function of the oxidizing enzymes of the plant. Little is known of the nature of these enzymes but their activity may best be described by saying that they act as accelerators of the ordinary processes of oxidation. It seems likely that the oxidizing ferments assist the plant in carrying on the oxidative processes of respiration by increasing the rapidity of the combination of oxygen with the oxidizable substances of the plant body. In the self-destructive processes of anaerobic respiration, these ferments probably play the same part. An illustration of the latter type is found in the case of the spadix of *Arum maculatum* which sometimes reaches a temperature of 20° C. above its surroundings. Certain of the higher plants and fungi change color very rapidly upon injury; the resulting exposure of the tissues to atmospheric oxygen, in the presence of oxidizing enzymes, causing the oxidation of colorless substances to those of varied color. During the normal life of the plant it seems to be able to hold these enzymes in check, but after death or interference with its functions, the enzymes run riot; thus causing blackening and colorations of many sorts. The blackening of the foliage of many plants after a frost and the production of the red and gold of our atuumn forests may well be due to the excessive activity of the oxidizing enzymes. The color of black tea, the odor of valerian, the aroma of vanilla-beans, etc. have all been attributed to this same cause. The presence of these ferments in the roots of growing plants seem to enable them to destroy certain poisonous substances in the medium in which they grow. There is a disease of tobacco known as the 'mosaic disease' which is characterized by the checkered appearance of the leaves, these checkered places being yellow in color. Woods showed that rapid growth, produced by cutting back or by excessive manuring, often caused this disease which he attributed to an abnormal activity of the oxidizing enzymes. It has also been shown that they may cause the destruction of chlorophyll. Now, most of the lower fungi contain these enzymes, so the yellowing produced by their attacks upon green leaves may be due to their activity. It is evident then, that in the plant the oxidizing ferments have a physiological and also a pathological rôle that are not well understood but which deserve further investigation."

Dr. P. A. Rydberg reviewed the Monograph of *Sambucus* by Fritz Graf von Schwerm. This paper will be published at a later date.

Adjourned.

PERCY WILSON,
Secretary

OF INTEREST TO TEACHERS

THE BOTANY UNIT

At the March meeting of the Commission on Accredited Schools of the North Central Association (including 13 states), the botany unit statement mentioned earlier in TORREYA was adopted.

"It has been the intent of the committee to prepare a statement that is sufficiently elastic to give adequate recognition to all good courses in high school botany, rather than to present a set line of procedure that must be followed by all. The work that is done should meet the needs of the pupils regardless of whether any work is to be done in any higher institution. Emphasis is placed upon the quality and quantity of the work done, and upon the preparation of the teacher, rather than upon the particular things that are to be done. To this end the report considers the following: I. The purpose and content of the course and the time to be given to it; II. Suggested plan of the course; III. The preparation that should be had by the teacher of botany; IV. A list of topics from which selection may be made to construct a course."

From the first topic four extracts are given:

1. "The ends to be sought through an elementary study of plant life include training in the scientific method of thinking particularly as relates to plant life, information and a more intelligent and a more active interest in natural phenomena in general, an elementary knowledge of fundamentals of plant life and a better understanding of those features and activities of plants that relate to every day affairs."

2. "In determining the content, order and treatment of topics in any indiviudal course, the needs and opportunities of the teacher and class should be dominant. * * * The quality and quantity of work done by the pupil, evidence of his ability to do accurate and reliable work, and adequate preparation by the teacher, rather than the specific content of the course are emphasized."

3. "There is presented a general plan of the 'synthetic course,' which the majority of the committee believes to be the best type, though it is not intended to restrict teachers to this type of course. This course embodies the elements of morphology of the great groups including the "lower forms" as well as the seed plants, of physiology with experiments upon plant activities, of ecology with emphasis upon class and individual field trips, including some acquaintance with local plants, of the relation

of plants to their habitat and to men, of food and timber supply, parasitism, disease, decay, soil replenishment, etc.

"An elementary consideration of the relations of plants to men as shown in plant and animal diseases, hygiene, agriculture, horticulture, erosion, decay, foods, fibers, etc., should be presented as an organic part of the study of botany. An adequate consideration of such separate applied sciences as agriculture, forestry, bacteriology, and horticulture should follow the general study of plants and animals."

4. "The time requirement of the course should be the equivalent of 180 periods of at least 40 minutes each; there should be two doubled periods per week for laboratory or field work, each of these doubled periods counting as one period in making up the total 180 periods."

The "suggested plan" of the course includes more material than any one year's work can present. The economic and practical phases are emphasized more throughout than in the report of the Committee of Education of the Botanical Society of America.* It is also stated that *any* of the following topics may serve as an introduction to the course, and lead directly to others of the group. The content is indicated below:

1. The structures of a typical seed plant—roots, stem, leaves, flowers, and seeds—and the kinds of work done by these parts.

How the plant lives—elementary, physiological experiments, absorption, root pressure, conduction, transpiration, photosynthesis, relation of functions to the structures by means of which they are performed.

The work of leaves.

The storage of food, its relation to the plant; its relation to men and other animals.

Seeds and seedlings; seed distribution; the establishment of new plants.

Acquaintance with some of the plants of the locality.

2. In addition to the topics just named, owing to seasonal advantage, preferences of the teacher, or needs of the pupils, the following will at times be found best in this connection, while in

*See Torreya **9**: 60–63, 81–85. 1909.

other cases it will be found best to take up these topics after the consideration of the great groups:

Relation of plants to light, soil, water, atmosphere, gravity, contact, seasons.

Growth and reproduction.

Responses of different regions.

Artificial control and methods of improving agricultural and horticultural plants.

Forests, their uses, distribution, dangers, and preservation.

The study of types differs little in range from the recommendation of the Botanical Society. In the cryptogams field work is more definitely recommended; the species selected in each group are in most cases left to the teacher, but the life, habits, and distribution are included with the life cycle requirement. Bacteria in relation to crops, sanitation, and disease occupy a much more prominent part. The suggestions for gymnosperms and angiosperms are reprinted below:

1. Gymnosperms. Pine or spruce as a type; habit of tree, perennial nature, twigs and stems of different ages, age of tree, leaves and the evergreen habit, nature of the timber and its uses; two kinds of cones and the processes, time and structures involved in seed formation, nature of the seed, seed distribution, seedlings and the establishment of the new tree.

Names of other kinds of gymnosperms.

Gymnosperms as source of much of the world's lumber supply, chief regions of gymnosperm forests, preservation and extension of gymnosperm forests.

2. Angiosperms.

Life cycle as compared with the gymnosperms.

Types of stem, root, leaf and flower structure, with consideration of the special work, habits, and uses of each of these.

Nutritive and reproductive processes arranged so as to extend whatever work was done with seed plants at the beginning of the course. Work suggested at the outset that was not done in that connection may be included here.

Pollination and seed formation, number of seeds, seed distribution, seedlings, vitality of seeds, struggle for existence.

Structures and habits of plants of different regions.

Acquaintance with plants of the leading families in the local region.

Angiospermous forests (possibly delay the consideration of gymnospermous forests until this point), the local timber supply either from local forests or from others, enemies of the forests, elementary forestry problems, United States, State, and local private work in forestry.

Relation of plants to soil, water, light, temperature, gravity, and other environmental factors. Productive and unproductive soils and climates in relation to agricultural plants.

Diseases of plants and their significance. Artificial improvement of plants through cultivation, pruning, grafting, selection, and breeding.

The minimum preparation in botany for high school teachers of the subject was decided to be the equivalent of two years of college work. This work should include the general morphology of the lower and higher groups, elementary plant physiology and ecology; zoölogy, physiography, and a course in general bacteriology are desirable. The teacher should also have some knowledge of the purpose of botany in high school education and of current and desirable practice in teaching botany.

A porous clay cup for the automatic watering of plants is described by L. A. Hawkins in the September *Plant World*. Coleus plants were so grown for 180 days, and *Vicia Faba* plants from the seed to the late flowering stage. A container which is at least partially impervious was found to be better than the usual flower pot when the automatic watering cup is used. The plants were as vigorous as the control plants potted and watered the usual way. The advantages of the automatic device are that it maintains an approximately uniform soil moisture, and affords a simple method of measuring "water requirement and water loss of potted plants"; it also decreases the amount of attention required by potted plants and avoids the evils of alternately overwet and baked soil.

The September series of papers on the Paleontologic Record now running in the *Popular Science Monthly* deals with ontogeny and its relation to phylogeny. While the parallel between these is recognized as "a powerful aid to investigation" one paper warns the paleontologist not to assume too much for it. Another concludes that "the young give us very little which is not deceptive in reconstructing ancestral forms." The next paper in the series, however, says "When, however, the student of post-embryonic ontogeny compares the youthful stages of an individual with the adult of immediately preceding species of the same genetic series, the fact of recapitulation becomes at once apparent." The references are mainly zoölogical, but are well worth the botanists' perusal.

In a paper on the economics of waste and conservation in the *Atlantic Monthly* for September John Bates Clark calls attention to the fact the "common allegation is true that a small area of growing trees is capable of meeting the entire demand of the country for lumber", but he briefly adds "It will do so *at a price*." The "one palliative fact about a monopoly of forests" is that "it would let new forests grow." Still Professor Clark is one of the last to present a plea for monopolies; and he presents the case for forests clearly when he says: "In another respect forestry is peculiar. Conservation not only permits, but requires, the use of the thing that is the object of care. . . . The scientific treatment of forests not only does not preclude a use of them, but positively requires it, and complete disuse is itself wasteful. Judicious cutting may go on forever without lessening the supply of timber which a forest contains, while refraining for all cutting is like letting fruit or growing crops go to decay. The trees that are ripe for use may give place to others which will keep up the succession and preserve forever the integrity of the forest; and few indeed are the public measures which would do as much for the general welfare as insisting on this amount of conservation."

NEWS ITEMS

William Henry Brewer, professor of agriculture in the Sheffield Scientific School of Yale University since 1864, died on November 2, in the eighty-third year of his age. Professor Brewer was first assistant on the geological survey of California from 1860 to 1864, had special charge of the botanical collections of this survey, and with Sereno Watson and Asa Gray wrote the "Botany of California," setting forth the botanical results of the survey in two quarto volumes. Several Californian species bear his name.

Dr. Melchior Treub, for many years director of the famous botanical garden at Buitenzorg, Java, and director of the Department of Agriculture for the Dutch East Indies, died at Saint-Raphaël, Var, France, on October 3. He was born near Leyden in 1851. Dr. Treub was editor of the important Annales du Jardin Botanique de Buitenzorg, beginning with its second volume in 1885 and retaining this editorship even since his retirement about a year ago. He was the author of many noteworthy botanical papers, covering a wide range of topics.

David Pearce Penhallow, the botanist and professor of botany at McGill University, Montreal, died October 26, on board the steamship Lake Manitoba bound for Liverpool. Professor Penhallow was born at Kittery Point, Me., May 25, 1854. He was graduated from the Massachusetts State College in 1873. In 1876, Professor Penhallow went to Japan and became professor of chemistry and botany in the Imperial College of Agriculture, Sapporo, Japan. He remained there until 1880, when he returned to this country and became instructor in physiological Botany in Prof. Gray's department of Harvard University. In 1882 he went to the Houghton Farm Scientific and Experimental Station as botanist and chemist. From here he went to McGill University in 1883. Professor Penhallow was a member of all the prominent botanical and natural history societies. He was vice-president of Section G of the American Association for the Advancement of Science. Among his numerous contributions are the Review of Canadian Botany from the First Settlement of New France to the Nineteenth Century, and various publications on paleobotany, plant anatomy and conifers.

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A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

JEAN BROADHURST

JOHN TORREY, 1796–1873

CONTENTS

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TORREYA

December, 1910

Vol. 10 No. 12

ADDITIONS TO THE PLEISTOCENE FLORA OF NEW JERSEY*

By Edward Wilber Berry

No very promising localities for Pleistocene plants have thus far been discovered in the New Jersey area. The long-known and justly-celebrated Fish House clays in Camden county have yielded a considerable Pleistocene fauna, both vertebrate and invertebrate; and vegetable remains are not uncommon in the clays, but they are poorly preserved and difficult or impossible to determine. The writer has previously mentioned the presence at this locality of fragmentary maple leaves, seeds of the gum, and leaves of the linden, the latter occurrence having been described in a previous issue of Torreya.† Still other seeds are present but they have not been identified.

Another New Jersey locality for Pleistocene plants was discovered by H. S. Gane in 1892 while working for the U. S. Geological Survey under the direction of Prof. W. B. Clark. The writer has not visited this locality, which is near Long Branch in Monmouth County, and such of the following notes as refer to this locality are based upon a small collection of the impure peat made at that time. The late Pleistocene age of these deposits near Long Branch has never been questioned, but there has been considerable divergence in the age assigned to the Fish House clays at different times. The following brief enumeration will give a good idea of the varying opinions which have been held regarding the age of these beds. Lea, Cook, and Whitfield regarded them as Cretaceous and of the same age as the Amboy clays; Cope at one time regarded them as Pliocene but later

*Illustrated with the aid of the Catherine McManes fund.

†Berry, Torreya, 7: 80, 81. 1907.

[No. 11, Vol. 10, of Torreya, comprising pages 237–260, was issued November 17, 1910.]

concluded that they were Pleistocene; C. A. White in 1883 considered them post-Tertiary; Carville Lewis in 1884 considered them to be inter-glacial in age; R. D. Salisbury in 1894 regarded them as post-Pensauken but in 1895 and since has included them in his Pensauken formation; Pilsbry in 1896 says that they are inter-glacial or pre-glacial, probably the latter; Woolman in 1896 referred them to the Pensauken; and Shattuck in 1906 correlates them with the Talbot formation of Maryland. In the judgment of the writer the fossiliferous stratum at least is not older than the last interglacial and the probability is strong though unverified that it is post-glacial in age. The same remark is applicable to the fossiliferous peat near Long Branch which has yielded seeds and fruits of a number of different species of plants.

While the present collections are too small for any very definite conclusions regarding the climatic conditions which were prevalent in this latitude at the time these plants were living, it is significant that of the nine forms enumerated only three are species which in the recent flora range from Canada or New England to Florida These are *Juniperus virginiana*, *Hicoria glabra*, and *Vitis aestivalis;* and in all three cases the New Jersey Pleistocene forms are not as conclusively determinable as would be desirable. Of the remaining six species, *Quercus Phellos* is the only one which in the existing flora extends northward beyond this Pleistocene occurrence and then only for a few miles. The others all have their present day northern limits of range considerably south of their northern limits in the late Pleistocene. *Nyssa biflora*, *Vitis rotundifolia*, and *Taxodium distichum* do not range northward beyond southern Maryland at the present time, while *Pinus Taeda* is said to find its northern limit in Cape May County, N. J. *Zizyphus* is not represented at all in the northern or central coastal plain at the present time and is mainly tropical in its distribution. These facts though few in number and coupled with a certain lack of precision regarding the exact age of the deposits are of considerable interest since it is a well-known fact confirmed by abundant and conclusive evidence that in Europe the last glacial retreat was succeeded by a period during which the climate was considerably warmer than it is at the present time as shown by the extension of various members of the existing flora for many miles to the northward of their present range.

The writer gratefully acknowledges his indebtedness to Mr. W. L. McAtee of the Biological Survey who through the courtesy of Dr. C. Hart Merriam has examined not only some of the present specimens but also other Pleistocene fruits and seeds collected by the writer. The Biological Survey in its extensive studies of the stomach contents of birds and mammals has accumulated large collections of fruits and seeds as well as experience in the identification of materials of this sort which is invaluable to the student of swamp deposits like so many of our Pleistocene plant-bearing horizons.

The following notes refer to the forms from New Jersey which have been recognized in the present study.

Taxodium distichum (Linné) Rich.

Holmes, Journ. Elisha Mitchell Soc. for 1884–85: 92. 1885.
Hollick, Md. Geol. Surv. Pli. & Pleist. 218, 237. *pl. 68.* 1906.
Berry, Torreya, **6**: 89. 1906. Journ. Geol. **15**: 339. 1907. Amer. Nat. **43**: 434. *f. 1, 2.* 1909. Amer. Journ. Sci. (iv), **29**: 391. 1910.

In the existing flora the cypress reaches its northern limit in southern Delaware and Maryland. Its range is becoming gradually restricted in the coastal plain as is shown by the sub-fossil occurrences of stumps north of the present limit of pure stands.

In the late Pleistocene its range was much more extensive and fossil remains are found at numerous localities north of its present limit of distribution. The most northerly of these occurrences is the present record based upon cone-scales from near Long Branch, N. J., which is nearly 200 miles north of the present northern limit of the species.

Pinus Taeda Linné.

Berry, Amer. Journ. Sci. (iv), **29**: 391. 1910.

Cones and seeds of this species were recorded recently from the Pleistocene of both eastern and western Alabama. In the existing flora the Loblolly pine becomes confined to the coastal plain north of the Potomac River valley, although to the southward it spreads over the Piedmont plateau and into the Appalachian region. It is found as far north as Cape May County, N. J., but the most northerly pure stands are in southern Delaware and Maryland on the sandy soils derived usually from the Pleistocene formations.

The present occurrence is based upon seeds from the swamp deposit near Long Branch, N. J., indicating that this species extended at least 75 miles farther northward in the late Pleistocene than it does at the present time.

Juniperus virginiana Linné (?).

Seeds of a *Juniperus* closely resembling those of this species occur near Long Branch, N. J. They are queried since from fossil wood in the possession of the writer collected from the

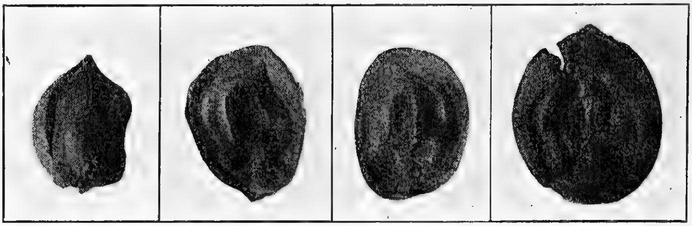

FIG. 1.—Nuts (×1) of *Hicoria glabra* from Long Branch.

Pleistocene of Maryland it is clear on anatomical grounds, that an extinct species of *Juniperus* was present in the northern coastal plain and these seeds may possibly be those of that species. The present identification was suggested by Mr. McAtee.

Hicoria glabra (Mill.) Britton (?).

Mercer, Journ. Acad. Nat. Sci. Phila. (ii) **11**: 277, 281. *f. 4, 5, 12, 16.* 1899. (*Carya porcina* Nutt.)

Berry, Torreya, **6**: 89. 1906. Journ. Geol. 15: 340. 1907. Torreya, **9**: 97. *f. 1–5.* 1909.

This species has a wide range in the existing flora of eastern North America and it is also frequently met with in the Pleistocene, having been previously recorded from deposits of this age in Pennsylvania, Maryland, Virginia, and North Carolina. The present specimens, a number of which are here reproduced, come from near Long Branch, N. J. They resemble somewhat *Hicoria microcarpa* but are larger and thicker shelled. They also show some points of resemblance to *Hicoria villosa*, a comparatively recent segregate from *Hicoria glabra*. On the whole they are closest to the latter species especially to those fruits of the latter which are more symmetrical and not ficiform in shape. They are queried since it is possible that they may represent some intermediate or ancestral form.

Quercus cf. *Phellos* Linné.

Berry, Journ. Geol. **15**: 342. 1907. Amer. Nat. **41**: 694. *pl. 1. f. 1.* 1907. Amer. Jour. Sci. (iv), **29**: 394. 1910.

This oak is a common species of the Carolinian and Louisianian zones ranging from southern New York to Florida and Texas. It is a common fossil in the North Carolina Pleistocene and has also been recorded from the Pleistocene of Alabama. The present occurrence is based upon somewhat flattened cupules from near Long Branch, N. J., whose specific identity is not established with entire certainty. In the same deposits the writer has found a number of immature *Quercus* fruits four to five millimeters in diameter which may belong to this same species.

Vitis pseudo-rotundifolia sp. nov.

Seed relatively slender, curved, pointed: Surface slightly wrinkled: Inner face flat; outer face full and curved: Raphe well marked: Length 6.12 mm: Width 3.20 mm.: Thickness 2.25 mm.

This species of *Vitis* is distinct from any existing species known to the writer. It resembles in its general proportions the seeds of *Vitis rotundifolia* Michx., but is much smaller and less rugose. If it represents an ancestral form of this species, as is not improbable, the range in the late Pleistocene was more extended than at the present time since *Vitis rotundifolia* finds its present northern limit in southern Maryland almost 200 miles south of the oc-

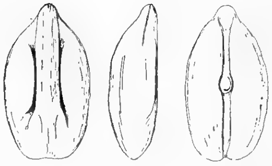

FIG. 2.—Three views of seed (×3) of *Vitis pseudo-rotundifolia* from Long Branch.

currence of **Vitis pseudo-rotundifolia** which is at Long Branch, N. J. Mr. McAtee who kindly compared this seed with the existing species reported that it was different from any of the existing species of *Vitis*.

Vitis cf. *aestivalis* Michx.

The summer grape is widespread in the existing flora of eastern North America ranging from southern New England to Florida along the Atlantic coast. The specimens from the Pleistocene near Long Branch, N. J., are seeds which agree fairly well with the existing species with which they have been compared.

Nyssa biflora Walt.

Hollick, Md. Geol. Surv. Pli. & Pleist, 235. *pl. 69. f. 5*. 1906.
Berry, Torreya. **6**: 90. 1906. Journ. Geol. **15**: 345. 1907. Amer. Journ. Sci. (iv), **29**: 398. 1910.

This species in the recent flora appears to be confined to the coastal plain ranging from Maryland to eastern Texas. According to Coulter & Evans it occurs in New Jersey, and Sudworth records it from the Piedmont plateau in Montgomery County, Maryland. However, the botanical survey of Maryland which has been completed recently failed to discover this species except in the river swamps of the southern "Eastern Shore" which it would seem marks its present northern limit. Britton & Brown state that perhaps it intergrades with *Nyssa sylvatica* which extends northward to Maine and Canada, but in any case the seeds are distinctive and it is upon the seeds that the present record at Fish House, N. J., is based. Gum seeds have been previously mentioned by the writer as frequent in the Fish House clays but these have never been specifically identified. As a fossil this species has been previously recorded from Maryland, Virginia, North Carolina, and Alabama.

Zizyphus sp.

The remains consist of a flattened drupe with a smooth stone from Long Branch, N. J. They are larger and more massive than those of the existing *Zizyphus obtusifolia* of the southwestern United States and differ from any of the existing species with which they have been compared. There is room for some doubt regarding the correctness of the identification; the remains are, however, more like those of *Zizyphus* than anything else in the existing flora with which they have been compared either by the writer or by Mr. McAtee of the Biological Survey.

JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

TWO INTERESTING NEW ENGLAND PLANTS*

BY H. A. ALLARD

During a brief visit around Oxford, Massachusetts, in September, 1910, I was much impressed with the pretty Spiked-Loosestrife [*Lysimachia terrestris* (L.) B. S. P.]. At this season in certain situations many plants had become strikingly conspicuous from the great numbers of deep red, elongated bulblets which were growing from the axils of the numerous, more or less distinctly whorled leaves. These bulblets, which morphologically are suppressed branchlets, may reach a length of ¾ of an inch, are very pointed and deep red in color. Late in the season these bulblets are very easily detached and thickly strew the ground beneath the plants.

In June and July the Spiked-Loosestrife produces an abundance of small, brown-marked, yellow blossoms in a terminal, pyramidal raceme. The plants, however, are far more noticeable in autumn when they have become reddened with their axillary bulblets, which at first sight resemble peculiar little fruits more than anything else. Conditions of environment seem to determine whether the plants will produce these bulblets abundantly or not. Many botanical descriptions of *Lysimachia terrestris* make little or no mention of this well-marked habit of the plant to produce axillary bulblets.

The Narrow-leaved Laurel (*Kalmia angustifolia* L.) is a low, evergreen shrub thriving in pastures throughout New England. During its growth it forms small tufts which, in the course of years, if the conditions of growth have been uniform, may form great circular areas many feet in diameter. This peripheral extension is probably accomplished by a process of budding from underground shoots.

*Illustrated with the aid of the Catherine McManes fund.

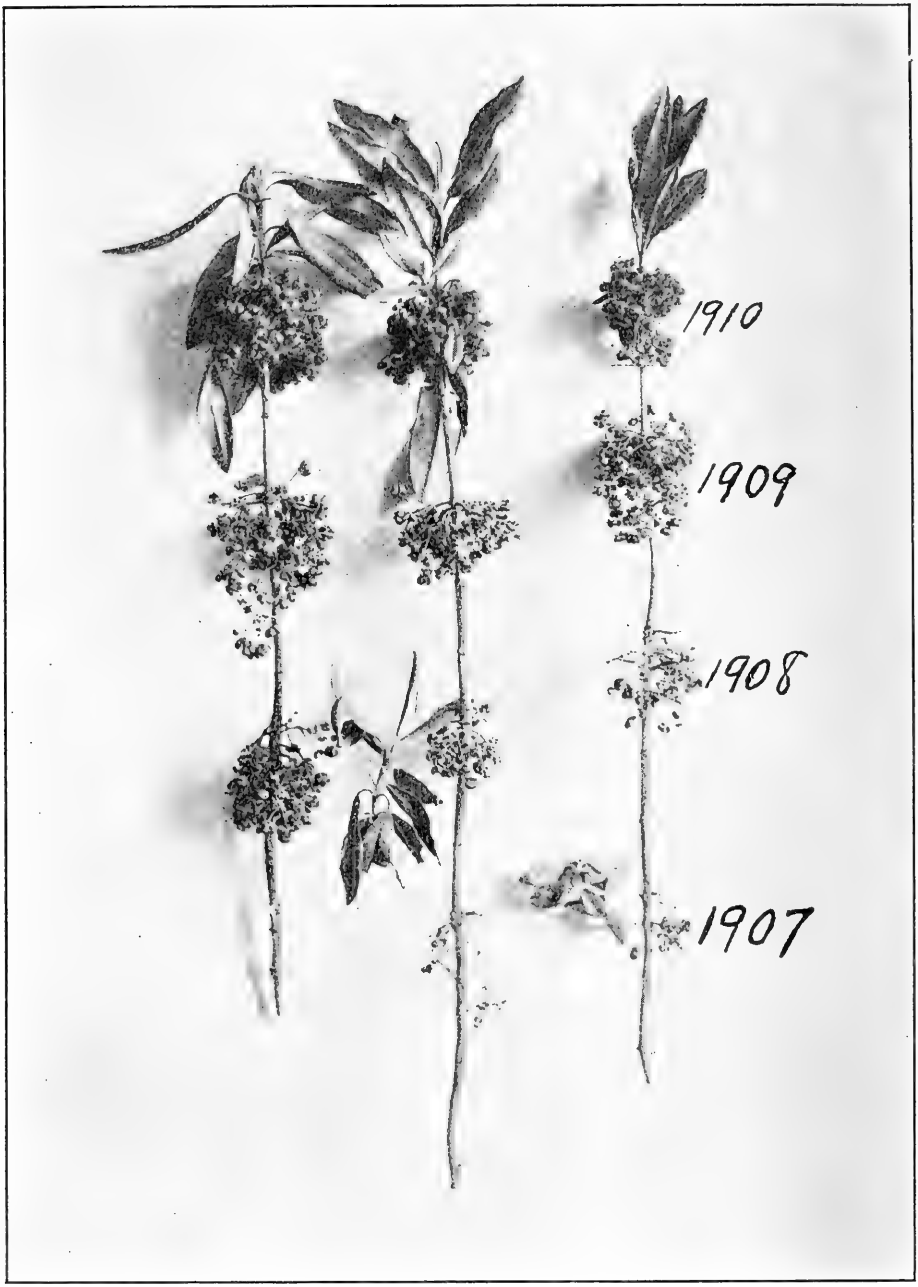

FIG. 1.—Capsule-clusters of *Kalmia angustifolia* of successive years.

It is interesting to observe how persistently this Kalmia retains the seed capsules of each season's growth.

If fruiting branches of this little shrub be carefully examined, it will be noted that several clusters of small, closely crowded capsules appear along the stalk, as shown in the accompanying photograph. Each cluster is the growth of a single season, and as the capsules are strongly persistent, clusters several years old may be present. The accompanying illustration shows two stalks with a few capsules still adhering from the growth of the season of 1907, together with clusters of each succeeding year including the present season of 1910. The uppermost cluster of capsules represents the present season's growth, and is of a rich, reddish-brown color, which becomes a dull, faded grey in older clusters longer exposed to weathering influences.

The beautiful, showy rose-red flowers of early summer are closely arranged in whorls of little corymbs in the axils of the persistent, last year's leaves. Later in the season following the appearance of the clustered capsules these subtending leaves are shed and the leafy shoot of the present season surmounts the topmost capsule cluster, as shown in the photograph. These new leaves persist through the winter, and from their axils will appear the flowers and seed-capsules of the next season.

Kalmia angustifolia flourishes in open, damp situations throughout New England. In certain open hilly pastures it becomes especially luxuriant. The rare beauty of its clustered, deep rose-red flowers in early summer together with the green, persistent leaves, the neat, compact, massing habit of growth, and its hardy adaptability should highly recommend this Kalmia to cultivation.

DEPARTMENT OF AGRICULTURE

REVIEWS

The Origin of the Coco Palm*

Having described a new species of *Glaziova*, founded upon a specimen growing in the Botanical Garden at Buitenzorg, but

**Glaziova Treubiana* nouvelle espèce de Cocoïnée, avec observations sur le genre Cocos. Par O. Becarri. Annales du Jardin Botanique de Buitenzorg, 2e Serie, Suppl. III. Pp. 791–806, Plate and text figures. Leide, 1910.

whose native country is unknown, and having recorded some observations on the flowers of *Cocos nucifera*, Dr. Beccari devotes the last half of his paper to a discussion of the disputed question of the original home of the latter palm.

On this point the generally accepted opinion had attributed an Asiatic origin to this palm, a view accepted by De Candolle in his classic "*Origine des plantes cultivées.*" But in 1901, Mr. O. F. Cook, in a paper published in the seventh volume of the Contributions of the United States National Herbarium, put forth a well supported argument in favor of "the alkaline regions of the Andes of Colombia,—in valleys remote from the sea," as the cradle of the cocoanut. From both these views Dr. Beccari dissents.

He calls attention to the fact that, in determining the place of origin of a plant or an animal, we must consider not alone the present configuration of the earth's surface, but we must go back at least to the tertiary period, when the ancestors of the organic forms of today were assuming their development (*s'etre effectuée la plasmation*). It is evident that during that period great geographical changes were effected in the Pacific basin in connection with the elevation of the Andes.

The weightiest argument in favor of the American origin of the Coco Palm is drawn from the fact that, with the exception of the African oil palm, *Elaeis guineensis*, all the other members of the tribe are indisputably American. But none of them are, Dr. Beccari claims, truly related to *Cocos nucifera*, which is strictly monotypic, as it is also regarded by Mr. Cook. Moreover, all these relatives, more or less remote, inhabit regions on the eastern side of the Cordilleras, which immense barrier separates them from the present actual center of distribution of the Coco Palm.

The author names several other palms whose presence in America is best accounted for on the hypothesis of the existence, in a former geological age, of a more extensive land area in the Pacific, than now remains.

While the Coco Palm may, under favorable circumstances, live at places distant from the sea, essentially it is a plant of maritime shores. That it does not occur on some shores where it might naturally be expected is attributed to enemies, among whom, it may be, even primitive man is to be counted. It cannot succeed in forests because it is unable to compete with other trees, and it is there without means of dissemination, for its nuts fall directly at the foot of the tree without any chance of being carried to a distance. On the seashore, favored by its tolerance of salt water, it encounters little competition, and the ocean currents bear its nuts afar.

A further argument is drawn from the singular association existing between the Coco Palm and the Robber Crab. This great crustacean, *Birgus latro,* a foot and a half in length, and terrestrial in habit, can exist only where the cocoanut flourishes, and is found only in the Asiatic and Pacific islands. Like its relative, the Hermit Crab, its soft body is unprovided with a protective covering, and to supply this want the *Birgus* encases its abdomen in the empty shell of a cocoanut, to the cavity of which its dimensions exactly correspond. Even that it climbs to the tops of the palms for the purpose of detaching the nuts, long regarded as a fable, has been recently ascertained to be a fact. Its buccinal claw has developed into a ponderous hammer, wherewith it staves in the germinal end of the cocoanut and extracts, bit by bit, the nourishing meat. To this rich food it is due that its abdomen is a reservoir of oil.

These modifications, so extraordinary both in habits and in organs, and found in the *Birgus* alone, of all the crab family, could have been acquired by association with no other plant than the Coco Palm, and to account for their acquisition demands an immense period of time. And since Polynesia is the native home of *Birgus latro*, it is logical to conclude that it is likewise that of *Cocos nucifera.*

The author, therefore, believes that the Coco Palm acquired its specific form in Polynesia, and that its distribution therein was effected by the ocean currents, whose efficiency for that purpose is so vigorously combated by Mr. Cook. In Asia and in Malasia it has only gained a foothold under the protection of man.

S. B. Parish

PROCEEDINGS OF THE CLUB

October 11, 1910

The first fall meeting of the Club was held at the Museum of Natural History. Vice-president Barnhart occupied the chair. Eight persons were present. Mrs. M. E. Soth, of Manitou, Colorado, was elected to membership.

The scientific program consisted of an illustrated lecture on "European Influences in the History of American Botany" by Dr. John Hendley Barnhart.

Jean Broadhurst,
Secretary pro tem.

October 26, 1910

The meeting of October 26 was held in the museum building of the New York Botanical Garden at 3:30 P.M. Eleven persons were present. Vice-president Barnhart occcupied the chair.

The minutes of the meeting of October 11 were read and approved. It was then voted to accept the resignation of Frederick S. Beattie, of Tilton, N. H.

The scientific program consisted of informal reports on the summer's work. Mr. Norman Taylor, chairman of the field committee, gave an account of the Decoration Day excursion by members of the Club to Saugerties, Ulster Co., N. Y., of a personal collecting expedition to Bean Run, Luzerne Co., Pa., and of the "Symposium" in cooperation with the Philadelphia Botanical Club, which was held this year at Farmingdale, Monmouth County, New Jersey, July 2 to July 9. Farmingdale is north of the pine-barren region and its soils are largely Cretaceous marls and clays, but it was of interest to find in this region, especially on the low hills, northward extensions of the range of certain characteristic pine-barren plants.

Mrs. N. L. Britton gave a report of the summer meeting of the Vermont Botanical Club, which was held at Woodstock, Vermont, during the first week of July.

Mr. F. J. Seaver remarked briefly concerning his visit to the mountains of Colorado, where he made collections of fungi during the month of September.

Dr. John Hendley Barnhart reported upon his visit to Europe during May, June, and July, including an account of the International Botanical Congress at Brussels, to which he was one of the Club's delegates. He also related some of his experiences and results in purchasing books for the library of the New York Botanical Garden and in a few hours of plant-collecting in the vicinity of Oberammergau.

Dr. P. A. Rydberg stated that for the first season in twenty-six years he had not collected a single plant, and in this connection he briefly reviewed some of his earlier field-work.

Adjournment followed.

Marshall A. Howe,
Secretary pro tem.

OF INTEREST TO TEACHERS

Kipling on the Old Herbalists

In Kipling's Rewards and Fairies* is a musical poem, "Our Fathers of Old", which shows that Kipling must be familiar with some of the old herbals. The first stanza follows:

"Excellent herbs had our fathers of old—
Excellent herbs to ease their pain—
Alexanders and Marigold,
Eyebright, Orris, and Elecampane.
Basil, Rocket, Valerian, Rue,
(Almost singing themselves they run)
Vervain, Dittany, Call-me-to-you—
Cowslip, Meliot, Rose of the Sun.
Anything green that grew out of the mould
Was an excellent herb to our fathers of old."

As in Adam in Eden, "simply and gravely the facts are told"; yet after all,

"Wonderful little, when all is said,
Wonderful little our fathers knew.
Half their remedies cured you dead—
Most of their teaching was quite untrue."

*Doubleday, Page and Co., Garden City, New York, 1910.

In the October issue (page 236) Professor Macoun's address was given as Ontario instead of Ottawa.

Teachers in the southwestern states will be interested in The Trees and Shrubs of San Antonio and Vicinity. This little booklet gives the woody plants of the region, with a brief, nontechnical description, and a short paragraph on uses and habitats. There is no key, but, as the author says, any plant may be traced to the family by any general flora; and as the plants are grouped by families, its further identification is a simple matter. The common names are emphasized by being placed first.

Professor Bessey (*Science*, November 11) has made a new estimate of the number of species of plants "with which botanists have enough acquaintance to permit of their systematic arrangement and enumeration. The result is that roughly speaking we may say that there are now known about 210,000 species, distributed as follows: Myxophyceae (Blue Greens) 2,020, Protophyceae (Simple Algae) 1,100, Zygophyceae (Conjugate Algae) 7,000, Siphonophyceae (Tube Algae) 1,100, Phaeophyceae (Brown Algae) 1,030, Carpophyceae (Higher Algae) 3,210, Carpomyceteae (Higher Fungi) 63,700, Bryophyta (Mossworts) 16,600, Pteridophyta (Ferns) 2,500, Calamophyta (Calamites) 20, Lepidophyta (Lycopods) 900, Cycadophyta (Cycads) 140, Strobilophyta (Conifers) 450, and Anthophyta (Flowering Plants) 110,000.

An article on conserving the purity of the soil (*Science*, Oct. 21) by H. L. Bolley emphasizes the necessity of keeping soils, especially for cereals, in a sanitary condition. The author concludes with the following paragraph:

"If, on the other hand, you declare for careful seed selection in all cases, careful seed disinfection at all times, the formation of a well-aerated but compacted seed bed, and for as extensive a rotation of crops of as wide-spread character as possible, you of the new dry land regions of the west have the greatest possible opportunity to prove to the world that it is not necessary to lose a crop of such importance as linseed from among your rotations, nor is it necessary that your wheat yields should fall from the now promising ones of thirty to sixty bushels per acre to the general average of twelve to fifteen."

The May *Bulletin of the Torrey Botanical Club* contains an article by Harry B. Brown on the genus *Crataegus*, with some theories concerning the origin of its species. Prior to 1896 about one hundred North American species of *Crataegus* had been described; since then eight hundred and sixty-six species and eighteen varieties have been described. Three explanations might be given: that the early systematists were not careful workers; that the number of species has multiplied greatly recently; that the older species are hybridizing. Opinions from leading systematists are given. Mr. Brown thinks that the present different concept of species is responsible for part of the increase; and the rest may be accounted for by (1) the decrease in forested land and the consequent increase in the number of *Crataegus* plants now occupying the space and (2) by the fact that many of the present forms seem to be hybrids.

In the *Plant World* for July an unusual formation of adventitious roots is described by F. A. Wolf. "During a storm the trunk of this large hackberry tree had been split and the fallen portion was subsequently removed. At a point about eight feet above the ground and a little above the broken edge of the tree a cluster of fibrous roots were formed. Some of these grew to be over a foot in length and larger in diameter than a lead pencil." Mr. Wolf says that there "is no doubt that no such phenomena would be expected to occur in a normal healthy tree, yet this is not an adequate explanation for their formation. Certain it is that the vitality of the tree had been seriously impaired and it responded to this abnormal condition by a peculiar development of roots. It would seem, too, that such a growth might better be expected in a more humid region and not under semi-arid conditions such as prevail about Austin. This is one of the singular, natural phenomena the reason for which can only be a matter of conjecture."

The American Phytopathological Society calls attention to "two dangerous European plant diseases: the potato wart, caused by *Chrysophlyotis endobiotica* Schilb., and the blister rust of white pine, caused by *Peridermium strobi* Klebahn. The former has been discovered in Newfoundland. The latter has been widely distributed in nine of the United States and in the Province of Ontario, but is now believed to have been eradicated." The Society regrets that through the absence of any national regulation in either the United States or Canada both governments are powerless to prevent the continued introduction of these and other dangerous diseases, or their transference from one country to the other; and promises to support all legislation in both the United States and Canada looking toward the inspection, quarantine, or prohibition from entry of all plant material liable to introduce these or other dangerous diseases or pests. The Society feels the need of immediate action, as "every law of biology and all experiences with plant diseases and pests indicate that, in a new climate, with new varietal and specific hosts and with an entire continent in which to spread, both diseases will reach a degree of virulence unknown in Europe."

The *Outlook* for November 19 gives the Forest Service "estimate of the loss in the National Forests in Montana and Idaho due to the fires and hurricane of August 26 last. The estimate puts the total amount of destroyed timber at over six billion board feet, or between one and two per cent. of the total stand of National Forest timber, the area burned over exceeding one and a quarter million acres. This announcement has caused caustic comment by the opponents of the Federal administration of forests. Some attempt has been made to connect the matter with the 'New Nationalism', as showing that there is no necessity for such an issue of centralization. Apparently, in the minds of these critics, the fires would not have occurred if the forests had been State and not National Forests!" Drought, the quantity of inflammable material, the inaccessible character of the country, and unusually high winds all added to the difficulties faced by the not incompetent but *inadequate* forest service. A much larger sum should immediately be appropriated by Congress for this work.

NEWS ITEMS

L. H. Pennington, instructor at Northwestern University, has recently been made assistant professor of botany at Syracuse University.

The annual meeting of the American Society of Naturalists will be held (Dec. 28–30) at Cornell University. Dr. D. T. MacDougal will deliver the presidential address.

A drinking fountain, the memorial to Dr. James Fletcher mentioned some months ago in TORREYA, has been erected at the Central Experiment Farm, Canada.

Professor W. A. Henry, professor emeritus of agriculture of the University of Wisconsin, is planning to spend a year investigating agriculture in Europe.

Dr. William A. Cannon of the Desert Laboratory of the Carnegie Institution is spending a year abroad, visiting European botanical gardens and African deserts.

Dr. W. A. Murrill, of the New York Botanical Garden, has just returned from a European trip taken primarily to examine type specimens of fungi.

Dr. Ormond S. Butler (Ph.D. Cornell, 1910) has been appointed instructor in horticulture at the College of Agriculture of the University of Wisconsin and the Wisconsin Agricultural Experiment Station.

Letchworth Park, the thousand acre park given conditionally to the state of New York in 1907, became the possession of the State upon the death of the donor, William Pryor Letchworth, on December 1.

The sixty-second meeting of the American Association for the Advancement of Science, and the ninth of the "Convocation week" meetings, will be held in Minneapolis, December 27 to 31, 1910, at the invitation of the University of Minnesota. The Botanical Society of America and various affiliated societies meet as usual at the same time. Owing to Professor Penhallow's death, Section G will convene under Vice-president R. A. Harper. Further information may be obtained from the permanent secretary, Dr. L. O. Howard, or from the secretary of Section G, H. C. Cowles, University of Chicago.

In the Brooklyn Institute prospectus for 1910–1911 two courses of lectures are announced in botany. They are given by Dr. C. Stuart Gager, the director of the new Brooklyn Botanic Garden. The first is a series of ten illustrated lectures on plant physiology given on Saturday mornings beginning October 15, but omitting November 26, December 26, and 31. The course will deal with modern views and interpretations of various fundamental life processes of plants. The second course is on the teaching of botany, and will be given on Saturday mornings beginning on March 4, but omitting April 5. This is intended primarily for teachers (including teachers of nature work) and those intending to teach. Readings will be assigned in the literature of the pedagogy of botany, and a comprehensive bibliography may be secured. All the lectures begin at ten o'clock, are open to teachers in the public and private schools, and will be held in the Brooklyn Academy of Music.

INDEX TO VOLUME X

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

THE TORREY BOTANICAL CLUB

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OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

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(1) BULLETIN

A monthly journal devoted to general botany, established 1870. Vol. 36 published in 1909, contained 720 pages of text and 34 full-page plates. Price $3.00 per annum. For Europe, 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 24–36 can be supplied entire; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Vols. 24–27 are furnished at the published price of two dollars each; Vols. 28–36 three dollars each.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–13 are now completed; Nos. 1 and 2 of Vol. 14 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

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