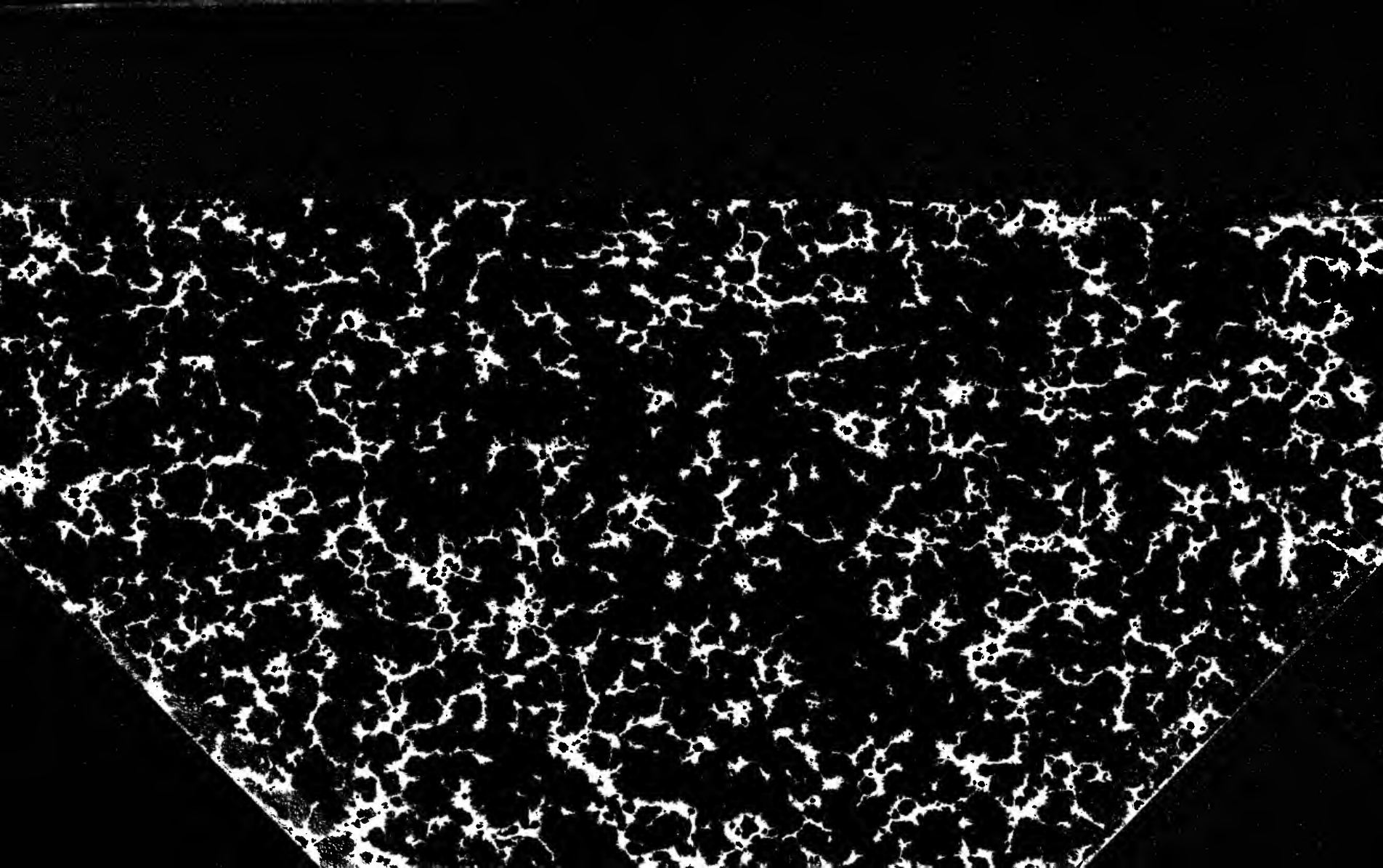

THE PLANT WORLD

AN ILLUSTRATED MONTHLY JOURNAL OF POPULAR BOTANY.

ESTABLISHED 1897.

EDITED BY
F. H. KNOWLTON, PH. D.,
CHARLES LOUIS POLLARD, A. M.

VOLUME III.

1900.
THE PLANT WORLD COMPANY,
WASHINGTON, D. C.

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THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. JANUARY, 1900. NO. 1.

NEW JERSEY PINE BARRENS IN JULY.

By C. F. SAUNDERS.

A TRIP of thirty-five miles through the heart of the Pine Barrens of New Jersey in mid-summer, is an undertaking which the average collector, acquainted with the characteristics of that rich botanical hunting ground, regards at first blush with enthusiasm. On sober second thought, however, owing to the heat, the mosquitoes and flies, and the heavy sands at that season, combined with an utter absence of accommodations for man and beast, he is apt to postpone the excursion until some other year. Nevertheless, in July last, W. N. Clute and the present writer made such a journey through a country removed from the beaten track not only of botanists, but of pretty much every other sort of human being, except an occasional berry picker, the route being from Tuckerton, near the coast, to Atsion, an inland village on the line of the New Jersey Southern Railroad. In the course of this trip, which was accomplished in a wagon and occupied three days, a very comprehensive idea was obtained of the flora of this fascinating wild garden.

Seven miles northwest of Tuckerton we crossed the stretch of open country locally known as the East or Lower Plains—a genuine rolling plain of sand three or four miles in width and twice as long, covered with a miniature forest of tiny pitchpine (*Pinus rigida*), scrub oak (*Quercus ilicifolia*) and Black Jack (*Q. nigra*). These Tom Thumb trees—they are only two or three feet high—have covered the plains from time immemorial, and tradition has it that no taller growth was ever known there, except an occasional stray shoot like a sassafras six feet high which we saw. Stunted and prostrate though they be, the little oaks bear acorns, and the little pines produce cones, and are to all

appearances just as thrifty in their way as their big cousins in the forests that surround the plains on every side. The reason for the absence of normal tree growth on the plains is a problem that the experts are by no means agreed about. Continuously recurring fires dating from the time when the only human foot that trod the region was the Indian's, sterility of soil, exposure to bleak winds—the land being rather elevated for that low country—have all been assigned as causes, but the mystery still remains a mystery.

But these sunny sands supported other plants than scrubby trees.

SCRUB OAKS SHOWING RELATIVE HEIGHT TO MAN.

Here the laurel (*Kalmia latifolia*) luxuriated, and the bearberry (*Arctostaphylos uva-ursi*), the latter's long, procumbent vines beaded with green fruit; here were trailing arbutus and catgut (*Tephrosia Virginiana*), mats of pyxie (*Pyxidanthera barbulata*) and beds of shiny sand myrtle (*Leiophyllum buxifolium*) mingled with gray hudsonia. The most interesting product of the plains, however, was a low bushy shrub, which one might mistake for hudsonia at first glance, but which is really of quite a different family—that is, the broom crowberry (*Corema Conradii*). This plant which, outside of New Jersey, is known but from a few isolated stations, grew in profusion on the Lower Plains, and to some extent also in the pine barren woods six or eight miles further west, where also we subsequently came upon it. The flowers appear in March and April, the tufted sterile ones, borne on separate plants from the fertile, being rather pretty in sombre brown

and purple. In July the fruit—a little dry ball about as big as a flat pin head—was fully mature and inclined to drop.

Our road led often along the edges of cedar swamps, fragrant with the delightful perfume of white azalias (*A. viscosa*), and late lingering blooms of the sweet bay (*Magnolia glauca*), here so far removed from civilized man as to be safe from his vandal hands. In a savanna near the Otwego River, we discovered some specimens of a liliaceous plant bearing spike-like racemes of small white flowers, with extremely sticky stems and leaves, which proved to be *Tofieldia pubens*. Though the range of this plant is given in the books as from Florida

GENERAL ASPECT OF SCRUB OAK PLAIN.

to Southern New Jersey, Dr. Britton's catalogue of New Jersey plants gives only one station for it in the latter state, namely, a bog near Manchester, and these "very rare and not recently collected." With the Tofieldia, we found quantities of the American bog-asphodel, (*Narthecium Americanum*), in the height of bloom—a trim, little plant with sword-like leaves, and spikes of bright yellow flowers to give place in the autumn to vermilion capsules of fruit. It is a plant peculiar to the damp pine barrens of South Jersey, having been reported from no where else in the whole world.

The bogs were spangled with the yellow helmets of the bladderwort flowers (*Utricularia clandestina*), the magenta blooms of the thread leaved sundew, the white stars of *Drosera intermedia* and the gaping rose-pink blossoms of the snake-mouth pogonia (*P. ophioglossoides*). Ever and anon, the brilliant orange heads of the wild bach-

elor's button (*Polygala lutea*) would flash out from the damp sand. In similar situations the two woolly comrades, *Lophiola Americana* and the Redroot (*Lachnanthes tinctoria*) were often noted. Lophiola was just coming into bloom, and the flecks of orange and red amid the white flannel-like buds were singularly beautiful. The coloring of these blossoms, indeed, is very rich. The anthers are orange, and each reddish brown sepal is exquisitely crested with lines of tufted yellow wool. When fully out, the sepals are reflexed, and look like tiny cushions of golden down, stuck with orange-headed pins.

The curious little fern *Schizæa pusilla* was found in two localities, but was too young to be observed to best advantage. Its graceful boon companion, *Lycopodium Carolinianum*, was also collected. At Quaker Bridge, the southern laurel-leaved smilax grew, with smooth, leathery leaves delightful to the touch. Two interesting plants of the dry sand were the milk pea (*Galactia glabella*), whose vines creep close to the ground and bear beautiful, reddish pealike blossoms, and the sand wort (*Arenaria Caroliniana*) growing in mats as big as one's hat from one root that strikes straight down a foot or two into the pure sand. In the stream at Quaker Bridge, we noted a little island of bloom displaying the national colors; there was red furnished by the meadow beauty (*Rhexia Virginica*), white by the lance-leaved sabbatia and blue by the massed spires of the pickerel weed. Two days before had been the Fourth of July, and it was as though nature had remembered the day off there in the wilderness, with a little special decoration.

OBSERVATIONS ON A WOODLAND FIRE.

By Wm. T. Davis.

The fall of 1892 was very dry, and a piece of woodland near Oakwood, Staten Island, N. Y., was burned over. Some of the swamps included in the area continued to burn for about two months in spite of several rains. To walk in one of the burnt swamps after the fire was out, was like tramping in the snow; the ashes were ankle deep and soft and fine. Many red maples two feet in diameter had fallen. There were also a few trees of other kinds. Their roots had been burned and a strong north wind, that came later, had blown them down.

Some of the most interesting facts connected with the above men-

tioned fire, were observed in a meadow adjoining the woods. The surface covering of matted roots, &c., was completely burned off in places, disclosing a fine yellowish-red sand below, into which a cane could be thrust to its entire length without reaching harder soil. The burnt places were often quite regular in outline, being nearly circular with diameter averaging about eight feet. I noticed where rabbits had been across them leaving their foot-prints in the soft sand, and in two instances they had evidently done a little digging. In one of the burnt sandy places a meadow mouse (*Arvicola pennsylvanicus*) was found, that had been dried by the fire until it was brittle; it had been burned to a crisp. Some roasted land-turtles were also found in the vicinity.

These burnt spots in the meadow have been inspected every year since 1892 for the purpose of observing how soon they would be covered by vegetation. On the 5th of August, 1893, they were encircled by rings of ragweed (*Ambrosia artemisiaefolia*), outside of which were golden rods, wild senna (*Cassia Marylandica*) and turk's cap lilies, all of which grew plentifully in the meadow. On the portions that had been completely denuded in 1892, there was nothing, with the exception of a few jewel weeds and an occasional creeper that had run out from the fertile edge over the soft fine sand. By May, 1894, moss had grown over the sand in many places. The rag-weed, which had been confined in 1893 to the edges of the burnt areas, nearly covered them in August, 1894. There were also two small poplars (*Populus tremuloides*), a willow herb (*Epilobium coloratum*), a golden-rod and a few jewel weeds. In August, 1895, evening primroses and fire-weeds had been added to the plants occupying the areas, and by September, 1896, a still further addition had been made of purple gerardias and golden-rods.

In 1897, the formerly denuded spots in the meadow were almost wholly covered with plants, the before mentioned rag-weed being the most common, though occasionally reaching a height of only about a foot. The spots were thus easily discovered among the surrounding growth, even at a distance. In 1898, the rag-weed failed completely, apparently being crowded out by the native plants, chief among which were *Potentilla Canadensis*, *Aster Novae-Angliae*, *Solidago rugosa* and *Solidago lanceolata*. The moist summer may have helped the natives to regain the ground. In the summer of 1899 the conditions of the previous year were not particularly changed, and the burnt areas were still easily discovered in the meadow amid the surrounding growth.

They are also five or six inches lower than the rest of the meadow, where the mat of tangled roots, &c., was not completely destroyed, and it will no doubt take a hundred years or more, under natural conditions, to completely restore the mat and repair the damage of the fire of 1892.

THE TALL GREEN ORCHIS (*HABENARIA HYPERBOREA*) VISITED BY MOSQUITOES.

By C. A. Crandall.

Early in August our party went into camp on the Medicine Bow Range at an altitude of 10,200 feet, and here for four days comparative idleness was forced upon us. The weather was provokingly unfavorable for the collection of plants. Clouds hung low on the peaks above us and at frequent intervals gave out showers of rain that kept everything dripping. The wind was raw, the temperature low and altogether the conditions were not such as to promote cheerfulness. Of course there was work to do—there always is when in the field, no matter what the weather conditions—but the two things we most desired, namely, to collect the alpine plants and to spread wet dryers were of necessity postponed. Mosquitoes were very abundant and evidently trying by industry to compensate for the short hours forced upon them by the low temperature. The tents were full of them, all hungry fellows who indulged in no preliminaries, but worked quickly and incessantly. They diverted attention from the work in hand and called forth frequent remarks that were not intended to be complimentary.

The monotony which quickly settles upon a wet camp renders any little diversion interesting, and when it was remarked that one of our mosquito visitors was abnormally developed, there was a scramble to catch her. This accomplished it was seen that she carried two, freshly taken pollinia from some orchid. The long slender caudicles at once suggested the common *Habenaria hyperborea*, but in order to be certain and to furnish proof to the doubter, gum boots and slicker were donned and a journey made to a nearby bog from which a dozen or more plants were quickly gathered. Returning to camp a pencil was sharpened and carefully thrust into one of the flowers. On withdrawal it brought the pollinia firmly attached, and comparison convinced all hands that they were identical with those borne by the mosquito.

Further examination brought to light the fact that many of the older flowers had been previously visited: some had lost one, others both of the pollinia. Young flowers would not yield them, but when at just the right age the pencil would invariably bring one or both. The viscid disks adhered to the pencil with great firmness, although when examined several hours after extraction there was no perceptible drying or solidifying of the viscid matter. From the extractions by pencil I did not succeed in demonstrating any deflection of the caudicles, but from the position taken by those attached to the mosquito, it would appear that these had been deflected forward after leaving the flower. The attachment of the disks to the insect was by the lower front of the head extending up and covering more than half of the compound eyes. The caudicles projected forward on either side of and parallel with the mouth parts which extended but little beyond the pollen masses.

An attempt was made to catch the insects in the act of visiting flowers, but crouching in the wet for some time beside a clump of plants brought no results beyond good proof that blood was more attractive than nectar. After finding the first pollinia laden mosquito, others were watched for, and seven were captured. Four of these carried two pollinia each. Three had each one pollinium. On two of these last the pollen masses were nearly gone, leaving only the disks with portions of the caudicles still attached.

The number of insects found carrying pollinia is small in proportion to the number noticed, but that this pestiferous mosquito can be credited with so innocent an employment as the fertilization of a very pretty though common plant was to me interesting, and I would almost confess to a more kindly feeling toward it.

One other fact might be added. In the search for pollinia bearing insects it was observed that the mosquito has troubles of its own. Three individuals were taken each of which carried a well developed colony of brilliant carmine colored parasitic mites.

Colorado Agricultural College.

The Camphor Tree (*Laurus Camphora*) is being planted as a street tree in New Orleans, La. A tree planted in 1883 in a four inch pot is now 35 feet high and 52 inches in circumference on the butt.—*The Forester.*

A FATAL CASE OF AMANITA POISONING.

By V. K. Chesnut.

On Thursday, October 12, the attention of the Division of Botany of the United States, Department of Agriculture was called by the editor of The Plant World to a clipping from the *Baltimore American*, giving an account of the death on Tuesday and Wednesday of two persons in Baltimore from mushroom poisoning. An investigation which was made at once, developed the fact that four persons were poisoned in one household, and one in another family that lived next door. The fungi were gathered on Sunday by three of the persons poisoned, none of whom had ever had any previous experience. About fifteen specimens were served up in the form of a milk stew for supper the same evening. Four persons who drank from one to three teaspoonfuls of the broth were not affected. One, a man of 29 years of age, who ate two tablespoonfuls of the broth, was affected very seriously; a baby 15 months old, who ate a similar portion, died on Tuesday; two adults who ate half a coffee-cupful of the stew were saved with difficulty by the administration of strychnine and by powerful sudorific treatment; and a boy of 18, who ate two saucerfuls of both the solid and liquid portions, died on Wednesday. The first symptom in all cases was vomiting. In the case of the baby this took place at 3 a. m. on Monday, and the other two cases between 6 and 7 a. m. of the same day. The nausea was soon followed by extreme diarrhœa, which lasted many hours. Atropine was not administered in any case.

No specimens of the fungi nor of the solid portions of the vomited matter were to be obtained at the house, but one of the men who gathered the fatal mess accompanied the writer to the exact locality where several specimens were still to be found. A pure white variety of the death cup (*Amanita phalloides*), probably a new species, was pointed out as the kind which was selected. Several specimens of this were secured and photographed by the Division of Botany.

The case is a very important one, inasmuch as it shows a very marked contrast to the recent De Vecchj case of *Amanita muscaria* poisoning, and shows conclusively that the two species produce markedly different effects, and must be treated by entirely different methods.

PLANT JUICES AND THEIR COMMERCIAL VALUES.

By Mrs. Caroline A. Creevey.

[*Continued.*]

Cotton seed oil has become an immense industry, dating from 1852. From four in 1867, the number of mills has increased to 300 to-day. In 1872 the export of the cotton oil amounted to 4,900 barrels. In 1896 it was about 30,000 barrels. To-day the product is 28,000,000 gallons per year, worth 30 cents per gallon, expressed from 800,000 tons of cotton seed. The process of purification is intricate and troublesome. Used for adulteration of olive oil, and for soaps.

Other commercial oils are, non-drying-ground-nut, almond, colza, rape and mustard, used for soaps, perfumery, medicine and for burning. Drying oils—German sesamum, linseed, poppy, gadia, Niger, hemp, nut (*Juglans regia*), used in varnishes and paints, especially in oil paintings, also for soaps, lubricants, and for burning. In England Hull is the centre of the seed-oil trade; Liverpool, of palm oil and oil of nuts.

China produces the so-called tallow tree, *Stillingia sebifera*, a spurge. Each cell of the three-celled capsule contains a thick, greasy substance that is made into tallow for candles, used for soap, for dressing cloth, and as a substitute for linseed oil. It is also burned in lamps.

Butter trees grow in India, Ceylon, etc. They are members of the Star-apple family, species of the genus *Bassia*. The seeds produce a half solid oil, which thickens and becomes like lard. The natives eat it and also use it for anoining their bodies. *Bassia latifolia*, a product of India, gives out a fatty substance used for butter. This is the celebrated Mahwa tree, which in famine seasons has preserved thousands of lives. A writer says that, standing on an eminence 250 miles northwest of Calcutta, one may see 100,000 Mahwa trees. "Any one fresh from Calcutta would mistake these for Mango trees, whose crop is uncertain. The Mahwa crop never fails. The part eaten is the succulent corollas, which fall from the trees in great profusion in March and April. Then is the feasting time for the humbler members of creation; birds, squirrels and tree-shrews feast among the branches by day, whilst the poor villagers collect the corollas which fall to the ground on all sides. Nor does the feasting end with day; at sunset peacocks and jungle fowl steal out from the surrounding jungle to share the Mahwa with deer and bears."

An African butter tree is the *Butyrospermum Parkii*, a tree from 60 to 90 feet in height. The kernel of the fruit is pounded and boiled. A fatty substance rises to the top of the water; it is skimmed off and strained, and is eaten with relish by the natives. To foreigners, like most of these substances, it has a rancid, disagreeable taste.

The Calaba tree of West Indies and Brazil yields a good oil for burning in lamps in those countries where gas and the electric light are not. Another West Indian tree, the Macaw palm or Grugru tree (*Acrocomia fusiformis*), produces an oily nut, which, when crushed and purified, becomes like butter in consistency. It has an odor resembling violets, and is used for perfuming soap.

The Wax palm is *Copernicia cerifera*, native to Brazil, a tree of about 40 feet in height. The leaves when young are covered with a waxy secretion, which is obtained by violently shaking and beating them. The wax thus shaken off makes very good candles. Another such tree is the *Ceroxylon andicola*, of New Granada. The whole stem of the plant becomes covered with a whitish substance, which, when scraped off and purified, is used in candles. This is a regular article of trade, the candles being in demand in the service of the Roman Catholic church.

A gum nearly equal to gum Arabic, is made from the mesquit trees, *Prosopis glandulosa* and *P. dulcis*, collected in their season in great abundance in Texas and Mexico. Another species of mesquite with twisted pods produces a kind of molasses. The Cashew-nut, on being tapped, yields a gum not unlike gum Arabic of special use in keeping insects away from books and herbariums.

Euphorbium resinifera yields a gum used in anti corrosive paint for preserving the bottoms of ships. In the milk form, it also is very excoriating, and causes sneezing and inflammation of the eyes.

Gum Senegal is collected in lumps as large as an egg, from an Acacia growing upon the banks of the Gambia, a gum reddish or yellowish in color.

Bassorin Gum Tragacanth, gum dragon or vegetable jelly exudes from the stem and lower parts of *Astragalus gummifer*, appearing from December to March, in Smyrna. The stem is incised near the root at night, and in the morning the gum is collected, a fine, white flaky substance. It is also obtained from roots of some orchids. It is used in printing calico, and to thicken paints, mordaunts, etc., as a vehicle for insoluble powders, and for fastening beetles and other in-

sects to cardboard. Cherry tree gum makes a thick, useful mucilage. Certain seeds, as quince, marsh-mallow, linseed, infused in boiling water, make good mucilages.

Gum-resin contains rosin mixed with an essential oil, usually with a small amount of mineral water soluble in alcohol. It is opaque and generally brittle. *Galbanum* is such a gum-resin, obtained from stems of several plants belonging to the parsley family, growing in western Asia. They have strong roots, stems from 3 to 6 feet high, finely divided leaves, and large umbels of yellow flowers. A little above the ground, the stem is cut; a milky juice exudes, hardens on exposure to the air, and has a balsamic fragrance. It is used in medicine. *Gamboge* is a gum-resin from Ceylon, obtained from species of Garcinia. It is used in painting, chiefly with water colors, also for brass lacquering. An allied species yields oil and butter.

Benzoin is a gum-resin obtained from *Styrax benzoin*, a member of the storax family, native to Sumatra, but found in other tropical regions. It is a yellowish juice, obtained from incisions in the stem. The gum is valuable in perfumery and medicine. One species, *S. punctatum*, yields its gum after the tree has been cut down and suffered to lie for many years. The bark is then taken off, and the gum found in little lumps underneath. This is used for frankincense. *Storax officinalis* is obtained from another species, from Asia Minor, only from a tree fully grown.

Ammoniacum, *asafœtida*, *bdellium*, *euphorbium*, *frankincense* and *myrrh* are examples of gum-resins. The myrrh of the Bible, one of the precious offerings of the Magi to the infant Jesus, was perhaps a mixture of the gummy exudation of a species of Rock-rose or Cistus, and a sticky, white gum from *Balsamodendron myrrha*, a small tree growing on the coast of Africa. Both are fragrant, and are in use to-day in perfumes.

Balsams are fragrant resins, or resins mixed with volatile oils, containing benzoic and cinnamic acids, used in medicine and the arts. Copaiva and Peru balsams are examples. The former is obtained from a member of the bean family, a hard wooded tree of considerable size, found in the forests of South America. The liquid basam collects in the veins of the plant in such quantities, that it often bursts with a loud report. The native collector cuts a large hole in the tree, often one foot square. Then he strikes the tree heavily with an axe, above the hole; the liquid rushes out with great force, and with a gurgling

noise. The whole wood, not including the bark, is filled with this fluid, and a tree will yield 12 oz. in 3 hours. It is stored in hollow trees, 2,500 lbs. in each, and floated down the Amazon. It is a substance much prized in medicine and perfumery.

A vegetable glue comes from *Combretum guayea*, a climber found on the banks of the Orinoco. It has the same properties as animal glue, and is used by the carpenters of Angostura. A kind of butter is given off by an allied species Certain members of the Lily family, Xanthorrhoea, are called grass-gum trees. About 10 species of these are found in Australia. A stout flower stem grows from a centre of a cluster of leaves, 10 to 20 feet high. After a fire, the blackened stems frequently remain standing, giving them the name of "black boys". A fragrant resin is obtained from incisions in the stem, which, mixed with nitric acid, is used in dyeing silk and wool yellow. The plants take years to grow before forming a stem. One at Kew gardens, 30 years old, was still stemless.

Mastich resin comes from *Pistacia lentiscus*, a member of the Cashew-nut family, a small, shrubby tree, 15 to 20 feet high. The balsamic sap issues from incisions in the stem and branches, in semi-transparent tears. It is useful in dental preparations, in fine grades of varnish for pictures, canvass, etc. The Peruvian mastich tree exudes from its leaves a highly fragrant, oily fluid. On throwing the leaves into water the oil is ejected with such force that the leaves shrivel and curl as if by spontaneous motion.

Our beautiful sweet gum tree, *Liquidambar styraciflua*, known by its star-shaped leaves, and woody, bur-like fruit, adding in fall fine color to our forests, exudes a fragrant, balsamic juice, used as a substitute for storax, also to make chewing gum. The gum storax produced by this tree is obtained from Northern Africa and Mexico. It is very similar to balsam of Peru, and therefore is sometimes called white balsam of Peru. It has stimulant and aromatic properties. It is used in France for scenting gloves. Mixed with tobacco, it once formed the favorite pipe filling of ancient emperors of Mexico.

Storax proper was long ago derived from a beautiful shrub with white flowers (*Storax officinalis*), a native of Syria. It was formerly used for incense, and was an article of Phoenician trade. It is the Hebrew *balm*.

[*To be continued.*]

EDITORIAL.

With this number, beginning a new volume, the PLANT WORLD enters upon the third year of its existence, nearly doubled in size, and otherwise enlarged and improved. The idea entertained by the projectors of the journal that there is a field for publications of this character, that is, one that should be scientific and accurate without being unduly technical, has been abundantly confirmed. From many sources we have received words of commendation and encouragement, and we do not hesitate to assert that the standard established in the first two volumes will be raised still higher during the coming year. We have already in hand or in advanced preparation a number of articles by the most eminent American botanists, conveying information as to the present status of many special fields. Perhaps at no time in the history of botany has the progress of investigation been more rapid than at present. The results of this work are published chiefly in the technical journals of the science, and it is the chosen field of THE PLANT WORLD to present this information in a style adapted for general reading. Ecology, or the adaptation of plants to their environment and to each other, is a comparatively new but rapidly widening field, and the popular discussion of this subject will be made a feature of the current volume.

The series of articles by Mr. Pollard, on the Families of Flowering Plants, was deferred last year on account of the pressure of other contributions and the limited space at out command. We have now decided to present this series in the form of a supplement with each regular issue, so that the subject may be treated more fully and suitable illustrations added. As the supplements are to be separately paged, those who may so desire will be able to bind them together, thus securing for the subscription price of THE PLANT WORLD not only the journal itself, but in a certain sense a text book of botany as well. We earnestly hope that all our friends will help us by giving wide publicity to these new features of the third volume, and we extend to old and new subscribers alike our cordial greetings for the new year.

NOTES AND NEWS.

The New York State holdings of forest lands in the Adirondacks now exceed 1,100,000 acres, and are being increased as fast as appropriations can be obtained for the purpose.

Perhaps the most highly prized plant in the Botanical gardens of the University of the Upsala, Sweden, is a fig planted and cultivated by the great Linnæus.

Dr. John M. Coulter, head Professor of Botany in the University of Chicago, is spending the winter in Washington, D. C. Dr. Coulter and Dr. J. N. Rose of the U. S. National Museum, have prepared a "Synopsis of the Umbelliferæ of Mexico and Central America", that is now in press. They are also engaged upon a revision of the North American Umbelliferæ.

In "Bird Life in an Arctic Spring, The Diaries of Dan Meinertzhagen and R. T. Hornby", recently published, a notable observation (if true) is recorded. "It is a curious fact that pine and fir trees, when they rot while standing, warp from right to left, and birch from left to right. This is almost invariably the case". To what extent can this be verified (or disproved) by American naturalists?

Dr. F. Kurtz has just published a preliminary paper [Revista del Museo de la Plata, vol. x, pp. 1-18,] in which he announces the finding of a typical Dakota Group fossil flora in Southeastern Argentina. Of the 31 species mentioned no less than 27 are common to our Dakota Group. This discovery is of the greatest importance as showing the wide distribution enjoyed by plants during the middle Cretaceous time.

The habitat of the Wild Columbine has been discussed in several numbers of THE PLANT WORLD. It is frequent in the vicinity of Grand Rapids, and occurs on sparingly wooded hillsides of sand, loam, or in moist creek bottoms among low shrubs: a few times I have found it growing in shaded wet mucky bogs in company with *Polygonatum giganteum* Dietrich, Great Solomons-seal, which with us prefers dry open ground.—EMMA J. COLE, Grand Rapids, Mich.

In reply to Mr. Pollard's query in reference to the finding of *Aquilegia Canadensis* in moist meadows in Central New York, I would say that so far as the main valley of the Susquehanna in Southern New York is concerned, this seems to be the plant's usual habitat. It may be occasionally found on our ledges of shale rock, but generally it grows in low meadows, often so abundantly that it appears like a fire in the grass.—WILLARD N. CLUTE.

The *Botanical Gazette* for October contains a brief account of the ancient Botanical Garden of the University of Padua, Italy, which was instituted by the Venetian Senate in a decree of June 29, 1545. Among the classic plants now living in the garden may be mentioned a fine palm tree about 30 feet in height, *Chamaerops humilis arborescens*, which was planted about 1585, and which was visited by Goethe on September 27 1796, whence it is known as *Goethe's palm tree!* There is also a plant of *Tecoma grandiflora* admired by Goethe for its beautiful flowering, and a specimen of *Vitex Agnus-castus* about 345 years old.

Mr. A. C. Seward of Cambridge University, England, has recently published [Philosophical Transactions, vol. 191], a valuable paper "On the Structure and affinities of *Matonia pectinata*". This is a very rare fern, found only on Mount Ophir, near Malacca, in the Malay Peninsula, and bears large spreading palmate fronds on slender stems, 6 or 8 feet high. Matonia has usually been placed among the *Cyatheaceae*, but Seward finds abundant reasons for regarding it as forming a different subdivision—the *Matoniae*. Ferns of this type were abundant in Europe during the Jurassic and Cretaceous epochs, and this is the last living representative, which lingers in this out-of-the-way place.

Mr. M. W. Gorman, of Portland, Oregon, who has traveled and botanized in Alaska for many years, left Fort Selkirk last July with a party of four on an expedition across country to the upper waters of White River. In the latter part of August, Mr. Gorman, in attempting to descend the White River to the Yukon on a raft with an ill companion, was wrecked at the confluence of the two streams, on September 1. Mr. Gorman's companion was drowned, but he, after being in the water for four and one-half hours, was opportunely rescued by some passing hunters. His provisions had previously became exhausted, and

for several days the daily subsistence had consisted of a few spoonfuls of flour boiled in water. All of his botanical specimens were destroyed, and, quite worn out, he arrived at Dawson, September 7, whence he writes that he will return to Portland soon, and adds feelingly that he "has had enough of the land of more square miles than square meals for the present".—*Erythea for October.*

BOOK REVIEWS.

Botanizing. A Guide to Field Collecting and Herbarium Work. By William Whitman Bailey. Providence, R. I. Preston & Rounds Co. 1899. Price 75 cents.

The present little work may be regarded as a revised edition of Professor Bailey's well-known "Botanical Collector's Handbook", which served such a useful purpose some years ago. While it is impossible to lay down any hard and fast rules that must always be followed in collecting, it is nevertheless true that beginners would often be saved a great amount of energy in working out their own plans by having accessible the results of a veteran collector. It has been said that a young botanist must make one herbarium and throw it away before he will have acquired sufficient knowledge to make a really creditable one. With a "guide" like "Botanizing" such a waste of energy will not be necessary, for every possible contingency that is likely to arise has been provided for, from the clothing one should wear and the lunch one should take on a botanical tramp to the final mounting of the specimens and placing them in the herbarium. Certain groups of plants require special treatment in order to preserve them properly, and a few defy all attempts. Professor Bailey has had the assistance of special workers in describing the most approved plans for collecting difficult groups, and there should be now no reason for a beginner not making good specimens.

Besides the chapters on purely collecting and preparing herbarium specimens, there are short chapters on storing and exchanges, a botanical museum, botanical gardens, &c., that contain much useful information. The volume is of convenient size and may be readily taken into the field. It is a useful book by an experienced field and herbarium worker.—F. H. K.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. FEBRUARY, 1900. NO. 2.

NOTES ON THE EDIBLE BERRIES OF ALASKA.

By WALTER H. EVANS.

EVERY one who has been fortunate enough to visit Alaska in the proper season has noticed the wonderful abundance and variety of berries. So striking a feature are they that the region has been repeatedly designated a land of berries. It was the privilege of the writer to visit that country in the summers of 1897 and 1898 and while there at least two dozen different species and varieties of edible berries were collected. Many of the berries enter quitely largely into the summer dietary of native and white population and to a lesser extent are preserved in various ways for winter use. Among the white population the usual methods are followed and canned fruit, jellies, jams and cordials are prepared for future consumption. With the natives a different process is followed and the universal method of preservation, so far as the writer is informed, is by mixing the berries with seal or other oil. The result is a mixture very repulsive to the uninitiated but it is highly prized by the natives. A jar or can of such character is considered a present of no mean value. However for the most part the natives use the berries in the fresh state and most generally uncooked. Berry parties are of common occurrence, and in the autumn following a good berry season special dances are celebrated.

Among the most widely distributed berries may be mentioned the salmon berries, baked apple berries, small and high bush cranberries, red and black currants, huckleberries, blueberries, elderberries, bunchberries, and crowberries. Of less common distribution, but still abundant in some regions are wild strawberries, red raspberries, dewberries, salalberries, thimble berries, bog cranberries, and bearberries. A number of others are of local and limited use, but all the above are important in their season.

Probably of first importance in the above list is the so called small cranberry (*Vaccinium vitis-idæa*). This is found nearly everywhere in the coast region and the interior. The bright red berries are intensely acid and of rather good flavor, although a taste for them must be cultivated. In some places large quantities are gathered for food and a not uncommon method for their preservation for winter's use is by putting them in pure water. In this way they may be kept for several months. Next to the cranberry in extent of use would probably rank the crowberry (*Empetrum nigrum*). In some regions these berries are gathered by natives in immense quantities. The berries, which are black when ripe, have a slightly acid flavor and are produced in great profusion on the stems. While used to some extent, the crowberry is not very highly prized by the white population and is only used to supplement an otherwise limited diet. The baked apple berry (*Rubus chamæmorus*), is widely distributed. It goes under a number of names but "molka" is one of the most common. It is sometimes called the Alaskan strawberry and in the interior it is frequently, although incorrectly, termed the salmon berry. When ripe the berries are soft and to the writer's taste were insipid although others pronounced them excellent. In some regions children are said to live almost exclusively on them during their season.

The true salmon berry or "molina" is found abundantly along the southeastern coast region and upon some of the islands. Two forms are met with, one having red and the other yellow fruits. Specimens more than an inch in diameter are common. While hardly equaling the flavor of the eastern blackberry the red forms remind one greatly of that berry and salmon berries are valuable adjuncts to the diet of both natives and whites.

In some regions the huckleberries (*Vaccinium uliginosum*) and blue berries (*V. ovalifolium*) are abundant and eagerly sought. The latter has, in the writer's opinion, no equal in the genus as a pie berry unless it be the beautiful scarlet berry (*V. parvifolium*). In the vicinity of Sitka both these berries are abundant. The fruit of the former is of a dark blue color with small seeds and averages about a half inch in diameter. The scarlet one is about half as long and is eagerly sought for by the white housewife for jellies, which are of most beautiful color and fine flavor.

In the Cook Inlet county, as well as elsewhere, currants are abundant. In the former place red currants (*Ribes rubrum*) form an

important food, and in excellence they can be said to be scarcely inferior to our ordinary garden currants. Black currants (*R. lacustrum*) are also common but of inferior value. *Ribes bracteosum* is abundant in many places and the fruits are not infrequently mixed with blueberries. It is claimed by some that it is for the added flavor but the circumstances under which it is done leads to the belief that it is for purposes of deception.

At a number of places wild red raspberries are plentiful although their distribution does not seem very general.

In the vicinity of Yakutat, and perhaps elsewhere, wild strawberries grow in abundance. The species is probably *Fragaria chilonsis* and the fruit in size and flavor is not excelled by any wild strawberry so far as known to be. The berries are more or less conical and frequently an inch or more in diameter. They ripen in July and August and are extensively gathered. Considerable quantities are sometimes brought to passing boats and at other times are sent as marks of especial friendship to Sitka or other places. Successful attempts have been made to cultivate this wild berry at a number of places, and its possibilities, as well as those of the blueberry, scarlet huckleberry, and red currant are well worth investigation.

Bog cranberries (*Vaccinium oxycoccus*) occur at Sitka and elsewhere but were nowhere seen abundantly. Salal berries (*Gaultheria shallon*) which are highly esteemed by some, occur in the more southern part of Alexandrian Archipelago and thimble berries (*Ribes parviflorus*) are found in the same region. *Rubus stellatus*, known as "Kneskeneka", "morong" or dewberry is common in sandy places. Its fruit was found excellent by the author but is apparently little esteemed by other writers. Successful efforts have been made at Sitka to grow this berry in gardens and it may prove valuable after a time.

Limited attempts have been made to cultivate some of the improved varieties of berries at a number of places. Peculiar success has attended the efforts with strawberries, raspberries, and currants. Gooseberries have been tried but the mildew seems to be a serious drawback to successful effort with this fruit. More extensive and better directed experiments have been recently attempted and it is to be hoped that success will attend the efforts.

GEOGRAPHICAL DISTRIBUTION OF CONIFERS.

By John M. Coulter.

NO group furnishes a better illustration of geographical diversity than do the Conifers. They belong to temperate regions, and a general map indicating their distribution would show a heavy north temperate massing and a lighter south temperate massing, the two separated from one another by the broad tropical belt, traversed only in the East Indian and Andean regions.

These northern and southern masses contain what are regarded as different generic types. The only exceptions are the dominant southern genus *Podocarpus*, which reaches the China-Japan region by way of the East Indies, and the northern *Libocedrus*, which reaches Australia by the same route, and also extends far into temperate South America by way of the Andes. Aside from these two lines, and these two genera, there is no crossing of the tropics, all the other genera being exclusively northern or southern.

It is worthy of remark that the greatest display of Conifers in genera and species is that which borders the Pacific Ocean, the chief centers being the China-Japan region, Australia, and Western North America.

The *Pinoideæ*, that is, the forms with true cones, or at least with ovules concealed, are characteristically northern, the two great divisions *Abietineæ* and *Cupressineæ* being entirely northern excepting the Araucarians, the peculiar Tasmanian *Arthrotaxis*, and the *Actinostrobineæ*.

Among the *Taxoideæ*, on the other hand, the *Podocarpineæ* are all southern excepting the few species which reach China, and the *Taxineæ* are all northern excepting the Australian *Phyllocladus*.

Of the four great groups of Conifers, therefore, *Abietineæ*, *Cupressineæ*, and *Taxineæ* belong to the north, although each one has a small southern contingent; while *Podocarpineæ* belong to the south.

Certain facts connected with the distribution of the northern forms seem noteworthy:

1. A number of genera are common to the China-Japan region and Western North America, six being in common besides those which extend broadly over both hemispheres.

2. The number of genera restricted to the China-Japan region is no less than seven, and most of them are monotypic.

3. Two peculiar genera occur in North America, *Sequoia* and *Taxodium*, one at the west, the other at the east.

5. The great dominant genus *Pinus*, with its 70 species, constitutes about one-third of the northern coniferous flora, and one-fourth of the coniferous flora of the globe. This genus is followed in importance and wide distribution by *Juniperus*, *Abies*, *Picea*, *Larix*, and *Taxus*, in the order given.

The distribution of the southern forms is modified by the fact that temperate conditions occur in three great isolated areas, although this has not resulted in the corresponding separation of genera that might be expected. The general facts may be grouped as follows:

1. *Podocarpus*, with its 40 species easily the second genus of Conifers, is distributed throughout the temperate region of the Southern Hemisphere.

2. South America and Africa are each generically paired with Australia, *Araucaria* being common to Australia and South America, and *Callitris* common to Australia and South Africa.

3. The Australian region is the notable coniferous region of the Southern Hemisphere, containing six peculiar genera.

4. Two peculiar genera occur in South America, and nine in Africa.

In considering this very distinct segregation of the Conifers into two groups, separated by the tropics and containing different genera, one is tempted to question whether there is also a difference of age, but the present evidence is opposed to such a view. That the two sets of forms were once associated in a general distribution throughout the Northern Hemisphere seems to be clear, but whether there was a similar association in the Southern Hemisphere remains to be discovered. In any event, conditions at the north for some reason became uncongenial for the genera now restricted to the Southern Hemisphere.

The Proceedings of the Biological Society of Washington (Vol. xiii, pp. 109-121) contains an article by Mr. F. V. Coville, on the botanical explorations of Thomas Nuttall in California, about which there has been much misinformation current. Every movement of Nuttall is carefully traced, and there is also given a full list of the principal new species based on Nuttall's Californian collections, that must prove of much value to students of that flora.

COLORATION OF LEAF FOR SEED DISTRIBUTION,

By Byron D. Halsted.

While upon a little scout in the woods my attention was called to the striking pink coloration in the lower half of each of the four leaves composing the uppermost whorl upon the fruitful stems of *Medeola Virginica L.* It was noted that the attractive tint was closely associated with the fruit production of the plants, and in no case where the plant had failed to flower was there any pink development, and the same was true in instances where old flower-stalks were still visible, but fruit had failed to form. In short the plants that carried the best clusters of berries were the ones that had the whorl at the base of the umbel with the most showy leaves, they being of a bright pink or purple for fully a third of the way from the base.

These conspicuous "cups" are well able to attract the eye of a passing bird and in so doing the dark purple berries might be removed and the seeds distributed. Our little "Indian cucumber root" seems to furnish an interesting instance of truly foliar display for the purpose of the dissemination of the plant offspring. One can almost imagine that the bright tint of the ripening fruit creeps down its stalk and out into the bases of the neighboring leaves.

New Brunswick, N. J., Nov. 8th, 1899.

WILD AND GARDEN PAEONIES IN AMERICA.

By K. C. Davis.

THE Genus Paeonia is said to have been named in honor of a physician, Paeon. The plants, commonly called Paeonies, are robust and large-flowered perennial herbs becoming shrubby only in case of *P. Moutan*. Although very familiar in gardens they are natives of Europe and Asia, only a single species, *P. Brownii*, being found in North America, on the Pacific coast.

Roots thickened to form upright rootstocks; leaves large, alternate, pinnately compound or dissected: sepals 5, persistent; petals 5–10, conspicuous, broad. Doubling may take place in any species by the numerous stamens becoming petals. Carpels 2–5 on a fleshy disk; follicles dehiscent, seeds large, fleshy.

All Paeonies prefer a very rich deep soil with a little well rotted

manure. They do well in either sun or shade, and are well suited to front borders of shrubberies, open places, along walks, or mixed borders. A top dressing of manure in mid-summer with the addition of a little liquid manure will help much. When once well established the roots should remain undisturbed for several years. The Paeonies of the tree section are likely to start early and may be injured by late spring frosts in the northern states unless protected at times of such danger. These do well in pots under glass where they may be forced to flower in February and March, but they become exhausted by this method, only to regain strength after two or three years.

Propagation. Shrubby forms are propagated by grafting on the largest rooted herbaceous kinds in August before the fall growth begins; by division; by cuttings of the young shoots in spring, in a little heat under glass; by layers and suckers. Herbaceous forms are propagated by division of the roots in August or early spring. Seeds of any variety sown in September, in a cold frame, will germinate, some the first, and others the second spring. The horticultural varieties produced from seed are numbered by the hundreds and thousands, each being given its trade name. These different forms retain their characters when propagated asexually. Many of the new forms are obtained by crossing varieties, as those of *albiflora*, and *officinalis*.

The latest extended accounts of the genus were by J. F. Baker in Gard. Chron. 21:732, 1884; and R. I. Lynch, in Journ. Royal Hort. Soc. 12:428, 1890.

P. Moutan Sims. Bot. Mag. t 1154, 1868. *P. arborea* Donn. *P. suffruticosa* Andr. *P. fruticosa* Dum.-Cours. *P. frutescens* Link. *P. officinalis* Thumb.

Stem 3 to 6 feet or even higher if not cut back, much branched; leaves glabrous; leaflets more often entire at the base of the plant than above; flowers as in *P. officinalis*, but various in color; follicles numerous, very hairy, rather small. May-June. China. Long cultivated there where varieties are numbered by the hundreds.

Var. **rubra-plena** Hort. Rose colored, almost single.

Var. **rosea-superba** Hort. Flowers much more doubled.

Var. **multicolore** Hort. Flowers single, white, rose and flesh color, striped, fragrant.

Var. **papaveracea** Andr. Bot. t. 463. Petals thin and poppy-like, white with red at center of flower.

Var. **Banksii** Andr. Flowers much doubled, rose colored, and large.

P. Brownii Dougl. Hook. Fl. Bor. Am. 1:27, 1833. *P. Californica* Torr. & Gray. Low leaves glaucous or pale, lobes obovate to nearly linear; flowers dull brownish red; petals 5 or 6, thickish, little longer than the concave sepals; outer sepals often leaf-like and compound; flower-stem reclining or recurved; disk many lobed; follicles 4–5, nearly straight, glabrous, seeds oblong. Early spring or summer. Pacific States. Introduced 1881. Bot. Reg. 25:30.

P. albiflora Pallas, Fl. Ross. 2, t. 84, 1784. *P. edulis* Salisb. Stem 2-3 feet, often branching and bearing from 2-5 flowers; leaflets 3-4 inches long, oblong, deeper green than *P. Brownii*, veining red; peduncle longer than in *P. officinalis*, often with a large simple bract; outer sepals large, leaf-like; petals large, various in color, usually white or pink; often 3-4 follicles, ovoid, with spiral stigmas. June. Siberia. Bot. Mag. 1756.

Var. **Reevesiana** Loud. Hort. Brit. Suppl. 3:601. A double form with deep red petals.

Var. **Sinensis** Steud. Nom. 2 ed. 2:247. *P. Chinensis* Vilm. A tall Chinese variety with large, double, crimson flowers.—One of the forms most used in gardens. Bot. Mag. 1768.

Var. **festivia** Planchon. Fl. de Serr. 8:113, t. 790, 1853. Flowers double, white with a few marks of carmine in the center.

P. tenuifolia L. Syst. 10ed. 1077. 1758. *P. tenuifolia* Hort. *P. laciniata* Pall. *P. multifida* Gueld. Stem one to one-and-a-half feet high, 1-headed, densely leafy up to the flower: leaves cut into numerous segments, often less than one line broad; flower erect; petals dark crimson, elliptic-cuneate, 1-1½ inches long; anthers shorter than the filaments: follicles 2-3, about half inch long, stigma red, spirally recurved. June. Caucasus region. Bot. Mag. 926.

Var. **flore-plena** Hort. Dense double, crimson flower.

Var. **flore-plena** Hort. Flowers double and globular.

P. officinalis L. Sp. Pl. 503, 1753. *P. fulgida* Sabine. *P. foemina* Vilm. *P. elegans* Sabine. *P. communtata* Wender. *P. banatica* Rochel. *P. lobata* Desf. *P. lusitanica* Tausch. *P. mascula* Mill. *P. nemoralis* Salisb. *P. perrigens* Reichb. *P. promiscua* Tausch. *P. villosa* Sweet.

Stem stout, 2-3 ft. high, 1-headed; leaves dark above, pale beneath, the lowest more divided than the others, having 15-20 oblong,

lanceolate leaflets, 1 inch or more broad; outer sepals leaf-like; petals dark crimson 1½-2 inch broad, obovate; follicles 2-3, becoming 1 inch long; stigmas crimson, recurved. May-June. Europe. One of the commonest in gardens. Bot. Mag. 1784, and 2264 (as Rubens, Sims.)

Var. **anemoneflora** Hort. (var. *rubra-plena*, Hort.) Flowers like the type but much doubled.

Var. **alba-plena** Hort. Flowers double, white, tinged with red. On. 265. Garden forms are given trade names, as: *rosea-maxima*, *rosea-pallida*, *rubra*, and many others. These vary in color from nearly pure white to pink and beautiful shades of red. *Var. festiva* Tausch. in Fl. 11:84, 1828. Flowers white with red centers. Native of Europe.

P. peregrina Mill. Gard. Dict. 8 ed., No. 3, 1768. *P. paradoxa* Anders. *P. Cretica* Sabine. *P. Baxteri* Sabine. *P. arietina* Anders. *P. lobata* Reichb. *P. multifida* Salm-Dyck. *P. splendens* Sabine. *P. villosa* Desf. *P. tatarica* Mill.

Stems 1½-2 feet high; leaves 5-6 on a stem, deep green and glabrous above, pale green and pilose beneath; otherwise the leaves and flowers are much like those of *P. officinalis*. Europe. Two beautiful garden forms with double flowers are varieties *amaranthescens-spherica* Hort., and *pulcherrima-plena* Hort., the latter differing from the former in the purple shade of crimson flowers.*

KEY TO SPECIES.

A. Shrubby: disk enveloping the base of the carpels.—*P. Montan.*

AA. Herbaceous; disk not produced to envelop the base of the carpels.

B. Petals short and leathery, scarcely exceeding the sepals.—*P. Broussii.*

BB. Petals not leathery, large and expanding, much exceeding the sepals.

C. Follicles and plant quite glabrous.— *P. albiflora.*

CC. Follicles tomentose, erect or slightly spreading.

D. Leaves and stem glabrous throughout.

E. Leaflets finely dissected.— *P. tenuifolia.*

EE. Leaflets not so finely divided.— *P. officinalis.*

DD. Leaves and stem pubescent in the upper part.— *P. peregrina.*

*I shall be glad to know the names of any species in American gardens which may be omitted from the above list.—AUTHOR.

PLANT JUICES AND THEIR COMMERCIAL VALUES.

By Mrs. Caroline A. Creevey.

(*Continued.*)

Amber is the ancient product of many generations of conifers, now extinct. It is found in alluvial soils, and on the seashores, especially between Memel and Dantzic, and under the Baltic Sea. Along the Prussian seacoast, there are amber mines, the deposit resting upon Cretaceous rocks, consisting chiefly of their debris, forming with it "blue earth". The buried trees form strata 40 to 50 feet thick, and are permeated with the fossilized gum, which reaches away in long, irregular arms. Lumps of amber are also found underneath, mixed with pyrites and iron. In these mines there seems to be an inexhaustible supply of the precious gum, the yield in a single year being from 350,000 to 400,000 lbs., five times that thrown up by the sea. One firm puts out, of the crude material, $6,000,000 worth annually, and pays 1,000,000 marks to the Prussian government for the privilege of mining amber. It is worth from $2 to $50 a pound. Along the Baltic coast, after heavy storms, it is thrown up in large quantities on the beach, and once persons who picked it up were punishable with death. Now the coast is carefully patrolled, and few trespassers find their way thither. Amber fishers break the ice in winter, and dive for the precious substance, disentangling it from masses of seaweed; or they fish up the seaweed with long spears. Extinct species of insects and well preserved flowers and leaves are often found as fossils in the gum. A beautifully clear and transparent amber is found along the coast of Sicily and the Adriatic, and has been found inland as far as Basle. In America, loosely imbedded in the soil, or in marl or lignite, at St. Martha's Vineyard, in New Jersey and Maryland, a little fine, clear amber has been discovered. Most of the Baltic amber is sold in Vienna, where it is cut and carved. After the first cutting, the chips and small pieces are put together, melted and recut, producing what is known as amberoid. This process is repeated four or five times, each remelting and cutting making the grade lower, the last cuttings being used in varnish. Large quantities of amber are also taken to Turkey, where it is much prized by the Mohammedans for pipe mouth pieces. They think amber is proof against infection, an important consideration, where the friendly pipe is passed from mouth to mouth. Many mothers are not above the superstition that a

string of amber beads around their children's neck, will prevent sore throats and sore eyes. This substance was known and esteemed long ago; 1,300 pounds of it were brought back to the emperor Nero, by an exploring party. Pliny said that it was a gum or resin, like cherry gum fossilized. Our word electricity, (Greek elektron) embodies the old romantic fable, that when Phaethon was hurled by the lightning of Jove into the river Eridanus, his brothers were transformed into poplars on the shores of the river, and that the tears they shed become drops of amber. Elektron was one of the names of the unfortunate Phaethon. The substance develops electricity by friction, as every student of the laboratory knows. If this beautiful gum had been of rare occurrence, it might have ranked in value among the precious stones which it resembles; for its color is soft, and in the cloudy and milky variety, is suggestive of opal.

Copal resembles amber in being hard, brittle and yellow, less hard however than amber. It is the product of various trees, and some of it is found where no trees at present grow. It is named from the country exporting it, the most important being Zanzibar copal, the next best coming from Singapore, called Manila copal. This is of a pale lemon color and almost transparent. The lower grades are darker, and the lowest is nearly black. In the trade, the lumps of black copal are called "nigger heads," while copal of recent formation is comparatively soft, and the lumps stick together. The price of importing from the other side of the world, is absurdly small, about $1.25 for a large box. It is sold to makers of varnish at prices varying from 75 cents a pound to 7 or 8 cents a pound. In the darker and lower grades, the gum does not mix well with other ingredients used in varnishes, but is precipitated in black, thick lumps or dust to the bottom of the vessel, whereas the clear colored grades mix perfectly. The raw copal, or fluid, called piney varnish, the droppings from living trees, is not so much prized as that which is fossilized. It makes what is termed Jackass, and the natives mix it with true copal, only experts being able to detect the fraud. In all such countries, the natives are very slippery to deal with. Copal is found about 4 feet below the surface, seldom lower, in lumps which range from a very small size to those of several ounces or even pounds in weight. After being exposed to the air, it becmes pitted or covered with what is called goose-skin. It is used almost exclusively in varnishes.

Dragon's blood is the name given to a substance obtained from

Calamus draco, a slender-stemmed palm, found in Malaysia. The fruit is about the size of a cherry, and is covered with imbricated red scales, which are coated with the resinous gum. The fruits are violently shaken in a bag till the resin drops off. It is used for varnishing and staining wood. A similar resin is obtained from *Dracæna draco*, a tree growing on the west coast of Africa, and the Canary Islands. A red, gummy substance collects at the bases of the leaves, which after the leaves fall, is scraped off and made into hard lumps. A famous tree of this species was thought to be the oldest in the world. It grew in Teneriffe, 70 feet high, and 48 feet in circumference. It was destroyed by a storm in 1867, and a piece of one of the branches is preserved in the Kew Museum.

Turpentine, resin, tar and pitch are products mostly of the conifers, of pines, firs and hemlocks. *Dammar resin* comes from about 6 species of firs, growing in tropical regions. *Dammara orientalis* grows on high mountains of the Molucca Islands. The resin, at first thin and viscous, hardens and is used in varnishing and dressing cloths. *Dammara australis* comes from New Zealand, from trees often 200 feet high; *D. vitensis*, found on the Fiji Islands, drops its resin so that lumps of 50 pounds weight have been found under the trees. A tall tree common on the lower Alps is the silver fir, (*Abies pectinata*). The turpentine collects in the higher parts of the tree, in bladder-like blisters. Men climb the tree, puncture the bladders, catch the liquid, which flows freely, in vessels, and descend with it to the purifying fires. The best turpentine is American, the product of *Pinus australis*, or *P. palustris*, only the last is a misnomer, for this tree does not grow in swamps. It quickly occupies worn-out cotton fields. Canada produces an inferior turpentine from *Abies balsamica*, which is used in varnishes and for mounting microscopic objects. In our southern pine, a pocket is cut in the tree, and left to fill. In about 10 days, 3 pints or so may be collected. The fluid is taken out, another cutting is made and left to fill, and so on. One person can attend to the emptying of 4,000 pockets, and the yield of these in a single season will be 16 barrels of 320 pounds each. By distilling crude turpentine and water, spirits of turpentine are obtained. The liquids arrange themselves in two layers, the spirits of turpentine uppermost. Rosin is the residuum after distillation, when the volatile oil has evaporated.

[*To be continued.*]

EDITORIAL.

We deeply regret the long delay in the publication of our January issue, which would have been in the hands of our readers early in the month but for an unfortunate circumstance, over which we had no control, connected with the delivery of paper for the covers of the magazine.

There has been of late considerable agitation in the local press with regard to the proper labelling of the numerous shade trees for which Washington is so justly celebrated. This city, situated as it is midway between the north and the south, possesses a climate which admits successful cultivation of ornamental trees and shrubs in great variety. It has been the general custom to plant individuals of a single species along a given street: thus we have honey-locusts on U street, sycamores on Florida avenue, elms on Rhode Island avenue, and so forth. This arrangement adds much to the beauty of the streets in summer time, and the varieties selected for this purpose are usually well chosen, though it may be questioned whether the box-elder can ever be regarded as a good shade-tree, on account of its susceptibility to insect attacks; while the silver maple and the white poplar are so likely to succumb to the severe storms of wind and rain which occasionally visit this region that they, too, might better be discarded.

Our parkings and squares are filled with hardy and half-hardy plants, many of which are unknown outside of greenhouse cultivation in more northerly latitudes. It is even more important, therefore, that there should be some attempt to properly label these, so that visitors may not be obliged to seek the officers of the National Museum and the Department of Agriculture in search of information, as is now often the case. One of the most interesting features of the New York Botanical Garden will be the complete and thoroughly adequate system of labelling, employed not only on the cultivated plants but on the indigenous trees and shrubs.

NOTES AND NEWS.

The Shrubby Sundew (*Roridula dentata*) grows into a bush nearly two feet high, and in some parts of South Africa, where the plant is native, the bushes are hung in houses to serve as fly catchers.— *The Garden.*

The report of the editor just received, shows that the U. S. Department of Agriculture issued during 1899 the large number of 603 separate publications, filling 26,420 printed pages, and including 7,075,975 copies.

The Bryologist has been separated from the *Fern Bulletin* and now appears as a twelve page quarterly under the editorship of Dr. A. J. Grout and Mrs. Annie Morrill Smith. It will be found invaluable to those who would study our American mosses.

Mr. William Hunter, of the National Zoölogical Park, recently collected, in Fairfax County, Virginia, what seems to be a new species of the Trumpet Creeper (*Tecoma*). Instead of the more or less crimson flowers of *T. radicans* it is a clear lemon yellow throughout. It is also a trifle smaller in size, and has smaller and slightly different leaves.

The New York Botanical Graden has established a sixteen page monthly journal with Dr. D. T. MacDougal as editor. It will contain notes, news and non-technical articles, more particularly being the results of the investigations of the efficient garden staff. The January number contains a description and full page plate of the newly completed Museum building.

The very destructive wilt disease of cotton, watermelon, and cowpea has been made the subject of exhaustive investigation (Bull. No. 17, of Division of Vegetable Pathology, U. S. Department of Agriculture), by Dr. Erwin F. Smith, who describes the fungus producing it under the new generic name of *Neocosmospora*. The life history has been carefully worked out.

The delicate little Creeping Selaginella (*Selaginella apus*), has been found fossil on the brink of the Grand Cañon of the Yellowstone, in the Yellowstone National Park. It is found in an indurated clay which was with little doubt deposited during glacial times. This species is now found from Ontario to the Northwest Territory and south to Florida and the Gulf States.—F. H. K.

Have any of our readers ever heard our pretty little *Tiarella cordifolia* called Foam Flower? It appears from the last number of *The Garden* that it is so called in England, where it was introduced into cultivation over 150 years ago, and this is certainly a more euphonious and dignified name than that of False Mitrewort by which it is usually known in its home. *The Garden* has a picture of a beautiful mass 20 feet square as grown in a hardy border. It should undoubtedly be more widely known here as it is of the simplest culture.—F. H. Knowlton.

In the recently issued number of Minnesota Botanical Studies (Second Series, pt. iii) Mr. K. C. Davis has two valuable articles, the first giving a careful synonymic account of the native and garden Aquilegias of North America, and the second a similar treatment of the native and garden Aconitums of North America. The method of treatment is the same as that followed by Mr. Davis in his paper on the Paeonies in the present number of The Plant World. These papers will be found exceedingly useful, not only to the trained botanist, but to the horticulturalist and amateur.

The synopsis of Mexican and Central American Umbelliferæ, by John M. Coulter and J. N. Rose announced in the last number, was issued on January 8, and shows how rapidly the knowledge of this group has advanced within the past twenty years. The first complete enumeration was that of W. B. Hemsley in 1880, at which time 25 genera and 76 native species were recognized. The present paper enumerates 39 genera and 182 species, or considerably more than twice the number recognized by Hemsley. The systematic portion is preceded by a careful generic key, and all obscure as well as new species are fully described. The paper, which is beautifully printed, is illustrated by numerous text figures and twelve full-page plates, and is an invaluable addition to the literature of this difficult group. It is published by the Washington Academy of Sciences.

BOOK REVIEWS.

PLANT STRUCTURES. A SECOND BOOK OF BOTANY. By John M. Coulter. New York. D. Appleton & Co.

This is the companion volume to Professor Coulter's *Plant Relations*, notice of which was given in September number of THE PLANT WORLD. That book it will be recalled was devoted almost exclusively to the ecological side of botany, this being in the judgment of the author the side best adapted for the first contact of the youthful mind with plants. Recognizing, however, that many teachers may prefer to begin with the morphological standpoint, he has prepared the present volume, in which morphology is the dominant subject, the two books together making a comprehensive and thoroughly satisfactory introduction to plant life. A teacher of botany who is properly conversant with his subject is never at loss for matter to teach, but certain limitations, as length of time that may be devoted to the study, age and previous preparation of the pupils, etc., constantly come in, and it becomes largely a matter of individual judgment as to just what phase had best be taken up. *Plant Relations* or the present *Plant Structures* will each prove valuable pathways for introducing the young student to the great kingdom of plants.

The first twelve chapters "form a connected whole, presenting the general story of the evolution of plants from the lowest to the highest." A few types in each of the groups are selected and their life-history recounted at sufficient length to give the student a fair knowledge of their economy and importance. The author announces that he is opposed to the use of technical terms, unless absolutely necessary, and when they are employed they are simplified as far as possible. Professor Coulter is a master of English, and his descriptions become as perfect word pictures as it is possible to make.

The typography of the book is quite up to the standard of its companion volume, and it is well illustrated, many of the figures being new. It the hands of proper teachers it will undoubtedly prove of marked value.—F. H. K.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. MARCH, 1900. NO. 3.

POPULAR IGNORANCE CONCERNING BOTANY AND BOTANISTS.

By AVEN NELSON.

ARE botanists especially rare in the United States? Does a large part of the population never see one? It would seem so. At least a field botanist soon finds himself the object of much curious and amusing attention. He is almost as great a curiosity to the average American as an enthusiastic field entomologist and we all know that the entomologist only escapes being captured and locked up because he "seems to be harmless" rather than "violently crazy".

In spite of our *popular* books on botany and our newspaper discussion of the subject; in spite of our summer schools of science and nature study in the public schools, comparatively few know anything of the aims of this science and fewer yet have any knowledge of its methods or the implements with which it is associated.

In the general popular knowledge of plants we are yet far behind most of the European peoples. The German or Scandinavian boy who has not owned and carried his *vasculum* is rare indeed. Many have made collections which were not laid aside when the term closed but which became the nucleus about which the later collections of the specialist grew. The large number among them who know not only something theoretically but practically about the subject,—that have experienced the pleasure of its pursuit,—has made possible the splendid and interesting literature that exists among them upon their local floras. Colored illustrations abound even in the handbooks and pocket manuals with which the amateur is equipped. The collecting case is as familiar an object with them as a dinner-pail with us. Evidence of this is easily at hand: one needs only observe the extent to which the *vasculum* does duty in the comic papers,—*Fliegende Blaetter*, for instance.

To the average American the collecting case is wholly unknown or is the badge of one "slightly unbalanced". By some who are a little better informed, botanizing is looked upon merely as a *fad* and recalls to their minds nothing but the scrappy bits of blossoms and leaves that they had "pressed" in the old geography and called their herbarium.

Why is this the condition here? In general education we stand second to none, and our courses in botany in the higher institutions are as crowded with students as are any other courses. But still the fact remains that the majority of the people are wholly unacquainted with the botanist and his implements. Of course, there are some who will say, "that may be true in the *new west* but in the older, cultured communities a very different condition prevails". Perhaps so, but it may be worth mentioning that the *newer west* is still so young that nearly its whole population is made up of those who represent, at least, a good average of the intelligence of the community from which they have severally come.

As evidence that the condition alleged exists, permit a few of the many amusing incidents that have befallen the writer during some of his collecting trips of recent years. While camped on the Platte, I had occasion to collect on the hilltops and bluffs overlooking, on its opposite bank, a village of a few houses. I soon noticed that I was eagerly watched by small groups of the inhabitants. The succeeding day I again collected in the same locality and again they assembled to discuss the object of their curiosity. Had not a river at flood-tide rolled between them and me, it is probable that a committee had waited upon me. On reaching the next village some miles beyond, I found that my fame had preceded me: "Oh, you are the crazy man who has been seen on the hills below here, going about with a tin can and occasionally picking up something from the ground!"

More times than I can tell, I have been asked, "What do you want those weeds for?" and, after watching me put the plants in press, "Will they grow when you get them home?" If any purpose in the matter suggests itself to the minds of the observers, it is that the plants are collected for their medicinal value. When such purpose is disclaimed and the statement is made that they are simply collected because of their scientific value, the interlocutor either at once loses all interest in the matter or looks upon you with a half pitying expression. But the idea of medicinal value in the "herbs" appeals strongly to many, —almost as much so to some whites as to a certain small band of

Shoshone Indians which once watched the writer at work with undisguised interest and who were easily persuaded, by my fellow camper, that I was a great "medicine man".

The collecting case as already stated is incomprehensible. The writer's, an unusually large one, has been mistaken at times for a "water-tank", an "oil-can" (for samples), a "gas-tank" (for supplying the CO_2 for soda fountains) and, lastly, for a mail bag (my assistant carrying it, on a recent trip in Yellowstone Park, was innocently asked by a tourist how often he took up the mail.)

If the *vasculum* is misunderstood, what shall be said of the driers? Our first camp in the Yellowstone Park was pounced upon by one of the mounted guards as follows: "Pick up all those papers that you have thrown out here". "Yes sir, as soon as they are dry". Questions now followed from him. These same driers were a source of much wonder throughout the season, especially to the tourists in the Park (may they not be taken as representative Americans?). Some thought that they were used under the camp beds: others said, "I see that you are photographers", and one wondered what we were doing with so much "fly paper". One intelligent tourist watched, for some time, my assistant collecting a small, bright-colored flower (*Eunanus nanus*) and then astonished him with, "Do you use those for fish-bait?"

But if one thing is more annoying than another it is to be mistaken for a peddler. In a certain Wyoming town, while going from the hotel to the neighboring hills, I noticed myself curiously watched by the city marshal. The following day this individual stopped me and made known the fact, that peddling without a license was not allowed. My aggravating smile which followed brought the explanation that he had seen me go through the town several times and could think of nothing else that I could be doing. The next instance, in another town, I rather enjoyed. I was resting for a moment, on the curb-stone at the town pump, after a long tramp, my laden case across my knees. A citizen watering his horse at the trough, after eyeing me for some moments, queried, "What are you selling?" "Nothing". "Canvassing?" "No sir". Another pause, during which said citizen expressed in his countenance his inquisitiveness and finally his disgust at my indifference, was broken with, "Well, I just thought I would warn you that no peddling was allowed without a license". "Thank you". With a vicious cut from his quirt he sent his horse flying down the street.

It was in one of these same towns, that among the many people at the hotel who became inquisitive, only one showed an intelligent interest, viz., the German man-cook. The others came into the yard where I was at work to ask such questions as I have already indicated, but the cook sat down and discussed at length the various plants, comparing them with the allied European species that he had known and using the scientific names as naturally as if were an every day matter.

Working along the railroad, I often encounter section gangs. Many of the foreign-born workmen recognize my calling and inquire as to my finds but the others look as if they thought me a *new species* of tramp.

Is the condition that I have pointed out, one indication of the oft made statement, that we have time for those things only which are immediately convertible into bread and butter? Let us hope that it is not, and let us find in the recent, rather remarkable development of literature, purporting to be botany popularized, an indication of a real demand for a working knowledge of a subject so well calculated to give pleasure and the highest mental stimulus.

Botany will not occupy the place in the popular thought that it should until our nature-study courses contain more meat than most of them do at the present time. "Cut and dried" questions about plants, that are sometimes present only in the mind of the teacher, concern real, live boys and girls, but little. They want something to do, and it must contain enough of difficulty so that the mastering of it shall be an incentive for its doing. A general enthusiasm for botany, or any other science, is not to be secured by even excellent popular works offered to adults but rather through suitable instruction in the grammar and high-school grades of our public schools. Neither, in my judgment, will it be secured even then, by any "milk and water" object lessons, indefinitely drawn out through the successive years, but rather by a term or two of well directed effort during which an enthusiastic teacher *leads* them into work upon the plants themselves. Enquiry for literature will soon follow from those who have felt the charm of Nature's secrets and have tasted the pleasure of laying open for themselves even the least obscure of these.

University of Wyoming, Laramie, Wyo.

CONCERNING SAXIFRAGES.

By Thos. H. Kearney, Jr.

THERE are some groups of plants which carry unmistakable evidence of great age in their diversity of form and wide distribution. This is especially true of those genera that are most abundantly represented in high northern latitudes and on the loftier mountain systems of the world.

Such a group is the genus Saxifraga, which, if current views of the past history of vegetation are correct, probably originated at some point not far from the Arctic Circle, or, at any rate, made its chief home there in some past era. Then, possibly during the Glacial Epoch, the species were forced southward, some to return northward with the retreating ice sheet, others to find lodgment at high altitudes on the mountains. So we find to-day saxifrages abundant in the alpine and subalpine region of the Sierra Nevada, the Rockies, the Pyrenees, Alps, Caucasus, Altai, Himalaya and other high mountains. Only five or six are known from the Cordillera of South America.

There has been, since the last great scattering of the genus, time for the development of peculiar species in most of these mountain regions, some of which are very unlike any of the more widely distributed forms. On the other hand some of the most common circumpolar species recur as alpine plants in many widely separated mountain systems.

North America is far less rich than Europe in species of this genus. Engler, in his elaborate monograph of the genus, gives us thirty five species, although the number is certainly larger. The mountains of the Western United States are the home of many species, some of which are endemic while others are circumpolar and widely distributed alpine species.

But in northwestern Alaska, on the shores and islands of Bering Sea, Saxifraga is relatively a more important genus than is the case anywhere else in the western hemisphere. Some of the species, as *S. Nelsoniana* and *S. bracteata*, are among the most abundant flowering plants of the region.

Most impressive is the enormous diversity of form which the species of this genus exhibit. *S. bracteata* has leafy stems and its few, rather insignificant white flowers are closely subtended by leafy bracts. *S. Nelsoniana* has crenate orbicular-reniform leaves which are all radi-

cal and a rather compact cluster of white flowers on a naked scape. *S. Davurica* has fan-shaped leaves, with the broad apex coarsely toothed. *S. nivalis* which grows near patches of snow on the mountains and among the bolders of the glacial moraines, looks much like our eastern *Virginiensis*, but has a denser flower-cluster. The flowers of its ally, *S. hieraciifolia*, are of a dark purple-brown. *S. bronchialis* has thick, coriaceous, pectinate leaves in dense rosettes.

S. oppositifolia, representing the small section Porphyrion, grows, when the soil is dry and sandy, in a very compact rounded cushion, often almost perfectly hemispherical. But on dripping rocks it spreads out, the slender stem-branches become elongated and the leaf-rosettes less dense. The solitary flowers are violet, an uncommon color in the genus.

Showiest of all the Saxifrages known in Alaska, and probably for that matter, in the world, are two species with large single flowers of a bright golden yellow, the exact color of buttercup flowers. These are *S. Hirculus* and *S. flagellaris*, the latter peculiar for its filiform, strawberry-like offsets which bud at the end and thus propogate the plant. Hardly less showy than these is *S. serpyllifolia*, for its blossoms, albeit smaller, are much more numerous. This species decorates the tundra of St. Matthew and other islands with a myriad of little golden stars. It has the caespitose habit and almost leathery leaves of *Diapensia Lapponica*.

THE WATER HYACINTH IN FLORIDA.

By A. H. Curtiss.

WE have had some notable examples of late years of the invasion of man's domain by species of the animal kingdom whose destructiveness and rapid increase has been most alarming, and whose small size has rendered them the more difficult to cope with. But something more remarkable than the invasion of the gypsy moth, English sparrow, rabbit or mongoose was witnessed a few years ago in Florida, when the destruction of her inland commerce was threatened by a species of the vegetation kingdom. Insects and quadrupeds must have food, and in quest of it they can move rapidly over a large territory. But plants, except by the dispersal of their seeds, are stationary. Even floating aquatics are so normally, their habitats being still waters or streams where they can obtain anchorage

by their roots. The Water Hyacinth (*Piaropus crassipes*) whose invasion of Florida waters is well known, grew after the latter manner for many years after its introduction, increasing prodigiously by stolons, and rapidly clogging the extensive system of lagoons which constitutes the St. John's River. But at length, in the summer of 1896, there came about a marvelous change. As if animated by a consciousness that there was need of more room, or of increased food supply, the compacted hyacinths, covering tens of thousands of acres, so to speak, left the lakes and creeks of the upper St. Johns, and started for the lower reaches of the river, where for a hundred miles it varies from one to five miles in width. Down they came by millions and hundreds of millions. Twice a day they were headed back by the tides, hence their progress was slow. The wind and varying currents caused continual changes in the positions of the plants, which were as interesting to watch as the transformations in a kaleidoscope. For an hour there would be a solid mass of them stretching a hundred miles from shore, when a changing current would transform what appeared like a green meadow into a huge cape; then this would break up into islands, some moving up and some down, according to their positions in the river. Then the plants would disperse, and at slack water the river would present the appearance of a shallow grassy lake. Hundreds of miles of shore were banked deep with drifts of decaying plants. All other aquatic and littoral plants were exterminated. Beds of stout rushes and leathery grasses were shaved off as by a scythe. Snakes came along with the mud-laden plants, and no one thought of bathing in the river. Small boats were blockaded, and it was difficult to navigate the river with boats large or small. Jacksonville, a city of 30,000 inhabitants, was in a state of alarm. It was expected that the Hyacinths would increase from year to year, and many feared that the river would thus become closed to navigation, while the decay of the plants might reasonably be expected to cause sickness. The next winter Congress took action in the matter, and there was no end of discussion, investigation and experimentation. By the end of fall all the hyacinths were either rotting on shore or swallowed up by the ocean. It was fully expected that the following year would witness another hyacinth invasion more formidable than the first, but that year had in store another and most agreeable surprise, for scarcely a plant was seen on the river, nor has there been since. Something has arrested the increase of the hyacinth, and it has been urged, apparently with

reason, that its favorite food elements were so depleted by its former prodigious growth that it can no longer multiply as formerly. If this be true may not the grand break up in 1896 be traced to the same cause, insufficient food or partial starvation? It was attributed to high water, but there is high water every fall in the region of the hyacinth's principal growth, and the water could hardly have been higher in 1896 than in years previous or subsequent. It may be that some future year will witness another thinning out of the hyacinths, but there is no longer any cause for anxiety on that score.

This curious and beautiful plant furnished a good example in producing variations in form. In depauperate growths the petiole consists of little more than the characteristic inflation, making it as broad as long, whereas in localities most favorable to its growth this enlargment almost disappears, and the slender petiole attains a length of a yard.

Although the hyacinth produces some seed, its increase is probably by offshoots almost exclusively. Its progress up stream may have been accomplished by means of the tide and passing boats. That it has not spread to the multitudinous lakes and ponds may be attributed to the fact that by the recurving of the spikes the seeds are placed out of reach of birds and animals as well as wind.

THE VELVET DOGBANE IN OHIO.

By A. Wetzstein.

LAST spring I was lucky enough to find some tiny plants of *Apocynum pubescens* R. Br., just coming out of the ground near the same place where, in June, 1898, I had taken about 6 specimens of this exceedingly rare plant, of which, in the Illustrated Flora, of Britton & Brown it is stated: "The only specimen seen by us was collected by C. C. Parry, in Polk County, Iowa, July, 1867."

How eagerly I watched them to secure another lot of specimens for my friends! But alas! One day when I came back to my plants, they were gone. An oilwell had been "shot" nearby, and the black pernicious stuff, unfurtunately spouting and flowing that direction, had killed my rarities.

What produces—by the way—the deadly effect of the coal oil on plant life? I don't think that it is a real poison for plants, because I see some of them growing and flourishing near oil wells and oil ponds,

where the ground must be saturated with oil. But as soon as the oil covers the stems and leaves of plants, they die. That greasy tenacious stuff stops all the pores: the breathing is hindered, and the plant dies from choking, as may be proved by experiment.

In spite of my bad success last year I hope to find some more plants of *Apocynum pubescens* the coming season, and secure at the same time the fruit, which I missed in 1898.

Saint Marys, Ohio.

THE TWIN-LEAF (*Jeffersonia diphylla*) IN IOWA.

By L. H. Pammel.

Many of the Berberidaceæ are quite restricted in their distribution. In the region of Gray's Manual but five species in as many genera are recorded. The commonly occurring species in Iowa, Wisconsin and Minnesota are *Caulophyllum thalictroides*, and *Podophyllum peltatum*. *Berberis Canadensis* and *Diphylleia cymosa* are confined to the Alleghanies. *Jeffersonia diphylla* is, according to Gray's Manual, distributed to woods from western New York to Wisconsin and southward. Mr. L. Pursell Walker, a special student in botany, reports that *Jeffersonia diphylla* is common in one place four and a half miles southwest of Cleremont. It occurs on a north hill-slope well watered, being in close proximity to a series of large springs. The plant covers about half an acre, and this is the only place it occurs in that vicinity. *Hydrastis Canadensis* which has the same general distribution also occurs in that region. *Adoxa Moschatellina* is likewise reported from this region as is *Phegopteris calcarea*. Several interesting conifers should also be reported as somewhat out of their range. *Taxus canadensis* and *Abies balsamea* both occur in the region of Cleremont.

Ames, Iowa.

According to a Farmers Bulletin recently issued by the Department of Agriculture there is a grood prospect of reclaiming most of the alkaline lands of the West by the growing of Saltbushes (*Atriplex*), a number of species of which have been very successfully introduced from Australia. They will thrive in soil so strongly impregnated with alkali that none of the cereals, grasses, or clovers will grow, the crop being from 15 to 20 tons of green food, or 3 to 5 tons of dry forage, per acre.

PLANT JUICES AND THEIR COMMERCIAL VALUES.

By Mrs. Caroline A. Creevey.

[*Continued.*]

After the pine trees are exhausted by about 6 years of tapping for turpentine, they are used for procuring tar. For this purpose the tree is felled and cut into small lengths. A hole is dug in the ground, depressed in the centre, and clay bottom is laid. The trees, branches and all, are placed in this hole around shavings and kindlings. After lighting the shavings, the whole is covered with earth or turf. By slow combustion, the tar is reduced to liquid, flows into the basin-like central depression, thence is drawn out in prepared channels and loaded into barrels. About 100,000 barrels is the annual yield of American tar.

Pitch is the solid residuum after distilling tar for tar oil. It is used in our concrete or asphalt pavements, for roofs, for covering ropes, etc. It is thought that the odor of tar has a beneficial effect upon lung and pulmonary complaints, and in the winter our fragrant southern forests of pine are peopled by semi-invalids, enjoying the warmth and the beauty of these places, if not always gaining perfect health.

Gum *camphor* is a concrete, volatile oil, made by distilled wood with water. It is obtained from Formosa and Japan, from *Cinnamomum camphora*, a tree of from 30 to 80 feet in height, symmetrical in its foliage, with small, cymose flowers. The diameter of these trees is, sometimes 50 feet. The tree is cut down and hacked into chips, which are placed in a still, with water on the bottom, and rice straw on the top. In the process of vaporization, the camphor gum rises and gathers in crystals on the straws. The gum is picked off, placed in casks, and undergoes a second purification before it is ready for market. Other plants yield camphor, one a herbaceous composite, whose gum is very volatile and pure. This is used in making India ink. Borneo camphor is taken from a splendid tree, called *Dryobalanops camphora*. It is described in these words. "The trunk rises to the height of 130 feet, without a branch, the base of which is fortified with gigantic buttresses, and the top crowned with a cluster of branches clothed with large, shining leaves. Flowers showy, fragrant and abundant. The camphor is obtained by felling the tree, cutting it into lengths and then splitting it up, when the gum is exposed in layers

in the wood, from which it is detached by means of a sharpened stick. The camphor is so pure it needs no process of refining, and it is the precious camphor of the east, used in religious ceremonies, and funeral rites."

The curious, sweetish substance called manna, is found in some seaweeds, in species of the Eucalyptus, and from the ash, *Fraxinus ornus*, common in southern Europe, Sicily and Calabria. In the latter tree the stem is cut, and the juice which flows from the wound is used to some extent by druggists. The "manna of Sinai" seems to be created by an insect, which stings the stem of *Tamarix mannifera*, a tree found in the desert countries of western Asia. From the puncture, a drop of sweet sap exudes, and as it hardens, it is gathered by the Arabs who esteem it as a sweetmeat. Camel's thorn grows in the deserts of Syria, Persia and Hindostan. In the hottest part of the day the leaves and branches are covered with a honey-like exudation, used in place of sugar, and as confectionery. It is not known what the manna of the Israelites was. There is a lichen, *Lecanora affinis*, which covers large areas of country, and being light, is sometimes loosened by the wind and carried into the air, from which it descends in showers. It often forms solid masses on the ground, and is eaten by sheep as well as by man in times of scarcity of food. It is about the size of a small pea, grayish outside, farinaceous inside, and sweet to the taste. It must be gathered in early morning, since the heat of the sun dries it and it is lost in the sand, but it can be kept in a closed vessel a long time. The Arabs boil it in water and make a jelly of it, which contains nitrogenous matter, mineral matter, sugar, starch and fat. Oak manna from Kurdestan is produced in the hot season by a species of Quercus. Natives cut the branches and steep them till the manna is distilled, then the branches are taken out and the water is evaporated, a thick honey remaining. It is shaped into round, flat cakes and sold as sweetmeats.

It is from the white poppy, *Papaver somniferum*, that the opium of commerce is obtained. There are three sowings of the plant, from October to March, the crop being greatly affected by the weather. The capsule is ready for cutting about two weeks after the petals have dropped. An incision is made in the capsule in the afternoon, and the exuded juice collected the next morning. The capsule is scraped, and the gum laid in a poppy leaf, which is covered by another. The lumps of gum are dried, and then assorted into three grades, accord-

ing to their freedom from dust and other impurities. This is one of those plants which have been factors in history. The war of England against China, to compel the sale of opium to the Chinese, opened the ports of the latter country to the world. Tobacco is another such plant, since, for its cultivation in Virginia, slaves were brought into this country, giving rise to the slave trade with its unspeakable horrors, the awful story ending with the chapter of our civil war. Nicotine, found in tobacco is a highly poisonous principle.

The fern family supplies a very limited number of our commercial products. A few tree ferns, as *Cyathea medullaris*, contain in their pith a mucilage which used as food. A drink has been sold in London made of the juice of maiden hair fern.

The Japanese extract the juice of the Ginkgo tree, called also the Maiden-hair tree, and according to their authority, the kernels of this fruit are edible.

Adder's tongue is said to have a mucilage in its fronds which is used in the preparation of salves.

Perfumes are obtained from many plants, being the essential oils in their leaves and blossoms. Patchouli, now little used, is taken from a member of the mint family, *Pogostemon patchouli*. Its leaves are broad and oval shaped. Arabs carry the dried leaves of this plant in pillows and mattresses on their travels, as a preventive of contagious diseases. Peppermint is extensively cultivated, cut when in flower, and placed in stills. After the oil is extracted, the refuse is given to cattle to eat.

Geranium oil is from *Pelargonium roseum*, a small fleshy-stemmed plant from the Cape of Good Hope. It is cultivated also in France, for an acid used in flavoring wine.

Oil of lavender is distilled from a mint, and a second distillation in spirits of wine, makes lavender water. It is a shrub, *Lavandula vera*, native of the south of Europe.

Another mint, *Rosmarinus officinalis*, yields an oil used for conserves, liqueurs and perfumery. It enters into the composition of eau-de cologne.

[*To be continued.*]

EDITORIAL.

The article in this issue on popular ignorance concerning botany and botanists, by Professor Nelson, will find many a sympathetic reader, for doubtless every field botanist has had similar experiences. One of the most laughable personal experiences was at the sea shore, where it was concluded by the onlookers that the blotting paper driers were used in the place of bath-towels! It seems a sad comment indeed upon our nature studies in the schools and even the technical study in the colleges that the implements and aims of botany should be so little understood. Professor Nelson's anxious fear that it may be due to the dominating influence of the chase for the "mighty dollar," seems only too well founded. The moment plant collecting can be shown to have a money value, it attracts the public, but collecting and studying for the sake of pure science receives scant courtesy. We are certainly behind European countries in this respect.

A field club for the study of outdoor life is always a pleasurable and profitable institution, even when its operations are limited to occasional excursions into the country of a few hours' duration. We learn that the Philadelphia and Washington botanists, however, have lately established club houses in the midst of areas that promise profitable collecting, thus enabling their members to devote more time to field work by obviating the necessity for travelling back and forth. In Philadelphia the house was built and is owned by half a dozen individuals; in Washington, on the other hand, a large club has been organized, and a suitable house rented and fitted up for the needs of the members, each of whom has a private key.

We believe that these clubs will prove of great value to those participating in their work, since they afford exceptional opportunities for the most valuable kind of scientific work, that is, actual study of the living organisms.

NOTES AND NEWS.

The agricultural products exported from the United States during the five years 1894–98 had an average annual value of $663,536,201.

According to a bulletin recently published by the U. S. Department of Agriculture the total agriculture exports of the United States during the the year 1898, reached the enormous sum of $858,507,942.

At a recent meeting of the Board of Trustees of the University of Wyoming, the herbarium connected with that institution was officially recognized as The Rocky Mountain Herbarium, the purpose being to build up, and make accessible and serviceable, a collection of the plants of the Rocky Mountains. It already numbers about 20,000 sheets.

We read in a York newspaper that an Elm tree, five feet in diameter, which for years was the oldest landmark in the eastern section of the city, was cut down recently because "it was in the way"! Is a tree of this kind ever in the way? It certainly is not in the way of anyone who has a due appreciation of its value and beauty. For more than a hundred years it appears to have been regarded as a thing of beauty and joy. One does not care to say in print what he thinks of the iconoclastic sentiment that laid it low. — *The New Era*, Lancaster, Pa.

In the last issue of THE PLANT WORLD, I was much interested in what was said about the cultivation and common name of *Tiarella cordifolia*. It is very common and beautiful in my locality at Port Huron, St. Clair Co., Mich. Although I had watched it some what for many years, I did not discover until last fall that it had a tendency to run to vines. While botanizing in the woods one day last fall, Mrs. Dodge called my attention to a plant on an old log with very pretty and leafy vines running down to the ground. At first I could not believe that it was *Tiarella cordifolia*. This particular plant was taken up, placed in a pot for the house, and the vines have been growing all winter. We afterward found a number of specimens with vines. In many instances a short distance from the mother plant these vines took root like the vines of the strawberry.—C. K. DODGE.

Several months ago THE PLANT WORLD made a request for notes on large trees. There are few trees of unusual size in Southern Kentucky. The Tulip, or Yellow Poplar grows to a larger size than any other tree in Southern or Southeastern Kentucky. On the upper Cumberland River it is not unusual to find trees from 7 to 10 feet in diameter. American Elms are from 5 to 6 feet in diamter in Warren County. Silverleaf Poplars 4 to 5 feet. An unusual Red Cedar measures 4 feet, and a Black Oak 5 feet. An unusual Sycamore growing near Barren River measures 25 feet in circumference. Near Louisville, is a Chestnut 9 feet in diameter and 80 feet high.—SADIE F. PRICE, Bowling Green, Ky.

An instance of the individual adaptations by which plants secure necessary air or light under adverse conditions, was recently observed at Watkins Glen, N. Y. A long frond of the fern, *Cystopteris bulbifera*, was found growing partly within and partly without a crevice in the rock: the pinnæ of the part in ordinary light formed the usual flat, spreading frond, but the pinnæ in the shade were turned sharply at right angles to the plane of the frond in order to bring the upper faces perpendicular to the rays of light entering the crevice. This position of these pinnæ was fixed. The device was evidently successful, for that part of the plant growing in weak light was as green and healthy in appearance as the part under normal conditions.—MINNIE L. OVERACKER.

The city of Los Angeles, California, has offered to the U. S. Department of Agriculture a tract of three thousand acres of land, upon which to establish a National Arboretum. It is proposed to conduct experiments in the cultivation of certain economic trees adapted to the southwest, such as the Cork Oak, Eucalyptus, Soapberry (*Sapindus utilis*) ets.

A full length portrait of Linnæus was presented to the Philadelphia Academy of National science at the meeting on December 26, by Mr. Charles E. Smith, a veteran botanist of Philadelphia. The portrait is a copy of the original painting in possession of Baron Verschner of Holland. It represents Linnæus in early manhood, in the dress he wore when making a journey in Lapland.—*The Botanical Gazette*.

BOOK REVIEWS.

CORN PLANTS by Frederick Leroy Sargent [Houghton, Mifflin & Co.,] is one of the most delightfully written and entertaining books that we have read in many a day. Beginning with the beautiful myth of Ceres and Proserpine, whence came our word cereal, the life history of each of the various corn plants is given in such simple, non-technical language that it reads more like a romance than a book of botany. It was prepared rather as a supplementary reader in schools, than as a text book, and as such cannot fail to arouse the interest of the young pupils, and give them a clearer idea of the grand part the cereal grains have played in the history and development of civilization. As the author naively remarks in the preface, it is believed that the book will be of interest also to older readers, who do not object to being addressed in simple language freed from unnecessary technicalities. There are still too few books of this kind.—F. H. K.

MINNESOTA PLANT LIFE. By Professor Conway MacMillan. Published by the Minnesota State Geological Survey.

After reading this charming volume one feels a sense of regret that it cannot be more widely circulated throughout the country. Professor MacMillan has succeeded in presenting all the important facts in the life, habits and structure of plants in a style interesting to the veriest tyro in botanical lore. The book is rendered doubly attractive by numerous beautiful photographs of characteristic scenes and groups of vegetation, while various outline cuts, selected mainly from other works, serve to emphasize the author's explanations of morphology. In one respect "Minnesota Plant Life" is entirely unique among American works on popular botany, in that it presents for the first time a general view of the plant families, thus covering practically the same field as the series now being published as a supplement to this journal. As the book is intended primarily for the Minnesota student, however, Professor MacMillan wisely restricts his treatment to those families occurring within the state limits. It may be questioned whether the absence of scientific names is an undoubted advantage in a book of this kind, but it certainly enhances its interest to the average reader. The book is unfortunately not offered for sale, but is intended for distribution to the people of Minnesota.—C. L. P.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. APRIL, 1900. NO. 4.

SOME ALGAE IN ORNAMENTAL WATERS.

By MARY G. FANNING.

IN seeking algal material for study in high school classes it is not necessary to go farther than the artificial ponds and lakes so common in city parks. One such small lake, situated between Minneapolis and St. Paul, has been observed during the past autumn and was found to contain many interesting forms. The lake, which covers nearly an acre, has during the summer a small fountain in the center which is fed by the city water.

Among the blue-green forms found in the lake, Nostoc, Tolypothrix and Gloiotrichia were the most abundant.

The Nostoc colonies, (see fig. 1) each enclosing many hundreds of filaments, are brownish-green, globular, jelly-like masses floating in the water. A filament resembles a string of beads of two sizes, the larger and less numerous known as *heterocysts*, the smaller and more numerous as *cells*. The filament grows in length by the division of the cells. The plant or filament reproduces by the formation of spores from these cells. Portions of these filaments, called *hormogones*, may become detached, work out through the enclosing jelly, and surrounding themselves again with jelly, form a new colony.

Tolypothrix (figs. 2, 3,) also forms colonies; that is, great numbers of filaments, each one a single plant, occur in little masses or mats floating in the water. The filament appears to be branched, but it is false branching that takes place. The heterocysts, formed at varying intervals, are fastened to the gelatinous sheath enclosing the filament. As the filament, by growth and cell-division, increases in length, this tension bursts the sheath and the filament protrudes through the rent like a bent bow. The bow finally breaks near one end and then the

longer portion springs out straight simulating a branch. In Scytonema, a form closely allied to this, twin branches are formed by the breaking of the bow near the middle and the two branches protruding through the rent continue growing in length.

The Gloiotrichia colonies (fig. 5) are brownish-green balls, not firm like Nostoc, but feathery or hairy. Magnified, these balls resolve themselves into hundreds of whip-like objects embedded in jelly, radiately disposed, the handles coming together at the center and the lashes curled around at the periphery of the ball. A heterocyst adheres to the end of the whip handle. The cell next to this grows long, resembling the handle of the whip, but the remainder of the filament decreases in size until it ends in a mere hair. The long, thick-walled cylindrical cell (the whip handle) is a spore and after the remainder of the filament falls off this spore after resting develops into a new plant.

In Gloiotrichia as in both Nostoc and Tolypothrix we find hormogones which form new colonies and also, as in Nostoc, no definite growing point. But it is an improvment on Nostoc in that it has an apex and base. Like Tolypothrix and Scytonema it forms false branches.

The name Gloiotrichia is descriptive, hinting of the gelatinous sheath and the hair-like end of the filament. Greek *gloia*, glue, and *trich*, a hair.

Of the green algae two representatives were abundant, Spirogyra and Micrasterias. These both belong to the order Conjugatae.

Spirogyra [figs. 6, 7, 8,] is too well known to need a general description here, but this particular form was interesting because it showed the cell contents more distinctly than is common. Just inside the cell wall the peculiar ribbon-shaped, spiral chlorophyll bands were coiled. The nucleus, an ellipsoidal translucent body in the center of the cell, could be seen without staining. The starch-forming bodies, pyrenoids, embeded in the chlorophyll band, were large. After staining, the protoplasmic threads attached to the back of these bodies, by which the nucleus is suspended in the center of the cell, could be seen.

Spirogyra material can be readily stained in the following way. Place the filaments in 1 per cent chromic acid and leave about twenty-four hours. Then wash for twenty-four hours by changing the material several several times into fresh or distilled water. It should then be placed directly in Beale's Ammonia carmine (sent out ready for use by Bausch & Lomb), and left for twenty-four hours. If

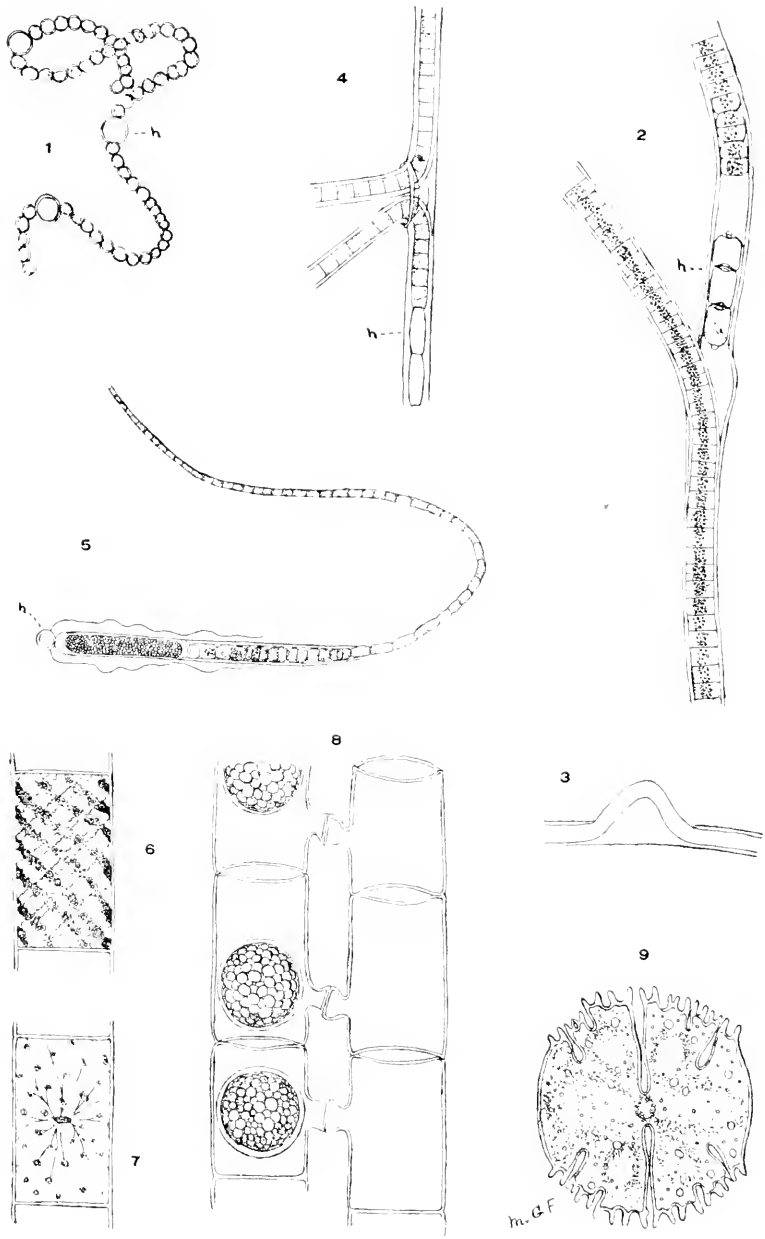


Fig. 1. Nostoc filament. h heterocyst. x 450.
Fig. 2. Tolypothrix filament with false branch. x 225.
Fig. 3. Tolypothrix filament in process of forming branches.
Fig. 4. Scytonema filament showing twin branches.
Fig. 5. Gloiotrichia filament. x 225.
Fig. 6. Spirogyra. Vegetative cell. x 42.
Fig. 7. Same after staining.
Fig. 8. Conjugating filaments.
Fig. 9. Micrasterias. x 200.

stained too deeply, wash in distilled water containing a few drops of hydrochloric acid. When the stain has been washed out sufficiently the filaments should be placed in 2 per cent formalin. One or two filaments may be mounted on a glass slide in a drop of formalin (2 per cent) and covered with a glass slip, the edge of which is coated with Canada balsam to exclude the air. Such slides, if carefully handled, will furnish permanent mounts. By this process the nucleus and protoplasm stain pink and the thread-like connections between the nucleus and pyrenoids are distinctly seen.

The plant (filament) grows in length by the division of any or all of the cells. As it breaks easily and each piece forms a new individual, the plant multiplies rapidily.

Reproduction takes place by conjugation. Two filaments lying side by side send out little tubes one from each cell. The tubes from two opposite cells meet between the filaments and unite. The walls separating the interior of the two tubes dissolve and the contents of the supplying cell is poured through the connecting tube into the opposite or receiving cell where the zygote is formed. At the approach of winter the plant dies, but the zygote, or resting spore, falls to the bottom of the pond and lies there protected from the cold by the thick wall surrounding it. In the spring it germinates and forms a new plant.

Micrasterias (Greek *mikros*, small, *aster*, a star). (Fig. 9.) These starlike, unicellular plants are usually found among other algae, as in the debris surrounding water plants. The disc-like cell is divided bilaterally, usually by means of a more or less deep constriction around the center of the cell. The wall is thick and gelatinous and is often prolonged on the outside into horn-like projections in the form of rays, knobs or warts. The plant is able to move slowly through the water, it is thought, by means of small streams of protoplasm issuing from the inside of the cell.

Reproduction, as in Spirogyra, takes place by means of conjugating tubes between two individual cells, except that in this case, the zygote or resting spore is formed and matured in the expanded tube which connects the two individuals.

The plant also multiplies by cell division. The isthmus or connecting tube between the two halves of a cell elongates and increases in size. This tube is formed into two half cells and when almost the size of the parent cell the two individuals part by means of the completed constriction in the middle of the tube. So one parent half-cell and one daughter half-cell forms the new individual.

University of Minnesota.

ABNORMAL LEAVES AND FLOWERS.

By Sadie F. Price.

I HAVE, this season, observed several instances of a deviation from the ordinary characteristics of certain species of plants, and have thought it might be of sufficient interest to record them.

In several clover leaves the basal margins of the leaflets were united, forming a funnel-like cavity. Several of the compound leaves of *Bignonia capreolata*, L., bore leaflets whose midrib had been prolonged into a fully developed tendril. This plant sent up so many sprouts in the yard where it had been transplanted, that an effort was made to keep it under control. But "it would not down". Could these extra tendrils have been an aid to it in "the struggle for existence?"

I have several leaves of the English ivy showing gradations from a palmate-veined leaf to a digitate leaf. In one there are only two lobes to the leaf, in others four; the central lobe is truncate as in the Tulip tree. Still another has a large two-lobe, and a small ovate leaflet with still another small leaflet produced at the edge of the leaf.

A leaf of the cultivated cinnamon vine is three-lobed or palmate; the center leaf being ovate, while the other two are ear-shaped on the lower side.

Fig. 1.

A flower of the pink zephyr lily, *Atamosco rosea*, has the bract subtending the perianth unusually developed, and of the same shape, texture and color as the perianth.

The usually cruciform flower of the Wild Rocket, *Thlypodium pinnatifidum*, had eight petals throughout the plant.

A correspondent has sent me several Buckeye leaves, (Fig. 1) that were gathered at Burnside, Kentucky, near the upper Cumberland, that have pinnate leaflets. It is a queer phenomenon, as perhaps a dozen leaves on the tree were thus divided, the rest being normal. These show all gradations. In some of the leaves the leaflets are all pinnate, in others only a part of the leaflet is thus divided.

THE MAKING OF AN HERBARIUM.

By Willard N. Clute.

Fifth Paper.—Arranging for use.

After our plants have been properly mounted there comes the work of arranging them in the herbarium in such manner that they may be easily and quickly examined. If plants were assembled without order or system, the larger the herbarium became the greater would be the difficulty of finding a required specimen; but by a proper arrangement it is possible to turn to any given specimen almost as quickly as one would turn to a word in the dictionary. This being the case, it might be supposed that all our large herbariums are arranged upon some uniform plan of this kind, but unfortunately most of them are not. The botanist usually needs a guide book when visiting a strange herbarium.

In this day of identifying plants by comparisons with authentic specimens, a merely alphabetical arrangement of families, genera and species will not do, for the reason that this would almost certainly separate closely related forms. In his studies, the botanist is saved an infinite amount of time and labor if allied species are placed together. But if they are so placed, one who is not acquainted with the systematic arrangement of the species, may have much trouble in finding the half dozen members of the genus with which he is familiar. Confusion, therefore, is sure to exist when either the systematic or alphabetical arrangement alone is followed. A combination of the two is much the best.

In order that all may understand the working of such a scheme, let me sketch its application in the case of a large herbarium. Smaller herbariums can modify the plan to suit their needs. In the ideal herbarium, then, each species is placed as close to the next related species as it is possible to do in a linear arrangement. The sequence now generally followed is that of Engler and Prantl's "Pflanzenfamilien" although there are still many herbariums arranged after systems long out of date. Leaving out of the question lower forms of life, let us assume that our herbarium begins at the ferns and extends through all the families of flowering plants to the highest, the composites. In order to know where to find each family in this vast host, an index is necessary. For this purpose the families are numbered in sequence,

beginning with the ferns. An alphabetical list is then made, in which the name of each family is followed by its number in the sequence. A glance at this list will at once tell us where to look for the required family. Having found this, we must have another index, for just as the families follow a sequence of relationship, so do genera and species. By arranging and numbering the genera in sequence and making a list similar to the first, the difficulties in finding the genera are overcome. The species must still be disposed of. In small genera we may be able to get along without indexes but with the large genera which often contain more than a hundred species it is better to arrange the species in their natural sequence, in this following the latest monographs of the genera, and providing an alphabetical index also.

For locating the families and genera in the cases, several devices are employed. In some herbariums a piece of pasteboard the size of the mounting sheet with a smaller piece of the same width hinged to one of its ends is used. The large piece is laid in the pigeon hole at the beginning of a family and the smaller piece, hanging down in front, has the family and list of genera which it contains, printed upon it. This, however, is a downright nuisance, for the hanging cardboard is always in the way. Another way is to label the pigeon holes by printed slips which are held in place by a contrivance fastened to the partitions, but this is objectionable because there is then no place for an index and because the labels have to be changed every time there is an addition of new material. Perhaps the best way yet devised, is to make use of a piece of light wood the size of the mounting sheet and about three-eighths of an inch thick. This is laid in the pigeon hole at the beginning of each family. On the visible end is printed the name of the family and its number. The upper surface of such a marker gives ample room for a catalogue of all the genera in the family, if not, the other side may be used also. This too may be recommended for use as a marker for the larger genera, in which case the list of species may be printed upon it. Such a list is always in position for consulting.

In all large herbariums, there is supposed to be a species cover for each species. This is made of a medium grade of manila paper cut to a size of 16½ by 26 inches and folded once. In this the sheets of mounted specimens fit like leaves in a book. At the beginning of each genus a slightly heavier cover of the same size and material, called a genus cover, should be placed. This is to contain species that are not

yet placed in species sheets, whether for lack of time, or because they have not been satisfactorily identified. In the lower left-hand corner, the name of the genus should be written and the same place on the species cover should contain the name of the species.

It is customary to place several genus covers at the end of the genus, in which to place foreign material. When the collections are large it is difficult to distinguish between these plain covers, therefore various color-schemes for making the task easier have been suggested. The Field Columbian Museum uses colored manila covers for its foreign specimens, but the trouble of obtaining and keeping in stock a supply of the colors needed may prevent many from adopting this scheme. A less expensive method, which gives equally good results, is to have a number of slips 3 by 4 inches in size cut from thin paper of the desired color. These may be pasted to the lower left-hand corner of the ordinary genus cover, and has the advantage over entire-colored covers, in that the color can be changed at will by painting a second slip over the first.

If colors are used to mark the different countries, they should be used in the order following. For North America, plain manila; South America, red; Europe, blue; Asia, orange; Africa, green; Australia and Polynesia, yellow.

In conclusion it may be said that an herbarium made after the directions herein given will continue to increase in value with age, and instead of being thrown away as so much rubbish when the owner is done with it, will find many others glad to preserve it.

ABNORMAL FORMS OF DOGWOOD.

By E. W. Berry.

Dogwood seems to reach the acme of profusion only every second year. In the spring of '96 we saw lots of it and in the fall of that year the woods burned with the hues of its many tinted leaves and scarlet berries. During 1897 we had dogwood, of course, but not so plentifully, and the scarlet of its fall dress was lost in the many other autumnal tints. In 1898 even 1896 was surpassed, the woods were snow-white in patches; often tinted, not pink as is usual, but splashed and blotched with crimson. Many flowers measured five inches across their head.

Two or three especially curious ones were observed. In one the blossoming head was perfect with the four white involucral leaves, and two inches below the head, separated by a cluster of normal green leaves, as shown in the illustration, (Figs. 1 and 3) was a fifth white involucral leaf, showing plainly the brown tip that stamped its origin from the old bud-scale.

In the other cases, two of which were observed, the head had five involucral leaves, the extra one (Fig. 2) being the uppermost and smallest in the one case while in the other instance the extra leaf was the lowest one and was much larger than the others. In all three instances the extra leaf seemed to show faint indications of a midrib, but were otherwise exactly like the regular involucral leaves. They are certainly very curious instances of the development and growth of an extra bud scale.

For the red-blotches involucral scales which were so common in 1898 no explanation offers itself, unless the very hot weather which occurred in early spring started growth and the action of the subsequent cold weather caused the unusual development of the scarlet color.

As the dogwood season is now close upon us it would be well to keep our eyes open for abnormal dogwood blossoms, while on our early spring forays.

Passaic, N. J.

Fig. 1. Fig. 2. Fig. 3.

PLANT JUICES AND THEIR COMMERCIAL VALUES.

By Mrs. Caroline A. Creevey.

[*Continued.*]

Of dyes, indigo and madder will serve as examples. The process of coloring as it is done to-day, is very intricate, since the colors are compounds, prepared from several sources. Indigo may be extracted from a number of plants, the most important being species of the bean family. *Indigofera tinctoria* is a plant 3 to 5 feet high, and it is in the leaves that the indigo-yielding principle is found, and as to the flower-buds are about opening, the plant is cut done. Its stems and branches are placed in fermenting vats, thereafter put through a variety of processes by which a paste is formed, which is made into cakes and dried. Bengal indigo is the most highly prized, Java and Guatemala ranking next. In these plants the indigo-yielding principles exists in the form of a glucose body, called indicem. The cakes are light and porous, of different shades of color, the inferior qualities being greenish or grayish.

The rubiaceous plant *Rubia tinctorum*, supplies every tint of red, purple, rose and lilac, even Turkey red being one of its colors. The roots of the plant are washed and ground; then the water is strained, fermented and distilled.

In making confectionery and as ingredient of cough medicine, we must not omit to mention the mucilaginous, sweet root of the marsh mallow, *Althea officinalis*. Spanish licorice is the sweet juice, boiled and thickened, of *Glycyrrhiza glabra*, a member of the bean family. It is imported in ship-loads to this country, and is probably used by brewers and tobacconists for purposes of adulteration.

Two American plants, long considered valueless, the saw-palmetto of sandy districts in the south, and a species of dock, *Rumex hymenosepalus*, a plant found wild in the borders of deserts and waste lands of California, New Mexico and Texas, have been discovered to contain highly concentrated, excellent tannin. The saw palmetto, *Serenoa serrulata*, grows almost horizontally, half buried in the soil, with many tough, fibrous roots extending downward from the trunk, fastening it so firmly in the ground that it is only removed with great labor. The large, expanding, tough leaves are joined to a petiole one to two or more feet in length, which is supplied with fine saw-like teeth on either side. The panicle of cream-colored flowers is very fragrant, attract-

ing swarms of insects bent on honey-gathering. The berries yield a volatile and a fixed oil, also a syrup said to be sweeter than cane-juice. The tannin extracted from the roots and bark fully equals that taken from oaks and hemlocks, and factories have lately been established in Florida, in which it is used in the preparation of superior leather for harness, etc. The tannin extracted from the western dock is called *canaigre*, and it has given rise to a special industry. Even in its wild state, the tubers of this plant are highly charged with tannin; while by cultivation, its value is quadrupled. It resembles the beet-plant, having large, coarse leaves which grow two to three feet high, and reddish stems. The flower-stalk shoots up several feet in height, and bears pink blossoms enclosing ultimately tiny seeds. To produce the tannin, the roots are sliced thin, like Saratoga chips, and dried, after which most of it is brought to New York, to a large factory in Jersey City, where the process for extracting the tannin is kept carefully secret. There are also smaller concerns in El Paso and Deming, Texas, where the roots are steeped. It costs one dollar a ton to slice the roots, and a farmer, with almost no labor, can make from $4 to $5 an acre, getting his plants in the first instance without cost, from the desert around him. This discovery, it is thought, will revolutionize the leather business. The supply will be inexhaustible, and comes in time to save the fast diminishing forests of hemlock. Canaigre was first exhibited in the World's Fair in Chicago, and already promises to be a bonanza to the western farmer, who declares that it will pay better to cultivate than oranges or apples. America alone can use the product of 1,500,000 acres of tannin, and Scotland will take the product of 500,000 more. It is almost the realization of the propheey, "the desert shall blossom as the rose," the yucca and candle-cactus having been hitherto the only desert plants of commercial value, the former yielding paper, the latter oil to a limited extent.

We cannot tell what another century may reveal of new and valuable plant products. When once the swamps, forests, and jungles of all lands are laid open, the curious, prying eyes of men will not permit anything of value to escape them. The fable of Midas comes true, and everything which we touch is turned into gold. Less ruthless methods must be employed in some cases to preserve the very existence of valuable trees, lest that other fable be illustrated of the woman who killed the hen that laid the golden egg.

[END.]

THE SMALL MISTLETOE IN PENNSYLVANIA.

By C. F. Saunders.

THE little mistletoe *Razoumofskya pusilla*, first described in 1873 by Prof. Peck, as *Arceuthobium pusillum*, has been rereported so far from a very limited number of stations. In July last, it was discovered in a new locality by Stewardson Brown of the Philadelphia Academy of Natural Sciences, in company with the present writer, in a swamp in Pike County, Pennsylvania. As usual, it was found on the spruce, and the trees attacked by it were conspicuous among the others by a peculiar, bunched appearance of the branches and twigs. On July 12, the date of collection, the plants were scarcely mature, the most robust being little over an inch high, while many were just showing themselves like tiny warts on the bark.

Carex pauciflora, Lighf., a rare sedge of the far north, was collected in the same swamp. It has been reported but once before from the limits of Pennsylvania.

Philadelphia.

In a letter to the editor, Prof. Guy L. Stewart, of the Maryland Agricultural College states that the Yew (*Taxus minor*), is known among the lumbermen and other dwellers in Northern Michigan as *shin-tangle* from the difficulty experienced in walking over it. Is this species so-called in other portions of the country?

* * *

In the March number of the *Bulletin of the Torry Botanical Club*, Mr. E. L. Morris presents a valuable revision of the species of Plantago commonly referred to *Plantago Patagonica*, recognizing sixteen species and varieties of which ten forms are regarded as new.

EDITORIAL.

By the time this number reaches our readers there will be many evidences of the return of spring, and we take this occasion to urge the keeping of note-books, wherein are to be recorded items of botanical interest, such as unusual situations or dates of flowering, malformations, extensions of range for rare species, etc. We shall be glad to publish notes of this character at any time.

It is proverbial that reforms come slowly, a condition which is particularly true regarding forest protection in this country, and yet there are gratifying indications that there is more or less of an awakening along these lines. Up to the present time thirty-six forest reserves have been made embracing 46,021,849 acres. These have been selected not only with the view of preserving the forests about the head waters of important streams, but also of preserving natural scenery, such as the Yosemite in California, the Hot Springs and geysers in the Yellowstone Park, the glacier-capped Mt. Shasta, etc. A number of states, notably Pennsylvania and New York, are as fast as possible acquiring possession of depleted or worn-out forest areas in these states, with the view to holding them until they can be reforested. Under intelligent management this reforesting is perfectly practicable, and the next generation will have occasion to thank the present generation for their wisdom and foresight. The forests used to be regarded as illimitable, but increased demands, coupled with the destruction of vast areas by fire, have so reduced the supply that it can only be a comparatively few years before very active steps will have to be taken to restore the forests or devise a substitute for lumber. It would seem that this matter has been so thoroughly brought to the attention of the people that it will not be necessary to actually destroy the forests before steps are taken for their preservation. We trust that all readers of The Plant World will use their best effort to stay this wanton destruction.

NOTES AND NEWS.

The highly instructive series of articles by Prof. Charles J. Chamberlin on methods in Plant Histology in the Journal of Microscopy, has reached Part XI, that on the Pteridopytes. Teachers will find this of much value.

Saccardo has just issued a supplement to his great work on fungi (Sylloge fungorum) in which he has described all species, about 5,000 in number, published during the four years closing with 1898. The total number of species described in the twelve volumes of this great work is 47,304. This is about six times the flora of the world as known to Linnæus.

Bacteriology has made such rapid advances in recent years that it has become a matter of difficulty to keep pace with, and Migula (System der Bakterien) has rendered an acceptable service in bringing together the scattered descriptions of the so-called species. In this work there are descriptions of some 1,200 forms of which over 700 are rod-shaped bacteria, over 300 are spherical forms and about 100 are spiral forms.

Messrs Swingle and Fairchild of the United States Department of Agriculture have recently published a circular relating to the cultivation of bur or globe artichokes is this country. The artichoke (*Cynaria scolymus*) is grown extensvely in the countries about the Mediteranean, where it is native and it thrives in the open air. It can undoubtedly be grown successfully in the Southern States and will furnish an acceptable addition to our list of vegetables.

In the December number of the *Botanical Gazette* Mr. C. W. Hyams described a new lily, under the name of *Lilium Massey*, from the high mountain meadows of North Carolina. It is characterized as follows: Bulb, 12 mm. in diameter or less, composed of fleshy scales; stem 1.5 to 5 dm. high, with two distinct scales below; leaves linear,

acute at both ends, or the lower obtuse, 12 to 25 mm. long, 2 to 4 mm. wide, in whorls of 3 to 8, the central ones generally alternate, glaucous, the margins revolute, prominently three-veined; flowers 1 to 3, erect, 2.5 to 5 cm high; perianth reddish-orange, its segments spatulate, obtuse, slightly pubescent, the blade 6 to 12 mm. wide, gradually narrowed into the claw, purple spotted below; capsule obovoid, 12 to 25 mm. high.

"Mutilation and destruction of the young pine forests growing up in various parts of the republic for the purpose of getting Christmas trees will soon open a new campaign in favor of droughts, blizzards, and infertility. Millions upon millions of the straightest, most symmetrical, and vigorous hemlocks, spruces, pines and balsams will soon be abroad freight cars and going towards cities to be put into homes for Christmas trees, which shall bear tin bells, dolls, bonbons, glass bulbs, and all sorts of gimcracks for the amusement of children. The generation following will want for lumber which these Christmas trees would have made. The birth of Christ could be celebrated with more common sense than by depriving the human families which will follow us of the material out of which to construct and embellish their homes."—*Conservative.*

Now that the Philippine Islands are ours—nominally—a list of Phanerogamous Genera of the Malayan Archipelago which was published in 1896, may be of interest to some of our friends. This list is not for the archipelago itself, but for the Malayan group, and as most of the genera are common to the two, the list will be both suggestive and practical. The list is entitled "Lyst der Phanerogamen—Geslachten van den Maleischen archipel", was prepared by S. H. Koorders, of the Agricultural Department of Java at Buitenzorg, and was published in the Naturerkundig Tydschrift voor Nedirlandsch India (9th series, vol. 4). The list is in systematic sequence and in parallel columns an indication is given whether the representatives of a genus are trees (boom) shrubs (heester), herbs (kruid) or climbers (kimplant). It appears that of the arboreal genera, 7 are conifers, 36 are palms, 5 are of the lily family, 5 of the Magnoliaceae and 22 of the soursop family (Anonaceae).

BOOK REVIEWS.

LESSONS IN BOTANY. By George F. Atkinson. New York: Henry Holt & Co., 1900.

This is an abbreviated and simplified edition of the author's Elementary Botany, prepared for the use of the pupils in the secondary schools, when short, or half-year, courses in botany are given, and when for one reason or another the larger book cannot be adopted to such shorter courses. It has been in large part re-written and will be found admirably adapted to the schools for which it is designed. The larger work is one of the very best of its kind, and we predict that the present abbreviated edition will be found equally valuable and useful.—F. H. K.

THE NATURE AND WORK OF PLANTS. An introduction to the study of Botany. By D. T. MacDougal. New York: The Macmillan Company. 80 cents.

Dr. MacDougal is too well known as a leader among American plant-physiologists to need a special introduction, and this book is bound not only to be received as a valuable addition to the list of elementary text-books, but as a satisfactory exposition of present knowledge along the lines it covers. We have become so accustomed in recent years to having all text-books on botany more or less fully illustrated, that it comes as a shock to open this little book and find that there is not a single picture in it. Perhaps we have been depending too much on illustrations, yet it is doubtful if their complete and and studied absence will meet with general approval. Even a few carefully selected figures would certainly add to the clearness and ease with which it could be used. The book is divided into ten chapters, of which we have only space to give the headings as follows: Composition and purposes of plants; Material of which plants are made up; Manner in which different kinds of work are divided among the members of the body; Roots; Leaves; Stems; The way in which new plants arise; Seeds and fruits; Power or energy of the plant; Relations of plants to each other, and the place in which they live. Each chapter is divided into numbered and separately headed paragraphs, and the language is extremely clear and graphic. We shall watch with interest the reception of this book by the practical teachers.—F. H. K.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. MAY, 1900. NO. 5.

THE DOUGLAS SPRUCE, *PSEUDOTSUGA TAXIFOLIA*.

By FRANCIS E. LLOYD.

THE Pacific Coast Region is characterized by a great belt of timber extending from Alaska to California. In this region, excluding a portion of California, the general humidity for the greater part of the year is excessive. North of the fifty-fifth parallel this humidity extends throughout the whole year. Between the fifty-fifth and forty-second parallel only a few months of the summer season are free from rain, while south of the forty-second parallel drier conditions prevail, although the mountainous regions possess a climate more like that of the regions farther north than do the lowlands. The eastern boundary of this rain belt is found in the Cascade Mountains of Oregon and Washington, and in the continuation of that range north and south.

This rain belt is the home of a large number of genera and species of magnificent cone-bearing trees, many of which are of great value commercially, and all of which are of surpassing interest to the botanist. Of the approximately sixty species here found, none is so important as the Red Fir, or more properly, the Douglas Spruce. This is true because of its general distribution from a little south of Alaska to Mexico, the richness of its "stand" and the very general usefulness of its wood. It is the purpose of this paper to give some account of this tree.

It was first discovered in 1791 on the shores of the Nootka Sound by Archibald Menzies who was employed as surgeon on Vancouver's voyage of discovery, and not, as has sometimes been stated, by David Douglas, who however, rediscovered the tree in northern Oregon in 1827. It was described originally under the name *Pinus taxifolia* by Lambert, whose account appeared in 1803 accompanied by a colored

plate which is really very excellent in depicting the foliage characters, though a figure of the cone was not included because "those which were brought by Menzies" had "been unfortunately mislaid."

Of all the Pacific Slope trees the Douglas Spruce enjoys the widest distribution and appears to be the best able to adapt itself to great differences in soil and climatic conditions. From the coast to the eastern slopes of the Rockies on the fifty-first parallel to the latitude of San Luis Potosi, Mexico, where it is found "in ravines and on northern slopes of the highest mountains," this tree is found under all kinds of environmental conditions. In the Coast Range of Oregon, Washington and British Columbia, on the western slopes of the Cascade Range and between the altitudes of 1,500-2,500 feet is the locality where it finds its most congenial surroundings and is the scene of its greatest development. The average size here attained is a diameter of five feet with a height of 250 feet. Occasionally trees twelve feet in diameter are found, and these may be without doubt regarded as the parents of the present smaller growth.

Of the environmental factors affecting the growth of this tree, moisture appears to be the most important. The largest growths are found at the altitude mentioned above where the moisture, either as the result of rain or melting snow or soil water, is abundant throughout the year, or along the bottom lands near to streams. On the bench lands which are subject to the droughts of summer, with seasonal extremes of wet and dryness, the tree does not make so good a showing.

When growing in the open, young trees of Douglas Spruce assume a conical form with a broad, rounded base, very similar in shape to the Norway Spruce as it grows on our lawns. The upper branches stand at an angle of about 45° with the horizontal, while those below gradually come more and more into a position at right angles to the trunk, with their outer ends turning upward, and supporting a mass of slender, pendulous branchlets. Older trees in similar situations have a long oval form, the contraction of the outlines below being due to the drooping of the lowermost branches. When growing in the forest the first limbs on trees of the average size are found at a height of 75-100 feet. The trunks are then straight and columnar holding their diameter from base to crown in a remarkable way.

Although the Douglas Spruce has a distinctly spruce like habit, it varies from that genus in the form and structure of its leaves. These are directed in different planes, slender, flattened and slightly tapering from

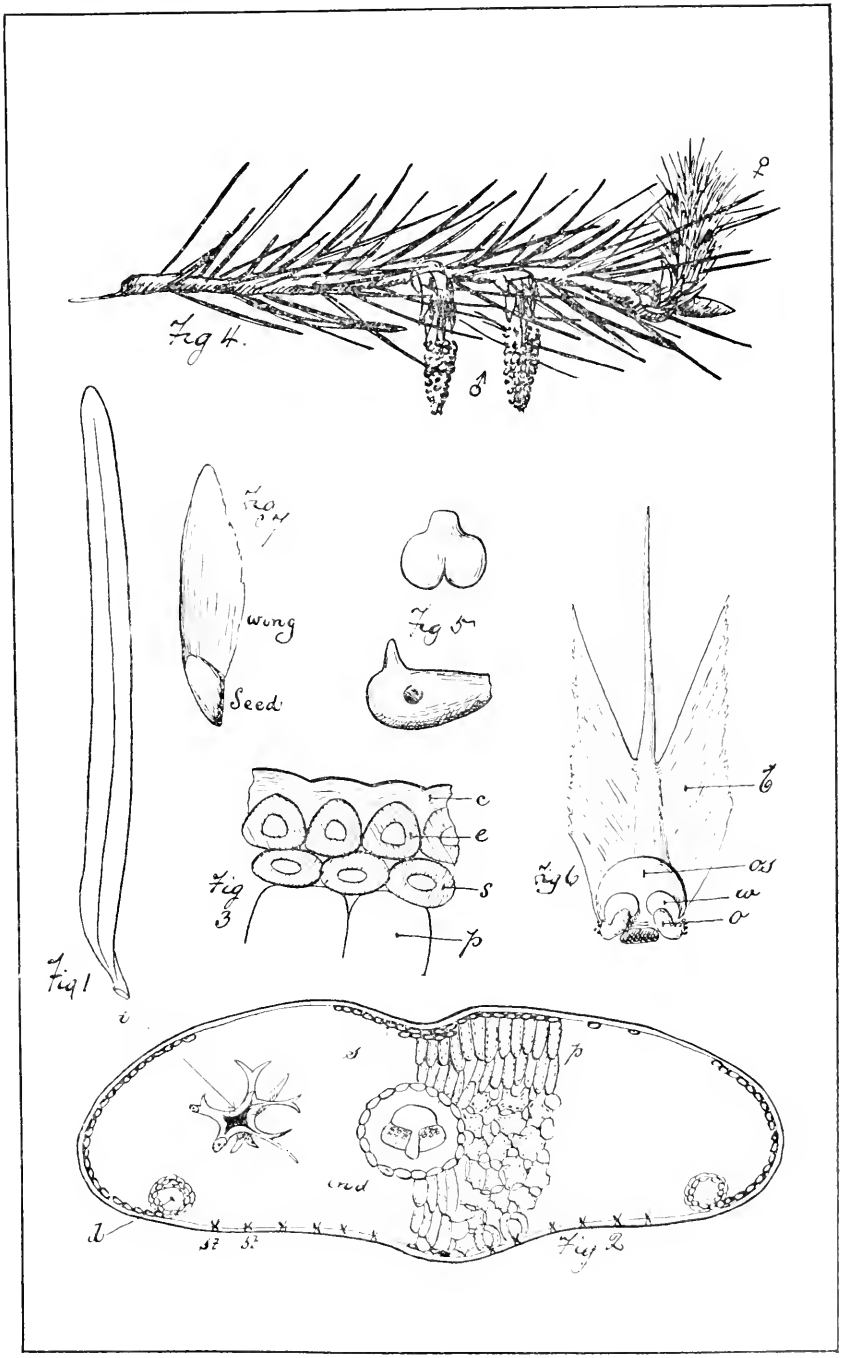


Fig 4.
Fig 5.
Fig 6.
Fig 3
Fig 1
Fig 2

below the middle to a rounded tip. (See Fig. 1.) On the leader and on stronger shoots near the tree-top, the apices of the leaves are acute. They persist for seven or eight years. Their color is dark green or glaucous green. It is a fact worthy of notice, that this tree varies quite markedly in color. I have observed in western Oregon two trees standing fifty yards apart showing extremes in difference, the one being distinctly blue as a result of the glaucous covering of the leaves, while the other is as distinctly dark green with no suggestion of the glaucous character. This latter character is therefore not confined to Colorado and the mountains of Mexico as has been thought. In these regions however, the glaucous covering may be more pronounced. Figure 2 is a transverse section. The epidermis is made up of small cells with thick walls (Fig. 3.) and a heavy cuticle which is thicker on the upper than on the lower surface of the leaf. The epidermal cells of the under side appear papillate in transverse section. As the cells are several times longer than broad, the under surface is thrown up into minute ridges. The lower surface only is penetrated by stomata (Fig. 2*st.*) and is distinctly glaucous. Beneath the epidermis lies a layer of long cells with thick walls which constitute in part the mechanical tissue (Fig. 2*s.*) of the leaf. The layer is not continuous. There is a strip along the middle of the upper side, where it is further strengthened by a narrow second layer. On either side of this median strip it is broken up or entirely absent. Around the margin of the leaf as far as the resin ducts it is again continuous, while it is absent from the under side, or is represented at least by a very few scattered cells.

The chlorophyll-bearing cells or parenchyma of the leaf is easily seen to consist of cells of two shapes. Those beneath the upper surface of the leaf are elongated at right angles to that surface, and constitute the palisade tissue. Between the palisade tissue (Fig 2*p.*) and the under epidermis the parenchyma cells are irregular, with short branches, the ends of which articulate with each other so as to make up a coarse network of cells with a continuous branching system of intercellular spaces which permit the movement of gases and water vapor. These spaces are in communication with hemispherical chambers which are found beneath the stomata. Traversing the leaf from end to end are two resin ducts, (Fig. 2*d.*) one of which lies near the lateral angle of the leaf and against the lower epidermis, a position which is more characteristic of the genus Abies—the true firs.

(*To be continued.*)

GOETHE'S PALM TREE.

By E. J. Hill.

IN an editorial note of The Plant World for January surprise seems to be intimated that a visit of Goethe to the Botanical Garden of the University of Padua, Italy, should lead to naming a certain Chamaerops "Goethe's palm tree." Whatever the visit may have signified to the gardener at the time it was made, or whatever led to the preservation of the tradition, the relations of the tree to Goethe are quite worthy of remembrance. We need to recall the fact that the greatest of German poets became in middle life an ardent student of botany and of some other natural or physical sciences, such as osteology, geology, and optics, and in the course of his life made several contributions to these subjects bearing more particularly on their theoretical or philosophical side. Among these is his "Metamorphoses of Plants," published in 1790, four years after his visit to the garden of Padua. This is an attempt to discover an ideal or standard flower of which all existing flowers are modifications, or from which they may have deviated under varied conditions of growth. Though faulty in method and failing in its main purpose, facts of value regarding the homology of the various parts of the flower and the leaf were brought out.

Goethe wrote a sequel to this treatise in 1818 and revised it in 1831, the year before his death. He entitles it "History of my Botanical Studies." It is autobiographic, in a sense apologetic, written at the request of friends to explain how a man known chiefly as a poet and with a training in early life almost wholly literary came later to work in so different a field. Up to the time of this change he confesses he had little idea of outward nature or knowledge of the three kingdoms, so called. It is an instructive account of an alteration of his mental habits by contact with nature, and as the study of plant life was the introductory causes it led him to say that after Shakespere and Spinoza the man of greatest influence on his intellectual life was Linnaeus. As a hunter in the forests about Weimer, he and the rather gay "Weimer circle" were led to look into methods of forest preservation and management, the earliest steps not only of his interest in botany but among the first in the important subject of forestry in Germany. The relations of trees to the soil in which they grew, to

the ground covering of minor plants and shrubs, even to the tiny mosses, became a subject of inquiry to this circle.

In the course of his botanical studies Goethe became specially interested in the adaptations of plants to their environment, and the changes which they undergo to adapt themselves to their altered conditions. He anticipated in this some of the ideas that have since been brought out so forcibly in connection with evolution. His views of these matters were particularly helped by the journey into Italy. The part of his account immediately bearing on the visit to the palm tree and its results to him are best given in his own words which are translated from the "sequel." After mentioning the adaptation of plants to climate and other conditions of environment he continues: "My adjustment to nature and especially to the plant world was greatly advanced by a hasty journey across the Alps. The larch trees more abundant than herotofore seen, the cone of the stone pine [*Pinus Cembra*], a new form, strongly called my attention to the influence of the climate. Other plants more or less changed did not escape notice in my rapid passage. But more especially did I remark the affluence of a foreign vegetation when I entered the Botanical Garden of Padua. From a high and broad wall the fiery-red bells of *Bignonia radicans* glowed charmingly over against me. Here I saw many rare trees growing in the open air which I had seen at home wintered under glass. Plants also protected against transient cold during the season of greater severity were now standing in the open, and delighted in the salutary air of heaven.

A fan-palm (*Chamærops humilis*) attracted my whole attention. Fortunately the undivided lanceolate first leaves were still standing at the base; their successive division was increasing until finally the fan-shaped leaf was seen in its completed form. A flower branch arose from a spathe-like sheath. It seemed a singular product, strange and surprising, standing unrelated to the preceding growth. At my request the gardener cut off for me the complete succession of these changes and I burdened myself with a large package in order to carry away my discovery. They lie before me as I took them with me at the time, still well preserved, and I revere them as a fetish, which, having adequately served to arouse and fix my attention, seemed to promise a successful result to my labors.

The changeableness in the forms of plants, which I had traced for a long time in its peculiar course, now awakened in me still more

strongly the idea that these forms are not primarily determined and unalterably fixed. Rather there is in them along with a stubborn generic and specific persistance a felicitous mobility and pliancy, by means of which they can adjust themselves to the many conditions to which they are subject throughout the earth and change in accordance with them."

In the "Italian Journey," under the date of Padua, September 27, 1786, Goethe writes at the time of his visit to the garden:

"Many plants can remain in the ground in the winter if they are placed against a wall or not far from it. They cover the whole at the end of October and heat it for a few months. It is delightful and instructive to stroll among plants which are strange to us. In time we cease to think at all about those to which we are accustomed as well as about other objects we have long known; but what is seeing without thinking? Here, in this great variety nearly confronting me, the idea became yet more vivid that we could perhaps evolve all the forms of plants from one. By this means alone it would be possible to delimit genera and species which, it seems to me, has heretofore been done in a very arbitrary way. On this point of my botanical philosophy I am at a stand and do not yet see how I shall extricate myself. The depth and the breadth of the matter appear to me about equal."

BLOOMING PALMS.

By P. Kaufman.

THE chief attraction at present in our greenhouses in Central Park, is the palm *Seaforthia elegans*, a native of Australia. Growing on the tropical island, in the main conservatory, it has attained a height of twenty-three feet. Some of its leaves are ten feet in length; the leaflets being linear, about one foot long, and two inches broad at the center or widest part. The flower stem extends horizontally from the middle of the trunk, some distance below the crown of leaves, and bears many long drooping racemes of beautiful heliotrope flower buds.

In another greenhouse we find the *Livistona Chinensis*, or Chinese Fan Palm, with its fan-shaped leaves five feet across, having pendent marginal segments. The petioles are from four to five feet, rounded below, flat above, the edges armed with short reflex spines, enveloped

at the base in a network of brown fibrous tissue. The whole appearance of this plant indicates great age. Bearing flowers and fruit at the same time, it excites a double interest. The flower racemes of greenish yellow are not as handsome as those of the Seaforthia, but the fruit—immense clusters of dull peacock-green olive shaped, deep purple or black speckled grapes, is worth going some distance to see. On cutting open one of these grapes you will find the skin lined with orange and encasing a pit much like that of an olive. Cut the pit and you come upon a white substance resembling vegetable ivory, inside of which is a brownish pithy material enveloping the germ. This palm is said to be perfectly hardy in Cornwall.

New York City.

THE PASSING OF THE WILD-WOOD.

By Katharine Dooris-Sharp.

IT was in Duluth, a few years ago, that the fact was first forcibly suggested to my attention that we are carelessly allowing the native vegetable growths of forest, vale, and water to become extinct. Near one of the docks, where a natural shallow inlet ran beside the unfinished stone-work for a short distance, the graceful sedges and water-plants still flourished undisturbed.

It was in the month of July when the aquatic floræ are at their best, yet in this one spot alone, did I seen anything to remind me that once these shores of Lake Superior had been green and luxuriant with blossoms. The iris and sagittaria spread their colored petals to the sun, the sparganium and typha lifted their forest of spears, with the pale green inflorescence sheltered from any but close observation.

There were tufts of *Scirpus lacustris* and other tall, graceful varieties of the *Cyperacea* duplicated by reflection in the water.

A glimpse of nature, an object-lesson for the denizens of the city, surrounded by the works of man from day to day, as they are, why cannot such spots be spared, here and there, from the general destruction of nature's original beauty, which takes place wherever a city is planted.

Nature's bounties are so various, and there is no locality in which some one of them may not be found. In one place the geological formation are rich, in another the long stretches of woodland and

prairie are profuse in botanical wealth. Here it is mosses and lichens, there the peculiar growths of the sea shore, with possibilities in conchology. Every where are birds and insects and the larger forms of animal life.

But civilization daily encroaches upon these remnants of pristine formations, and in many localities nothing remains of nature's original construction.

In my own county (Madison) I have seen her driven from the wayside and fence-row by the hoe of the thrifty farmer, till but few spots remain in which she still holds summer revel.

The obliteration of natural plant life radiates from the cities to a greater extent every year. The neat farm-houses spring up within short distances of each other, the fence-rows disappear, and orderly cultivation takes the place of nature's wild luxuriance. What once the zigzag fence partially protected, the wire exposes to the hoe and plow. Instead of the wild hyacinth, clematis, cardinal flower or pink, which decked the tangled fence-row, the carrot, white-top yarrow, or other pest of the farmer is monopolizing the beauty forsaken wayside.

This spoliation is partly owing to the city loiterer, greedy for beauty and nature's treasures, but more from the owner of the soil who has little difficulty in eradicating every thing but those persistent plant beggers, which stand a living contradiction to the law of "survival of the fittest."

About two miles from town there is a strip of woodland, which is being gradually cleared away until now there is left less than ten acres. Itis rich in the production of wild vines, trees, flowers and ferns.

The wild grape, ampelopsis, tecoma, clematis and *Rhus Toxicodendron*, the smilax and bitter sweet trail from tree to tree. The Dioscorea flourishes here. The red bud, dogwood, spicebush, sassafras, elm, maple, oak, and other trees are here in profusion, and to name the wild flowers that congene at their roots would require pages and pages of a botanical analysis.

Many varieties of violets, the sanguinaria, meadow rue, hydrophyllum, wake robin, solomons seal, indian turnip, green dragon, silene, phlox, dog's tooth violet, mertensia, greek valerian, lady's slipper, Actea, anemones, tradescantia, euphorbia, sweet cicely, the bedstraws with their matting of shiny pixie wheels, but enough. The

wealth of spring and summer lead up to the *Compositæ* and the autumn abundance. The *Umbelliferæ*, the *Labiatæ* are here represented, and many other families; in a word, it is a treasure spot to the botanist.

Doubtless each locality has had such a spot until eradicated by encroaching civilization.

But already the work of destruction goes on. There was a time when the ginseng, cimcifuga, spikenard, &c., flourished, but these have been appropriated by the "herb doctor."

Do we not owe a duty to posterity in making an attempt to save a tract like this intact for future students in the neighborhood of each city, town or college? If the government purchases and preserves the birth place of a great man, the field of a celebrated battle, why not a strip of mother earth, rich with indigenous vegetation?

A little Nature Park, hedged in from the thoughtless maraerdu, but open to the student and lover of nature. Can any acquisition be worth more to a Natural History Club or Scientific association?

Ladies' clubs might well consider this in connection with their interest in ornithology. In a Nature Park the birds flourished undisturbed; left to the precarious shelter of cultivated grounds, only the tamer species will be likely to remain.

London, Ohio.

PHILADELPHIA BOTANISTS COMMEMORATED IN THE NAMES OF PLANTS.

By John W. Harshberger.

The city of Philadelphia has been the home of many distinguished botanist. Their names will be perpetuated and their memories will be kept green by the scientific work which they have accomplished Their names have been preserved to posterity by being incorporated into some generic or specific name bestowed upon a plant. The list of such persons, whose merit alone saved them from oblivion, is a long one. The following information, concerning the memorialization of the names of Philadelphia botanists, is gathered together for the perusal of the general botanical public.

1 James Logan,		*Loganiacea.*
2 John Bartram,	Bartramia,	*Musci.*
3 Peter Kalm,	Kalmia,	*Ericaceae.*
	Lobelia Kalmii,	*Lobeliaceae.*
	Bromus Kalmii,	*Gramineae.*

4 Humphry Marshall,	Marshallia,	*Compositae.*
5 Adam Kuhn,	Kuhnia,	*Compositae.*
6 E. H. F. Muhlenberg,	Muhlenbergia,	*Gramineae.*
	Dothidea Muhlenbergiae,	*Fungi*
	Solidago Muhlenbergii,	*Compositae.*
	Salix Muhlenbergiana,	*Salicaceae.*
	Erythraea Muhlenbergii,	*Gentianaceae.*
	Carex "	*Cyperaceae.*
7 Casper Wistar,	Wistaria "	*Leguminosae.*
8 Benjamin S. Barton,	Bartonia,	*Gentianaceae.*
9 Frederick Pursh,	Purshia,	*Rosaceae.*
	Plantago Purshii,	*Plantaginaceae.*
	Lesquerella "	*Cruciferae.*
10 Bernard McMahon,	Mahonia,	*Berberidaceae.*
11 Solomon Conrad,	Corema Conradii,	*Empetraceae.*
12 Lewis D. de Schweinitz,	Schweinitzia,	*Ericaceae.*
	Carex Schweinitzii,	*Cyperaceae.*
	Cyperus "	*Cyperaceae.*
	Fusarium "	*Fungi.*
13 John Lyon,	Lyonia,	*Ericaceae.*
14 William Darlington,	Darlingtonia,	*Sarraceniaceae.*
	Euphorbia Darlingtonii,	*Euphorbiaceae.*
15 Constantine S. Rafinesque,	Rafinesquia.	*Compositae.*
	Euphorbia Rafinesquii.	*Euphorbiaceae.*
	Opuntia Rafinesquii,	*Cactaceae.*
16 Thomas Nuttall,	Nuttallia,	*Rosaceae.*
	Allium Nuttallii,	*Liliaceae.*
	Aplopappus "	*Compositae.*
	Atriplex "	*Chenopodiaceae.*
	Calochortus "	*Liliaceae.*
	Chrysopsis "	*Compositae.*
	Euphorbia "	*Euphorbiaceae.*
	Potamogeton "	*Naiadaceae.*
	Ptilimnium "	*Umbelliferae.*
	Viola "	*Violaceae.*
	Zygadenus "	*Liliaceae.*
	Helianthus "	*Compositae.*
	Lespedeza "	*Leguminosae.*
	Silphium Nuttallianum,	*Compositae.*
17 David Townsend,	Townsendia,	*Compositae.*
18 Joshua Hoopes,	Helenium Hoopesii,	*Compositae.*
19 Elias Durand,	Quercus Durandii,	*Cupuliferae.*
20 Robert H. Schomburgk,	Schomburgkia,	*Orchidaceae.*
21 John H. Redfield,	Redfieldia.	*Gramineae.*
22 William Gambel,	Quercus Gambelii,	*Cupuliferae.*
23 Tomas C. Porter,	Porteranthus,	*Rosaceae.*
	Bromus Porteri,	*Gramineae.*
	Calamagrostis Porteri,	*Gramineae.*
	Panicum Porterianum,	*Gramineae.*
24 Josiah Gregg,	Greggia.	*Cruciferae.*

25 Thomas Meehan,	Meehania,	*Labiatae.*
	Halesia Meehani,	*Styracaceae.*
26 Job B. Ellis,	Sorosporium Ellisii,	*Fungi.*
	Coryne "	*Fungi.*
	Dendryphium "	*Fungi.*
	Gymnosporangium Ellisii,	*Fungi.*
27 William Canby,	Hydrocotyle Canbyi,	*Umbelliferae.*
	Peucedanum "	*Umbelliferae.*
	Scirpus "	*Cyperaceae.*
28 William Herbst,	Sparassis Herbstii,	*Fungi.*
29 Abraham P. Garber,	Eugenia Garberi,	*Myrtaceae.*
	Liatris "	*Compositae.*
	Habenaria "	*Orchidaceae.*
30 William P. Wilson,	Tillandsia Wilsoni,	*Bromeliaceae.*
31 Joseph T. Rothrock,	Rothrockia,	*Asclepiadaceae.*
	Pyrrhopappus Rothrockii,	*Compositae.*
	Halenia "	*Gentianaceae.*
	Stachys "	*Labiatae.*
	Townsendia "	*Compositae.*
	Artemisia "	*Compositae.*
	Nama "	*Hydrophyllaceae.*
32 Frank Lamson-Scribner,	Scribneria,	*Gramineae.*
	Panicum Scribnerianum,	*Gramineae.*
33 William Baldwin,	Vernonia Baldwinii,	*Compositae.*
	Vincetoxicum Baldwinianum,	*Asclepiadaceae.*
34 A. A. Heller,	Liatris Helleri,	*Compositae.*
	Gnaphalium Helleri,	*Compositae.*
35 Maj. John Adlum,	Adlumia,	*Papaveraceae.*
36 William Maclure,	Maclura,	*Urticaceae.*
37 George Martin,	Monetia Martini,	*Fungi.*
	Saccardia Martini,	*Fungi.*
38 Zaccheus Collins,	Collinsia,	*Scrophulariaceae.*
39 David Landreth,	Camellia Landrethii,	*Ternstroemiaceae.*
40 Benjamin Franklin,	Franklinia (Gordonia),	*Ternstroemiaceae.*
41 E. A. Rau,	Didymella Rauii,	*Fungi.*
42 Isaac Martindale,	Macrosporium Martindalii,	*Fungi.*
43 John W. Eckfeldt,	Sphaeria Eckfeldii,	*Fungi.*
44 Joseph Carson,	Sium Carsonii,	*Umbelliferae.*
45 Jesse M. Greenman,	Talinum Greenmanii,	*Portulacaceae.*

This list is not entirely complete. A careful perusal of a large number of botanical works would be necesary to satisfactorily bring together the names of plants derived from the botanical worthies, who resided in or near "the city of brotherly love."

University of Pennsylvania.

EDITORIAL.

This year the American Association for the Advancement of Science departs from its time honored custom of meeting in late summer, and will assemble in the week beginning June 25th. New York City has been selected as the place of meeting, and there will be many features that should make it a memorable occasion. Thus aside from the Association itself with its numerous sections, there are sixteen affiliated societies that will hold their meetings at the same time and place. Of these the Botanical Society of America, the Linnean Fern Chapter, the Sullivant Moss Chapter and the Botanical Club of the Association will all furnish interest to our readers; and we shall hope to publish certain of the more interesting results brought out before them. One day that will be of special interest to botanists, has been set aside as Torrey Day, on which occasion memories of this distinguished botanist will be revived. This meeting is to be held at the New York Botanical Garden, and an opportunity afforded of viewing this splendid institution. We trust that many of our readers may have opportunity of attending this Association meeting. As has been our custom for several years past, a representative of THE PLANT WORLD will be present, and copies of the journal on exhibition.

The Department of the Interior has just issued a Report in the Petrified Forests of Arizona, by Prof. Lester T. Ward, of the U. S. Geological Survey, who visited the locality last season at the request of the Department. It gives valuable information regarding the extent and appearance of this fossil forest and recommendations for its preservation. Since this report was printed a bill was introduced into and passed the lower House of Congress setting aside the principal area in which the trees are found as a natural park. The area will comprise four townships.

NOTES AND NEWS.

The rare little fern, *Schizæa pusilla*, is reported by Miss E. H. Terry in the April *Fern Bulletin* from the vicinity of Lakewood, New Jersey.

Number four of the Nature Study Leaflets, issued by the Natural Science Committee of the Associate Alumnæ of the Normal College of New York City, is a popular treatment of Mosses by Elizabeth G. Britten. It should stimulate the study of these interesting plants.

The largest pulp mill in the world is at Saulte Ste Marie. Twenty-two acres of the best spruce land is cleared and converted by this mill into 250 tons of pulp in a single day, and this is consumed by a great newspaper in two days.—*The Forester.*

In the March *Botanical Gazette*, Mr. J. Schneck of Mt. Carmel, Ill., reports the establishment of the Cretan brake (*Pteris cretica*) in a number of wells in that vicinity. This plant is well-known in conservatory and household cultivation and its spores appear to have found their way into the wells where the plants grow and multiply luxuriantly.

According to the March number of the *Journal of the New York Botanical Garden*, the herbarium of that institution contains about 98,000 specimens of the higher plants, and the Ellis collection of fungi which numbers 80,000 specimens and is by far the largest in this country. The herbarium of Columbia University, one of the largest in America and containing over 600,000 specimens, is also deposited at the garden.

The olive can be grown only in a small and favored portion of the globe; middle and Southern California, and (perhaps) part of Arizona, are the only points in the United States, so there will be no danger of overproduction. Regarding the culture of the olive from the mercenary standpoint, there is more to commend it than either the orange or the prune. Trees are now growing in California that at eight years old produce 2,000 gallons of olives to the acre. These will make 250 gallons of oil, which—at say $3.00 per gallon, means an income of $750 per acre. The net income from such a crop, would be not less

than $500 per acre; and with good care, the crop will be large and sure from year to year for a century.—*Forest Leaves.*

In the March number of THE PLANT WORLD mention is made of *Tiarella cordifolia.* I have in my herbarium specimens collected in Gaylord, Mich., similar to those described by Mr. C. K. Dodge, viz: with runners and which are also taking root.

I should like to reiterate all that Professor Nelson says in the same number about botany and especially botanists. Where I am located—in sight of the National Capitol—I am a constant curiosity to people when they see me with "that yere tin can." I heartily agree with his entire article.

May I ask through THE PLANT WORLD something about the habitat of *Primula Mistassinica* Michx.? In 1895 I found it clinging to perpendicular cliffs of limestone at Grand Ledge, Michigan. Afterward in Otsigo County, while rambling about the country, my attention was called by some Polish people to a "pretty posy". I found it to be this Primula, but growing in a veritable quagmire. It was darker color, and a patch of four or five square yards was certainly handsome.—GUY L. STEWART, *College Park, Maryland.*

The March number of the *Annals of Botany* contains an exceedingly valuable paper on the Maidenhair Tree (*Ginkgo biloba*), by A. C. Seward and Miss J. Gowan. This tree is sometimes spoken of as unknown in a wild state, but according to the authors, it is found in several places in China and Japan under conditions that would seem to preclude the possibility of its being cultivated. It occasionally reaches the height of 100 feet, and a circumference of 28 feet, but usually it is much smaller. The authors first present a brief historical sketch of its discovery and subsequent scientific history. Then follows a careful description of the anatomy, and the structure and development of the flowers and fruit. They then give a short account of the probable ancestors as shown by fossil remains. They conclude that it is to be regarded as an isolated type that should be placed in a separate division of the Gymnosperms—the Ginkgoaceæ—and no longer included in the Coniferæ. "In many respects Ginkgo shows a marked affinity with the cycads: like the extinct cycadofilices, Ginkgo possesses both Filicinean and cycadean characters, but while exhibiting traces of the union of cycads and Ferns, it represents in all probability a very ancient type which may have been merged into the cordaitales in the Paleozoic era"

BOOK REVIEWS.

ENCYCLOPEDIA OF AMERICAN HORTICULTURE. Edited by Prof. L. H. Bailey, with the collaboration of numerous specialists. Vol. 1, A. D. MacMillan & Co. New York.

For several years we have been looking forward to the appearance of a much needed Cyclopedia of American Horticulture. The first volume of the work bearing this title has recently been put out by the MacMillan's. This first volume includes all horticultural subjects beginning with the first four letters of the alphabet. Three other volums are to follow. Prof. L. H. Bailey, whose ability to turn off high-grade work at a rapid rate is almost proverbial, is the editor in chief. Mr. Wilhelm Miller is assistant editor as well as author of many of the most readible articles. In addition, Professor Bailey has had as collaborators one hundred of the leading horticulturists and botanists of America.

The treatment of the articles is very commendable. First the derivation of each generic name is given. Then follows a nontechnical description of the genus; then in large genera an alphabetical index to the species; then follows the species in a systematic order separated by useful keys. After a brief popular description of the species follows the date of flowering, distribution and references to published illustrations. Articles (with maps) on each of the states and regions of North America are contributed by men who are perfectly familiar with their locality; as for instance Arizona is prepared by Prof. Toumey and Alaska by Dr. Evans. Many of the horticultural subjects are treated in a most entertaining manner enriched with historical and statistical information. Among those in which the writer has been especially interested are those on cranberry and celery culture. Biological sketches with portraits are given of those who have had most to do with the development of American horticulture.

The book is profusely illustrated. It contains nine full paged plates and 743 text figures while there are but 508 pages of text. As has been pointed out one cannot open the book without seeing one or more illustrations. The illustrations have been well chosen, and will be very helpful. This work will be a most valuable accession to the library of every botanist and horticulturist. In the Department of Agriculture it is also being used as a check list and is to form the basis of their economic herbarium. While the various specialists may not always agree in their treatment of the subjects yet it must be admitted that even in the completed articles the most recent revisions and monographs have been utilized.—J. N. R.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. JUNE, 1900. NO. 6.

COFFEE GROWING AND DRINKING.

By ALICE CARTER COOK.

THE Europeans learned the use of coffee in the seventeenth century from the Turks and Arabians. It was, indeed, supposed to be a peculiarly Arab product and Linnaeus called the shrub *Coffea Arabica*. Botanical and historical research have, however, shown that the plant and the knowledge of its use were of African origin, and were introduced into Arabia in early Mohammedan times.

As with all other successful novelties, conservative opposition was aroused, and there was what might be called an anti-coffee crusade in the Moslem world. Some used the beverage to assist them to keep awake during their midnight devotions, while others considered these bogus vigils offensive to Allah. In Europe laws and penalties were enacted to check the growth of the coffee habit, and eminent men considered it an ephemeral craze: but it has continued to increase, and has become almost co-extensive with civilization.

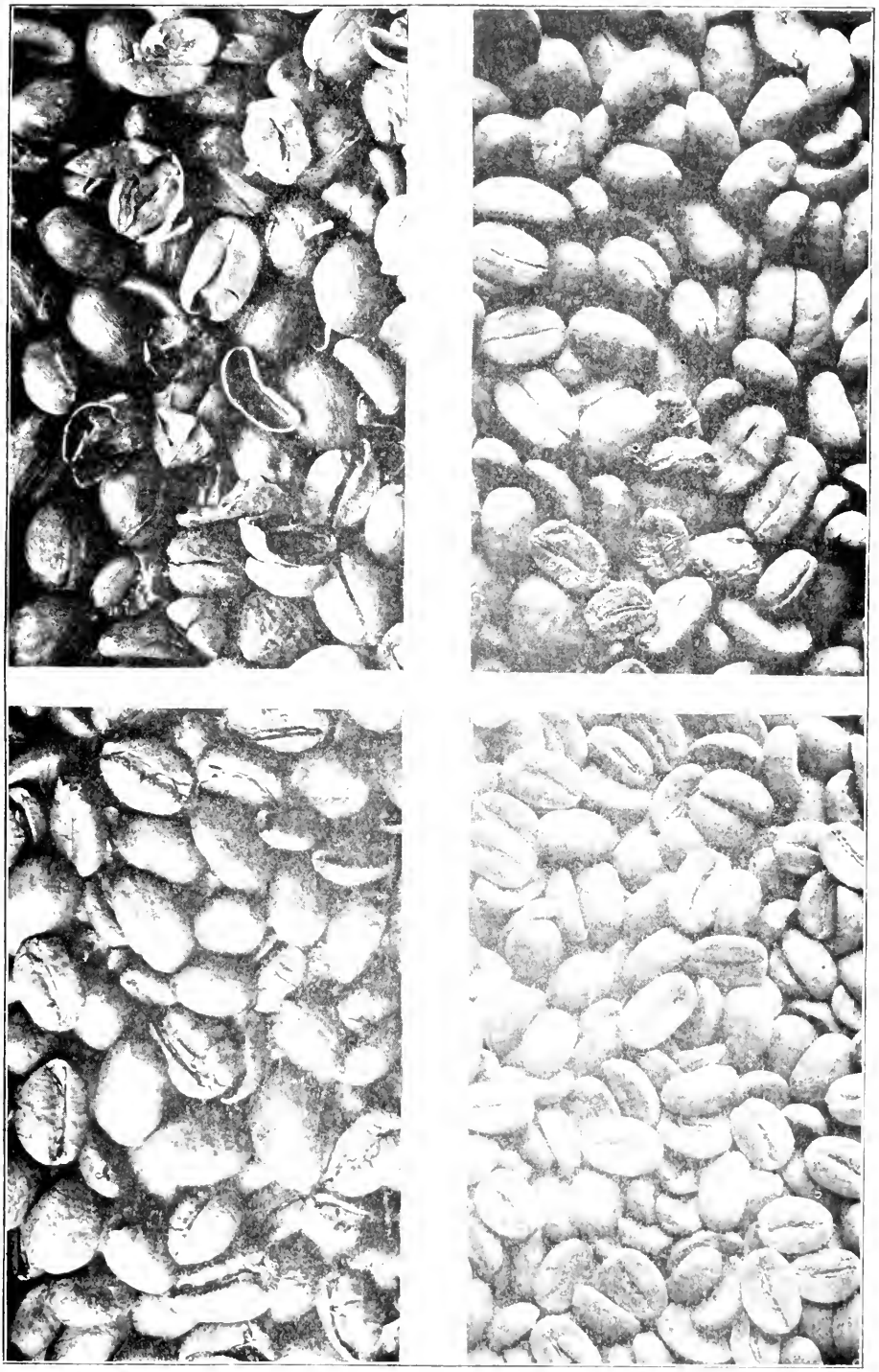
The growing demand was not long supplied by Arabia, and the tree, which can endure a great variety of climate, is now widely cultivated in the tropics. The first plant seen in Europe was sent from Java, where coffee has been cultivated as a government monopoly since 1690, to the Botanic Garden of Amsterdam. Young trees propagated from this were distributed among the gardens and conservatories of the continent. One presented to Louis XIV, by the magistrates of Amsterdam, was described as a species of Jasminium by Jussieu. De Clieux, a French officer, took a cutting of this tree to Martinique, sharing with it his own scanty allowance of water during a long voyage. It grew and prospered in the new home, and its numerous offspring were scattered throughout this and the adjacent islands. Some even claim that

all of the plants on the American continent are its descendants; this, however, can hardly be true, for in 1718 scions were sent from Java to Surinam. In order to keep the monopoly there, the inhabitants were forbidden on pain of death to sell fresh berries to foreigners. But a few seeds were at length smuggled into Cayenne, and thence the tree was distributed through the French colonies. The extensive cultivation of coffee in Brazil, amounting to seventy per cent of the world production of 1,800,000,000 pounds, is largely due to the efforts of a bishop of Rio Janeiro, who distributed the seed generously in the latter part of the last century. The physician Isemberg brought plants to the Antilles in 1716, and the Spaniards had begun to grow the trees in their West Indian possessions by the middle of the eighteenth century, and thirty years later cultivated them on the mainland. Coffee is said to have reached San Domingo by means of wildfowl which carried the seeds in their crops from the neighboring islands. Once introduced the plant gained favor rapidly everywhere, and now flourishes in many of the South and Central American States where some of the most highly esteemed grades are produced. In Mexico also the enterprise improves from year to year.

Long before the coming of the Dutch, the Cingalese grew coffee near their temples, employing the flowers for the decoration of the shrines. The tender leaves were also used for curries, but nothing was known of the properties of the fruits. The Dutch began its cultivation in 1820, and some of the varieties of Ceylon coffee rank with the best. The leaf parasite has, however, caused such havoc that within recent years, many plantations have been abandoned or turned over to the tea or sugar industry or to the culture of the Liberian species which is more resistant to the disease.

Coffee is also grown in the Philippines, in Bourbon, Madagascar, Guinea, the Fiji, Friendly, Samoan and Hawaiian Islands and the other groups of the Pacific; also in Queensland and other parts of Australia. The soil and climate of Borneo are specially adapted to the Liberian species, which is a lowland, warmth-loving plant.

Coffea Arabica is a highland shrub or small tree thriving at altitudes one to six thousand feet above the sea level. The leaves are evergreen, the flowers clustered, short-pedicelled, white and very fragrant; the mature berries of a deep red color, and the outer pulpy layer has a sweetish taste not at all like coffee; the two hard seeds or "beans" are each enclosed in a tough coat technically known as the



The upper left hand figure shows a sample of coffee dried in the berry; the upper right hand, "parchment coffee" from the Philippines; the lower left hand, Liberian coffee from Liberia; and the lower right hand, Arabian coffee from Porto Rico.

"parchment" and each is again invested with a delicate membrane called the "silver skin." For convenience in picking and to insure protection against windstorms, the trees are usually pruned to a height varying from two-and-a-half to six feet according to the taste of the planter, and the condition of the climate. "Good coffee can only be obtained from well-kept trees and carefully harvested fruits." When a tree has reached maturity at an age of six to ten years, it yields an average crop from one-half to one pound of cured berries for a period of twenty years or more. The length of life and the amount of harvest are very largely determined by the care bestowed. Some trees have continued to bear for nearly a century, and crops of twenty-five pounds have been obtained from a single plant.

Since the flavor and appearance of the beans is greatly influenced by environment, there are almost as many varieties of coffee as localities where it is grown, but there have been said to be three classes: Arabian, East Indian and West Indian or American. Of these the three general types are: Mocha, Java and Brazilian.

Mocha coffee, which, in point of excellence, probably leads the list, is said to owe its superiority to the method of curing. The berries, left upon the trees until they are "dead ripe," are shaken down upon mats spread upon the ground. They are then dried in the sun and the pulp and parchment removed by wooden rollers or by pounding in wooden mortars. After being winnowed and twice sorted, once according to color, and again according to size, the beans are sent to the shipping port on the backs of donkeys.

This method is impracticable on a large scale or where continuous dry weather is not to be counted upon. For the berries must be spread very thin and constantly turned, and perfectly protected from dampness, as fermentation in the pulp injures their flavor. Therefore machines are used for pulping on large plantations and the berries, sometimes carried to them through iron tubes in a current of running water, are pulped within twenty-four hours of being picked. They then remain water-immersed for about twelve hours, which causes sufficient fermentation to render easy the removal of whatever fleshy or mucilaginous substance remains. The beans, now known as "parchment coffee", are next dried, either in the sun or by artificial heat. Some experts favor the shipping of the beans in the parchment on the ground that the aroma is thus better preserved. Moreover, peeling and hulling machines are expensive, and are more easily obtained at the

purchasing port, where also, the pellicles themselves may be sold as low-grade coffee. "Garbling" is the color sorting, done by hand, which follows "peeling" and "hulling," the removal of parchment and silver skin, and precedes the size-sorting which is done by sieves. Great care is necessary in the shipment of coffee to prevent wetting, to avoid the proximity of mal odorous substances and to secure ventilation.

(*To be continued.*)

THE DOUGLAS SPRUCE, *PSEUDOTSUGA TAXIFOLIA.*

By Francis E. Lloyd.

(*Concluded.*)

A very curious feature of the leaf of Pseudotsuga is the occurrence of huge thick walled cells (Fig. 2*i*.) with tapering, branching arms which penetrate between the cells of the surrounding parenchyma. These stellate cells, astrosclereids or idioblasts as they have been called, are arranged in two rows, running on either side of and parallel to the median strand of vascular tissue. I have found them in leaves from all parts of the tree. What purpose they serve is not always plain. An explanation which naturally suggests itself is that they assist in the mechanical support of the leaf, and are analogous to the spicules which occur in most sponges. Strangely enough these cells are said by McNab* to be absent from plants of this species cultivated in Great Britain. If this observation is correct, it is certainly a phenomenon difficult to explain. It should be pointed out that other genera, and not alone this or other coniferous plants, possess these peculiar cells.

The center of the leaf is occupied by a strand of cells concerned in the transportation of water and food, circular in transverse section. The outer layer of the strand is readily distinguishable by the size and regularity of the cells which constitute the endodermis. (Fig. 2).†

The staminate and pistillate flowers are produced on all parts above and below, of the same tree. The former are produced from usually numerous small buds on the under sides of the twigs (Fig. 4.)

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*Quar. Jour. Mic. Sci. 1876, p. 414.

†The figures refer to the illustrations published in the last issue of The Plant World.

of the previous seasons growth, and hang down during anthesis. The anthers (Fig. 5.) are orange-red in color. The pollen is produced in immense quantities. In the early spring the ground in an Oregon forest is often completely covered by a layer of the whitish powder.

The pistillate cones develop in lateral buds near the ends of the twigs; usually one, sometimes two on the same twig. The trifid bracts (Fig. 6.) which correspond to the true leaves in position, have in their axils the ovule bearing scales. The ovules, (Fig. 6*a*.) two on each scale, (*os*.) are placed with the micropyle near the axis, but directed in such a manner as to be at the end of a trough made by the overlapping bracts. The cones are upright during anthesis, (Fig. 4.) and the much exserted bracts form a trap which catches the falling pollen. This rolls down to the micropyles of the ovules where it is caught by a drop of secretion which, as it dries, draws the pollen down to the middle part or nucellus of the ovule. After pollination has taken place the cone becomes pendant and the scales develop very rapidly, so that the discrepancy in size between bract and scale is quickly reduced, although the bract always remains exserted, and is in this and in its trifid form very characteristic of the genus. In the spruces proper the scale outstrips the bracts so that at maturity the bracts are hidden by the scales. When ripe the cone is 9 inches long and 4.5 inches wide when expanded, reddish brown in color, and occupies one season in coming to maturity. The spreading of the scales allows the winged seeds (Fig. 7) to escape after which the empty cones fall from the tree. The seedlings, which develop in abundance on the forest floor, have usually six cotyledons.

When the tree is young, the bark is thin and smooth with a good many resin blisters. When of some age the bark gets to be quite thick especially at the base of the tree. It is longitudinally fissured into broad, rounded plates of rather corky texture. The bark of medium sized trees—that is, before a marked amount of thickening has taken place—has a tannin content higher than that usually occurring in tannin bearing barks. Material collected by myself at Forest Grove, Oregon, and studied by the late Professor Trimble gave, when air dry, 15.25 per cent. for tanning purposes.

The wood is very strong and elastic. When dry it is hard to work on account of the great amount of "pitch" or resin in the summer wood. The difference in solidity between the spring and summer wood is very marked, especially in trees which grow in the lowlands.

The color of the wood varies in a very curious manner, and the fact of this variation has given rise to the popular belief that there are two kinds of "fir"—the "red" and "yellow fir." The latter is more even in texture, and more valuable for all kinds of work, and I believe is found in trees growing at the higher levels, while the lowland trees seem to have the red timber. Whether the difference in color is actually correlated with difference in habitat is not to be asserted, but is rather a question which should be answered by more extensive observation than I have been able to give it.

The usefulness of the lumber is appreciated when one is told that it is used in shipbuilding and other fine construction, railroad bridging, for flooring for which it is especially good when laid with the "grain edge" up, for house building, piling, for ties and for fuel. It is unique in its value for spars and masts—for which purpose it is sold as "Oregon pine."

There is another feature of the Douglas Spruce which has been little observed, but which needs and deserves special study. When one is walking through a piece of land from which the trees have been cut away, one occasionally finds a stump which, different from the rest, has resisted decay and has in a most remarkable manner, covered the whole top of the exposed wood with a cap of wound tissue several inches thick, according to the size of the stump. No "suckers" are to be found and no sprouts occur on the stump. Now, that a stump should be able to seal over its whole top with callus, and this independently of foliage is noteworthy. Chlorophyll occurs in the young bark of the callus, and its activity doubtless assists in the formation of the necessary food. This, however, is only contributory. It may be that the explanation is to be sought in the activity of a fungal symbiont which is doubtless to be found in the association with the roots. The solution of the problem presented by this very unusual behaviour is yet to be found.

The Yearbook of the Department of Agriculture for 1899, just published, contains a number of articles of interest to students of plant life. There are accounts of forage experiments, the latest discoveries in methods of plant breeding and seed testing, practical suggestions for forest preservation, etc. The book should prove of much value to farmers.

NATIVE ORCHIDS.

By Frank Dobbin.

MANY members of the Orchidaceae are native to New England and the middle states. Baldwin in his monograph on the Orchids of New England gives over forty. Comparatively few however, can be found in any one locality. In this locality, eastern New York, they are all rare, if we except the Spiranthes and one or two Habenarias: but a diligent search will usually be rewarded by the finding of a few of the native species.

The first Cypripedium to appear is the stemless Lady's Slipper *Cypripedium acaule*. It is usually found in swamps or at least in shaded situations. We have seen it growing in profusion on the summit of the Green Mountains in Vermont, where by the way, its roots were gathered and dried for medicinal purposes under the local name of valerian.

The Yellow Lady's Slipper, *C. pubescens*, is generally in bloom about the same time as the purple one, and is usually found on higher ground. I know of one clump that comes up annually on a sunny railway embankment. A strange place for such a shy plant to choose for its home.

The White Lady's Slipper or Moccasin flower, *C. spectabile*, is a little later than the other two, and can usually be found in cold peat swamps. It is worth going a long distance to see, and the day when the enthusiast catches sight of his first group is one long to be remembered.

We found the Grass Pink, *Calopogon pulchellus* and *Pogonia ophioglossoides* growing in the same swamp as *Cypripedium spectabile*, but in a more open situation. The delicate rose-tinted flowers of the *Pogonia* were in great profusion with here and there a stem of the more gaudy *Calopogon*.

In one spot only have we found *Arethusa bulbosa*. This is where there was evidently a shallow lake not many years ago: but it is now overgrown with sphagnum moss and partly covered with the low brushes of the Pale Laurel, *Kalmia glauca*. Here we find a few of the almost naked scapes of the *Arethusa*, with their solitary flowers, rising from the damp moss.

In July the Purple Fringed Orchid, *Habenaria psycodes* may be found in nearly every meadow. Some years it is much more abundant

than others, but it is seldom that a few specimens cannot be gathered. Of less frequent occurrence, but inhabiting the same situations is the Rugged Orchis, *H. lacera*. The inconspicuous *H. tridentata* is sometimes present as is also *H. dilatata*, which we sometimes find growing with the *Calopogon* and *Pogonia*.

One of our commonest autumn plants is the Ladies-tresses, *Spiranthes cernua*, and its spike of white blossoms grace every meadow. *S. gracilis* is of much rarer occurrence, but may sometimes be found on sandy hills.

Our native orchids are well worth careful study, and much is to be learned from a close observation of their many devices for securing fertilization.

VITAITY OF WILLOWS.

By Eva M. Reed.

ABOUT the middle of January (or earlier, I regret not having the exact date) I was given a bundle of Willow slips which I placed in a dish of water, changing it day by day, until the 21st of April, when, without the least attempt at careful planting, the slips were set out in the ground merely "to see what they would do." Meanwhile roots had formed in the water, and fresh green shoots from one or two to five or six inches long had developed. The slips were all placed in one dish, and the roots thus formed were of considerable length, but entangled and deflected from their proper course through lack of room. It was in this matted condition that I took them out of the glass, April 21st, and set them in the yard.

Somewhat to my surprise, within a week several of these slips showed that they meant to seize the opportunity to grow up into graceful Willows of sufficient size.

Of course I know that Willow shoots would develop roots in water alone, but I did not know that they could be kept in it nearly all winter, and would then grow the following spring if planted out. It appears however, that only certain species will survive—others failing to show any sign of life.

At present my Willows are growing promisingly.

Missouri Botanical Garden.

INCIDENTS AFIELD.

By C. F. Millspaugh.

MR. Nelson's article in the March issue of "The Plant World" recalls many curious incidents connected with the vasculum and the press that have happened to me in my botanical rambles; and to the point of his argument I might add that I have personally attracted no deeper interest among the mountaineers of the Virginias than among the residents of a New York city of twenty-seven thousand inhabitants.

Many times a day, during a wagon tour of West Virginia, both my entomological companion and myself were accosted with questions that, by the end of the journey, would sufficiently fill a volume. Even our horses learned before we were three days out, that they were being driven by a curious pair of bipeds, and would turn and eye us pityingly when, with a shout, one or both of us would leap from the wagon, clear a fence, and rush madly afield. On each occasion the team would stop the instant we dropped the lines, and watch us intently until we regained the wagon; then, with a sad wag of the head, they would walk meditatively on while we put away our prizes.

On one particular occasion, as a long-bearded mountaineer approached on a lanky white horse, both happened to espy an object of interest in the fields on either side of the road. With a yell of delight the entomologist snatched his net, and clearing the wagon, and the fence, in two leaps, rushed zig-zag down the hillside after an elusive butterfly; at the same instant I reached for my plant press and was over the fence and scrambling up the bank above the road. The mountaineer's horse gave a snort, reared, and whirling on his pivoted hind legs threw his astonished rider, and ran back down the road. Returning, and not seeing the mountaineer about, we put away our trophies of the chase and drove on. That night we "put up" at a house in a little settlement on our route. As we breakfasted in the morning we overheard the following outside the kitchen door.

"Do yeou-all know yeou-all's got the durndest pair o' lunyticks in yeou house outen jail? I met 'em on ther pike yestiddy, 'n' whatter yeou think: them too—w'en th' seed me a comin'—jess fetched er whoop 'n' lit outen the'r waggin; wun er 'em grabbed er paytent gate 'n' slid up ther bank like er woodchuck makin' fer 's hole; 'n' tuther went flyin' daoun Jim Skellen's hillside pastur a wavin' a white rag

over 's haid. My ol' mar' she jis uppen dumpt me in ther road 'n' tuck to ther woods, 'n' w'en I got back atter ketchin' her, they-all 'd gone. W'at yeou-all gwine ter do with 'en w'en yeou all get 'm fed?

One day in Binghamton, New York, vasculum in hand, I was passing a house in which I had attended a woman in confinement a day or so before. On the curb sat two little children playing. The boy glanced up as I passed, and I heard him whisper loudly to his companion: "Say Ellie, what you think the Doctor's got in that tin box:" the little girl responded in a supercilious but confiding tone "Umph, don't you know—babies".

THE VIOLETS ON LONG ISLAND.

By Wm. L. Fisher.

THE wide level tract of land in the west-central part of Long Island, known as Hempstead Plains, is rather unsatisfactory ground for botanical collectors. On account of the very dry, sandy soil, few of the early spring flowers, that are common in other parts of the state, can be found there. One searches in vain for the spring beauty or the trailing arbutus, and the blood-root and the hepatica are seen but rarely in the hills on the northern border of the plains.

One forgets, however, all his disappointment at the absence of these old friends, as soon as the violets begin to appear. From the latter part of April until the first of June there are violets everywhere. An acquaintance of two years has led to the identification of ten species, four of which are very abundant in this region. One of the first flowers of the season is *Viola pubescens*, which is somewhat rare in the open woodlands. Closely following this comes *V. palmata*, which I have found in large numbers in a recently cleared wood-lot, just north of Hyde Park. At the same place I found a very few specimens of *V. villosa*, which is, I think, a new station for this species.

The violets that are most common here are *V. ovata* and *V. pedata*. The former may be found in sandy places where there is not enough vegetation to cover the ground, and the latter is everywhere, in such quantities that some of the fields are actually blue instead of green.

This species bears its flowers in great profusion. One small plant, growing in the dry sand on the railroad embankment had sixteen flowers and two seed pods. *Viola obliqua* and *V. sagittata* may be seen in shaded places by the roadside and in the open woods. In the swamps and beside the few small streams are the sweet white flowers of *V. blanda* and *V. primulaefolia*.

The most abundant of the white varieties, as well as the latest one to appear is *V. lanceolata*. This species may be found growing with *V. pedata* in the open fields, but it remains in blossom much longer, some very fine specimens having been collected as late as the tenth of June. Altogether the violets form one of the most pleasing features of the spring flora.

RANGE EXTENSION OF *IRIS HEXAGONA*.

By A. Wetzstein.

BY the finding of *Iris hexagona* in Auglaize County, Northwestern Ohio, the fact seems to be proved that this plant has a much wider range than that given by our botanical authorities. Gray's *Manual* relates its range: "Prairies, Kentucky to Western Missouri, and on the coast from South Carolina southward;" Wood's *Botanist and Florist:* "South coastward;" and Britton and Brown's *Illustrated Flora:* "South Carolina and Florida to Kentucky, Missouri and Texas." In contradiction with those statements I believe that it is not only a plant of the south, but occurs also, through perhaps, sporadically and locally, in the middle portions of our country.

I found pretty large patches of this Iris at three different and quite remote places near St. Marys, Ohio,—evidence enough that it is wholly acclimatized, and entirely at home. Its habitat here is in wooded swamps with *Iris versicolor*, and blooming about the same time (I found my specimens June 14th), but easily distinguished from it by the lower stems which are surpassed by the leaves, and the somewhat larger and lighter colored flowers. The capsule plainly shows the six-angled form that gave this Iris its characteristic name (hexagona).

I would like to know if anybody has found this Iris in more northern localities.

St. Marys, Ohio.

EDITORIAL.

We would ask the indulgence of our readers, as the summer season approaches, for possible delays in the appearance of each monthly issue of THE PLANT WORLD. So many details enter into the editorial and business management of any magazine that the whole establishment may be likened to the complex mechanism of a watch, which is disabled when a single wheel slips out of place. In the first place, literary contributions become less numerous, because the majority of our readers are doubtless enjoying midsummer fiction and iced lemonade at various cool summer resorts. The result is that the editors, confined to the atmosphere of our Washington office, are forced to dip their pens in ink more freely than time or inclination warrants. There are also supplies to be purchased from time to time, illustrations to be obtained, and correspondence to be attended to, often when the staff is considerably reduced in numbers on account of summer vacations. We can perceive a ray of comfort, however, in the fact that many of our plant students are now gathering notes and making observations in the field, the fruit of which will doubtless appear in forthcoming issues of THE PLANT WORLD. It is our hope, therefore, that subscribers will await with reasonable patience the arrival of each issue, knowing that we never intentionally neglect or disappoint.

A reprint of page 27 of the supplement is sent out with this issue to take the place of the original page, on the reverse side of which an advertisement was inadvertently printed. The desire for binding the supplement separately is so universal that we prefer to have the volume possess an attractive appearance when completed.

NOTES AND NEWS.

While collecting plants near Lake Success, in the northwestern part of Long Island, on May the 5th, I found four specimens of *Trillium cernuum L.*, which had two flowering stems growing from the same rootstock. Some of the plants were very large, with both of the stems well developed, and each bearing a perfect flower. Can you tell me if this is a common habit of this species?—Wm. L. Fisher.

Notes on Texan Plants.

The Painted Cup (*Castilleia sessiliflora*) is found in abundance in April and May on sandy soil in Texas. Its brilliant scarlet color attract all passers-by. To the botanist it is especially interesting as it presents a peculiarity rarely met. The corolla is small, and of a dull greenish color, while the calyx is brilliantly tipped with a rich scarlet, and the floral leaves are similarly colored. The lower floral leaves are only faintly tipped with color. This plant is an excellent specimen to use as an object lesson to impress on young students the derivation of all floral organs. Indeed, it may be that such a plant first suggested the present accepted theory as to *the origin of these organs.*

On the black lands of Texas *Tradescantia virginica* grows in profusion on meadow lands. This spring I have noticed several groups of another species growing alongside of the above, *Tradescantiaerosea.* It is usually found in sandy nooks.—E. C. Lewis, *Forney, Texas.*

This spring I saw an abnormal flower that seemed especially interesting, a specimen of *Saxifraga Virginiensis* with quite double flowers closely resembling the cultivated *Achillea*, though the flowers were not so large. It grew on the rocky bluff of Barren River in Warren County. Dr. Small, to whom I sent a flower, wrote that the only other specimen that he knew of was collected many years ago on the rocky bluff of the Delaware River below Eastern, Pa.

I have seen it mentioned that in Maryland the trumpet creeper (*Tecoma radicans*) is known as "cow-itch." That is the local name for it in this part of Kentucky by the country people. In towns it is generally called "Virginia Creeper."

Mr. Jas. H. Ferriss, the conchologist wrote me last summer during his annual trip through the East Tennessee mountains that the mountain people called the Turk's-cap-lily "Yellow Jessamine," and sensitive brier was called "sensitive rose."

I do not remember seeing a mention of any use being made of persimmons save that in Maryland the darkies make "simmon beer." In many sections in Southern Kentucky the farmers' wives make preserves of them and also dry them in the sun for winter use. I have noticed some six or more varieties of this very toothsome fruit in Southern Kentucky; one of medium size that ripens early in September before frost; one small, turning purple when fully ripe, and still another, of especially fine quality, is quite large, two inches long, and ripens late in December or the first of January.—SADIE F. PRICE, *Bowling Green, Ky.*

The readers of THE PLANT WORLD will be interested in learning that the New York State College of Forestry of Cornell University has made provision in its curriculum for a course of instruction in "Fish and Game Protection and Fish Culture." The course consists of lectures, laboratory work and field observations regarding the life-histories of the important food and game fishes; the biology of streams and lakes; the relation of the forest and of forestry, logging, lumbering, milling, mining and irrigation operations to the streams and lakes and their inhabitants; the artificial propagation and protection of fishes, and the protection of the useful mammals and the game birds and song birds of the forest. This department is in charge of Dr. Barton W. Evermann, Ichthyologist of the U. S. Fish Commission, and the course was first given during the second and third weeks in May in the College Forest at Axton in the Adirondacks. The value of instruction along these lines can be scarcely overestimated. The young men who go out from the College of Forestry are the men who will be called to the management of the large forests of the United States, both national and private, and they should know not only how to care for the trees of the forest but also the birds and mammals and the streams and lakes and their inhabitants. Dr. Fernow, Director of the College of Forestry, and Dr. Evermann are both to be congratulated upon the successful inauguration of this interesting and important work.

BOOK REVIEWS.

A Taxonomic Study of North American Ranunculaceae. By K. C. Davis. Published by the author, and presented to the faculty of Cornell University as a thesis for the degree of doctor of philosophy.

An elaborate monograph of any group of plants is always welcomed by botanists, since from the author's extended study it may be presumed to afford a reliable guide and standard for systematists. When to the indigenous species are added the forms occurring in cultivation, fully described and treated in their proper place, the value of the work becomes greatly enhanced. The main purpose of a monograph, however, is to present a detailed account from the structural and taxonomic standpoint, of the plants it comprises. It should never attempt to embrace a distinct subject like that of horticulture. It is a matter of regret that Mr. Davis has fallen into this error, and has obscured the pages of his monograph by numerous directions for the cultivation of the plants he describes. The systematic treatment seems to us unfortunate in many cases. There is no reason for remanding the anomalous genus *Crossosoma* to the Ranunculaceae when the majority of European and American botanists agree in considering it the type of a distinct family. Moreover, we doubt whether the various varieties scattered so freely through the work are all worthy of admission, while on the other hand many of those to which the abbreviation "n. var." is incorrectly appended may have been wrongfully reduced. The descriptions, while in the main complete, are marred by innumerable typographical errors, evidently the result of careless proof-reading. The keys are, as a rule, well constructed.

The pamphlet under consideration includes only a portion of the family Ranunculaceae. As stated in the explanatory preface, it is "partly printed by the author and partly issued as magazine separates" a practice which does not conduce to a very attractive appearance in the book.—C. L. P.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. JULY, 1900. NO. 7.

COFFEE GROWING AND DRINKING

By ALICE CARTER COOK.

(*Concluded.*)

To attain the best results the beans should not be roasted until they are required for use; not only because the volatile oil to which the drink owes its agreeable properties disappears readily, but also because the quality improves remarkably by keeping. This is true to such an extent that Brown declares that "the worst coffee produced in America will, in a series of years not exceeding ten or fourteen, be as good, parch and mix as well and have as high a flavor as the best we now have from Turkey if properly kept in a dry place." Roasting, however, requires long experience, and therefore, is as a rule done by the merchants.

After being roasted, the beans are often glazed, ostensibly to protect them from the atmospheric oxidation, preserve the aroma and clarify the liquor in the making; but in reality, the object in most cases is to disguise defects. The egg glaze sometimes used is not objectionable, but too often the substance consists of glue, purified petroleum oil, gum arabic or other equally undesirable ingredients.

The commercial value of coffee depends upon the form, size, color, flavor, smell, age, uniformity and purity of the beans. "Large, shining berries may have an aroma decidedly inferior to that of insignificant ones." Color, besides being an index of maturity, is a local peculiarity, and is often altered by staining or polishing. A taste and oder test should always be applied, but both require long experience. The mixing of different varieties secures combinations of properties suited to the tastes of individual consumers, and is also practiced for the less praiseworthy object of disguising the flavor of inferior sorts

by the presence of a small quantity of finer grade. Mixing requires great skill, and when well done results in the attainment of exquisite aromas. The Parisians are expert in this art, sometimes using as many as five kinds in combination.

Perhaps in no other commodity is deception more practiced than in coffee. Mocha, which is freely dispensed from the shops, is in reality a rarity, and it is stated on good authority never to have been tasted by the majority of coffee drinkers. The coffee of Brazil "mechanically classified goes into the markets of the world, where it is sold, the small, round grains as Mocha, the large, flat grains as Java, and so on, until all the coffee producing countries are represented in the corner groceries of the world by the product of a single Brazilian plantation."

Chicory is one of the commonest adulterants, being sometimes used to the extent of 90 per cent. It is often added knowingly, but is in no way to be recommended, for its continuous use results in drowsiness, headache and inertia. "Roasted grains, peas, beans, carrots, parsnips, mangel wurzel, acorns, mahogany sawdust, spent tan, baked horse and bullock liver, burnt sugar and Venetian red" have all been used to enhance the value of the king of drinks. It is like printing Shakespeare and Mother Goose on alternate pages. Liver baking is a regular trade, the product being utilized by low-grade coffee shops. Of the many so-called "coffee substitutes" it is not necessary to speak. The proof of the liquor is in the drinking.

To detect accurately the impurities of coffee, chemical knowledge and microscopic tests are needed; but the housekeeper by very simple means may know whether or not she has a good article. If a little ground coffee placed upon the surface of a glass of water, sinks quickly to the bottom, discoloring the liquid, it is adulterated; or, again, it is impure if it hardens into cakes on being pressed between the fingers, or if the particles become softened when put upon a hard, smooth, moist surface.

The chief methods of preparing coffee, as is well known, are: (1) Infusion, the pouring of boiling water on the grounds; (2) Decoction, the pouring on of cold water and letting it come to a boil; (3) Filtration, the modern fad method of making so-called "Drip coffee".

La Roque, writing a century ago, describes the Arabians as wrapping the coffee-pot in a wet cloth as soon as it is taken from the fire. This "fines the liquor instantly, makes it cream at top, and occasions

a more pungent steam which they take great pleasure in snuffing up as the coffee is pouring into the cups. They use the whole berry, dried and slightly bruised before being lightly roasted over a charcoal fire. It is then thrown into boiling water to which some of the inner husks are added. Coffee so prepared is very delicate, but can probably only be made where the berries are grown". This so-called "Sultana coffee" needs no sugar. Orientals never use milk with coffee, and when sugar is added it is done so while the liquor is making. Cardomom seed, cloves, musk or various other spices are sometimes used, and one author says that a pinch of soda improves the quality of the drink. Turkish coffee is ground almost as fine as flour, and served black and thick. In Cuba a coarse flannel bag half full of pulvarized coffee is hung over a pot. Cold water is poured over the bag at intervals until the mass is well saturated, when the first drippings are again poured over the bag until the liquor becomes almost thick and very black. One teaspoonful of this extract put into a cup of boiling water or milk "is simply deliciousness itself".

The natives of Sumatra prefer the infusion of the leaf to that of the berry, and consider it more nutritious. Europeans, however, who have tried it are not unanimous in its praise, and describe it as tasting like a mixture of tea and coffee. The value of coffee as a food is still a debated question. Some time ago a learned society of France declared that coffee with milk is nothing but "leather-soup," a substance absolutely indigestible. Orientals never drink coffee at night, and it is a by-word among them that if one has been long fasting, it would be better to eat a piece of rock than to attempt to drink coffee. Caffeine, the principle to which it owes its refreshing properties is identical with the theine of tea, and is also present in cocoa, mate, guarana and other plants from which drinks are made. In large doses it causes a kind of intoxication. The aroma is due to an essential oil, caffeone, produced during the roasting. Overdoses cause sleeplessness. These two substances act in such a way that the stimulating and exhilarating effects of the one precede the sedative ones of the other. Be it a food or not, it is certainly true that many house workers and shop-women, students, literary and professional men eat little else at the morning meal, and that it has long been acknowledged to be the "intellectual beverage." We are not accustomed to think of it as well adapted to children, yet we have seen healthy and happy babies of two years of age in the Canary Islands, whose dietary was mainly coffee and gofio, and have

been told that the physicians there frequently prescribe it for ailing infants. Scott (not the novelist) in 1765 declared that the exhilarating effects of coffee made it "one of the best breakfasts in the world for the honest, brave people of the foggy island of Great Britain, where such a multitude of melancholy accidents happen from a lowness of spirits." Another says, "If Queen Elizabeth had breakfasted upon coffee and hot rolls, instead of beer and bacon Queen Mary would have never been beheaded." An old Arab, probably speaking from experience, exclaimed, "Grief cannot exist where it grows and sorrow humbles itself before its power."

In addition to its well-known soporific properties, coffee is also a cure for headache, a purgative, an astringent, a stomachic, a febrifuge, a nerve tonic, an asthma cure, a specific for calculus complaints, gravel, gout and rheumatism. It is an antidote for alcohol or opium poisoning, a remedy in infant cholera, a disinfectant, an external application for foul sores, an excellent preventative against epidemics, and useful in cases of hysteria. It has been often found superior to quinine in malarial fever, and some doctors consider it almost a specific against typhoid, and of great benefit in yellow fever, sometimes succeeding when all other remedies have failed. During the cholera plague in New York in 1835, the physicians of that city issued a manifesto urging the people to use no other drink but strong, pure coffee to keep the system healthy, and render it less liable to the disease. Professor Beer, an eminent Vienna oculist, maintains that, pure, hot, freshly made coffee is very invigorating to the eyes," but attributes many eye troubles to the use of chicory.

According to Walsh, the great absorbent power of coffee makes it a good barometer. On the eve of a storm the beans become damp and can only be ground with difficulty. Moreover, if the air-bubbles liberated by the solution of a lump of sugar in a cup of coffee, collect in the middle of the cup, it will be a fair day; if they adhere to the sides of the cup, leaving the center free, rain is at hand; if they are irregularly scattered over the surface, the weather will be changeable.

The pulp of coffee berries may be fermented to make a liquor like arrack; the dried husks are infused; the wood of the tree is highly prized for engraving and printing; the smaller branches make good walking sticks; a magnificent dye can be prepared from the alkaloid of the fruit; and if anyone is greatly in need of anything else, the coffee-plant in some of its parts will surely show itself equal to the demand.

Washington, D. C.

A SAND DUNE FLORA OF CENTRAL ILLINOIS.

By Frank E. McDonald.

IN the very heart of the prairie state of Illinois is a sandy barren with features of vegetation as characteristic as the sand dune flora of the Great Lake region. This sandy waste begins a few miles below Beardstown in Cass Co., and extends to a few miles above Havana in Mason County parallelling the Illinois river and from six to ten miles in width.

It appears to have been the ancient bed of this stream. In a botanical way this region seems to have attracted more attention in an early day than in late years. Sometime in the 40's Carl Geyer, a German botanist collected in the vicinity of Beardstown. He obtained one species, that has not as far as I know been collected in the state since—*Trautvetteria palmata*. In Patterson's Catalogue of Illinois Plants this species is credited to Dr. Mead, and locality noted thus, "In moist ground along a branch of the Sangamon river, near the Mounds, about three miles northeast of Beardstown, Cass County." In Mead's herbarium all of the specimens of this plant are of Geyers collecting and from this locality; so, presumably, Geyer is the only botanist that ever obtained it in Illinois. I have made efforts to identify the locality, and rediscover the species but so far without avail. The same collector obtained the type specimens of Euphorbia here. Dr. Mead and Elihu Hall collected here in a latter day.

As there is little in this sandy waste to tempt the agriculturist, in its botanical features it probably is very much the same as fifty years since. In the past few years I have had opportunities for collecting in this region, that enable me to speak in a general way of its botanical features. In its physical features it presents a dreary uninviting appearance.

It is a dry sandy plain, intersected here and there with swales, that retain sufficient moisture the year around, to support a luxuriant aquatic vegetation, with which this article has not to do. The barrens proper, are composed almost wholly of clear sand, so loose and shifting as to be taken up and swept along with every passing breeze. In early spring, sand storms are frequent, when so dense is the flying sand that one can scarcely see a hundred feet distant. Where the winds have full scope dunes are formed, especially noticeable near

Arenzville in Cass Co., where there are conical shaped hills of pure sand over a hundred feet in height.

While the flora of this region cannot be termed rich, it is certainly peculiar and characteristic when compared with the usual prairie flora of the Illinois Valley. The only arboreal vegetation, are groves sometimes of considerable extent, composed solely of *Quercus Marylandica*, an oak characteristic of a barren soil. The underbrush is restricted to seedlings of the above and *Rhus aromatica*.

From a botanical standpoint these wastes appear at their best in the spring and early summer, when abundant rains bring forth a varied herbaceous flora. An early bloomer and a common plant is *Phlox bifida*. It is of a bushy spreading habit covered with a profusion of star-like flowers, varying through all shades of lavender to white. It grows here under the same conditions as it grows along the sandy shores of Lake Michigan. Near Peoria, it confines itself to the precipitous rocky sides of deep defiles. With in can be noted, *Viola pedata*, *Draba Carolinana*, *Arabis lyrata* and *Astragalus distortus*. *Baptisia leucophaea* is a conspicuous object with its ample racemes of showy cream colored flowers almost reclining on the sand. Passing over many common species that help to enliven these wastes in early spring, we will pass on to June when *Erysimum asperum* comes into flower. It is not reported from elsewhere in Illinois, but here it must find a congenial home as it is very abundant. With its wand like sten, frequently four feet in hight, terminated by a raceme of most intense orange colored flowers, it makes a very effective bit of color in these barren wastes. It is a showy plant and very easy and deserving of cultivation.

With it grows *Lithospermum hirtum* equally intense in color. In charming contrast, is *Callirhoe triangulata* with its showy purple blossoms. *Desmodium Illinoense* is common, growing on the barrenest of knolls. This species is so markedly distinct that it is surprising that it remained undescribed until a comparatively recent date. Its peculiar spike like racemes, often two feet in length, alone distinguish it from any other species. It is our earliest flowering Desmodium, commencing to bloom the fore part of July. I have met with it in widely separated localities in Illinois, and have always found it growing under the same conditions. It delights in an abundance of sunshine, and a sandy soil, while our other species prefer a rich soil and usually shade. Growing with above will be noticed *Tephrosa Virginiana*, *Desmanthus*

brachylobus, *Coreopis lanceolata*, *Ranothus Americanus*, *Crotalaria sagittalis*, *Strophostyles paucifloras*, *Cassia Chamaecrista*, *Asclepias obtusifolia*, *Oenothera rhombipetala*, *Cuphea viscossima* and *Opuntia Rafinesquii*. *Chrysopsis villosa* puts forth its first golden blooms in early July and continues in flower until cut down by frost.

August brings forth three conspicuous sunflowers, *Helianthus occidentalis*, *rigidus* and *mollis*. *Artemisia caudata* with its immense panicles is a prominent object.

With these are noticed *Liatris pycnostachya*, *scariosa* and *cylindracea*, *Crotonopsis linearis*, *Monarda punctata*, *Cyperus Schweinitzii* and *Lespedeza capitata*. *Croton glandulosus* is very common; *C. capitatus* sparingly.

September ushers in some things that deserve special mention. *Brickellia Floridana* and *Cycloloma platyphyllum* are paramount They are everywhere. The latter is a good example of a tumble weed. When growing out in the open by itself, it assumes a bushy globular form, frequently two feet across, and after the frosts a passing breeze snaps off the brittle stem, and it goes bounding along, until it brings up in a fence corner, where with others it forms a pile as high as the fence. A characteristic group of "sand grasses" invite attention at this time, namely: *Sporobolus asper*, *Calamagrostis longifolia*, *Aristida tuberculosa*, *Cenchrus tribuloides*, *Boutelona hirsuta*, *Paspalum setaceum*, *Panicum autumnale* and *Eragrostis tenuis*. The last named deserves special mention. It frequently grows over large areas to the exclusion of every thing else. The tall slender stem is terminated with a large spreading panicle of numerous spikelets on capillary pedicels. The spikelets dance to the slightest zephyr as if endowed with life, and to see a field of this grass swaying and bending to every passing breeze, is a sight that would appeal even to one that is not a "weed crank" like the author.

Peoria, Ill.

The wide popularity of Henry Wallace's *Letters to the Farm Boy* has led to its complete revision by the author and the publication of a third edition by the Macmillan Company. As is well known this book is by a plain common-sense writer expressed in language of which Defoe or Bunyan would not have been ashamed. It is intended to give a healthy sound talk to boys who, by-the-by, in spite of the book's title are likely to belong to many other occupations than that of farming.

DOES THE CATCH FLY GRASS CATCH FLIES.

By C. F. Saunders.

IN low damp grounds of our southern states grows a grass (*Leersia* or *Homalocenchrus lenticularis*) with round, flat spikelets, edged with strong teeth-like bristles—a combination somewhat on the plan of a steel trap. Frederick Pursh, who was one of the pioneers of botanical researches in this country, and who, in 1814, published a work on the plants of North America, has left a record, an interesting observation concerning this plant. He says: "This singular and elegant grass I found on the islands of Roanoak River in North Carolina, and observed it catching flies in the same manner as *Dionæa muscipula;* the valves of the corolla are nearly of the same structure as the leaves of that plant. I communicated specimens with this particular circumstance to Dr. B. S. Barton of Philadelphia, who has made mention of it in a paper on the irritability of plants."

Professor Gray, writing his Manual a generation later, seems not to have observed this curious phenomenon himself, for in his description he remarks cautiously of the glumes, "*said* to close and catch flies." Still a generation later, comes the Illustrated Flora" of Britton and Brown, who, regardless of the testimony of Pursh, say nothing whatever of the plant's trapping propensities.

It would be interesting to know what may be said on the subject by modern observers. Can any reader of The Plant World who knows the grass in its home, confirm Pursh's recorded observation?

Philadelphia.

PRIMULA MISTASSINICA.

By E. J. Hill.

IN 1889 I found this plant on the trappean rocks by the northwest side of Presque Isle, Marquette, Michigan. These rocks form a table-like mass raised a few feet above the level of Lake Superior. They are eruptive in character, of a very dark or nearly black magnesian-serpentine, variegated in places by narrow veins and thin lines of calcite and other light colored minerals, being a complex of several ingredients. They weather to a very rough surface abounding in small cavities or hollows, and are mostly bare of vegetation. In some of

the cavities a soil had been formed and plants are growing. Little cup-like hollows that were dry, and sometimes scarcely larger than one's fist, hold such plants as *Solidago juncea* and *Triodium subspicatum*. Larger and deeper bowl-shaped hollows contained water in addition to the soil, or were very moist. The water made a little muddy pool at the bottom of the shallow cavity. A different plant society had established itself under these hydrophitic conditions. It was mainly composed of *Primula Mistassinica*, *Pinguicula vulgaris* and *Scirpus cæspitosus*. The *Primula* and the *Scirpus* were rooted in the soil, the *Pinguicula* grew on the more naked sides of the bowl near the edge of the water. These hollows were kept well supplied with moisture by rains, and being generally near the edge of the mass of rock when they had these three plants, would readily be sprinkled with spray from waves dashing against its vertical sides, or when the waves ran high would get a heavier bath from the broken crests. The three plants, being wet rock and swamp species, found in these hollows a congenial home.

Chicago, Ill.

SOME NAMELESS PLANTS.

By A. H. Curtiss.

ONE source of vexation to travelling botanists is the finding of plants which, while presumably new to science, are undeterminable because of the entire lack of flowers or fruit. In Florida I have met with a number of plants of this sort and most of them still remain unnamed.

The most remarkable of these plants grows on the southern edge of the Everglades. It appears to be entirely leafless as well as flowerless, being mostly a thick green vine running about among grass and bushes, and resembling nothing so much as the slender green snake which is frequently seen in Florida gliding through bushes or dropping from branches of trees. What might be termed rudimentary leaves are found in a few brown bract-like scales. In 1881 I sent a specimen to the Department of Agriculture, and Dr. Vasey suggested that it might be *Vanilla planifolia*. I was told that the same plant is rather common in the Bahamas, and I presume it is identical with an unnamed plant mentioned in Baron Eggers' Flora of St. Croix and the Virgin Islands, but of slenderer growth. It is described as follows:

"A supposed Aroidea with an immense, nearly aphyllous, climbing, terete green stem, about 100′ long, 1″ diam., with scaly, early deciduous leaves and aerial roots resembling those of Vanilla." One might guess that a plant of this description belongs to the large genus Philodendron, but it is going far enough in the way of conjecture to call it an Aroid. I think the Florida plant has some aerial roots, but my memory is not clear on that point.

Another interesting plant of the Florida coast which has not been identified appears to be a cypress. It grows on the sand ridges next the sea south of Jupiter Inlet. It has a stout, horizontal stem growing about two inches below the surface and sending up numerous scaly branches which bear rosettes of short leaves at the surface. A specimen brought to the surface reminds me of a miniature row of palms.

Another plant of the same habit as the last and which has never been seen in flower or fruit, is evidently an Halophila. It grows among sea-weeds, "along the West coast of Florida" according to Chapman, but also on the South and East coasts. Twenty years ago I sent specimens to Dr. Englemann for study. He was much interested in it, and a year or two later it was formally named *Halophila Englemanni*.

The habit of extensive multiplication by other means than seeding tends to a corresponding abatement of flower and seed production. This is perhaps sufficient explanation of the sterility of the two plants I have mentioned. Other examples are found in the cane (Arundinaria) and the grass too well known in Florida as "maiden cane", so named because of its stability and its resemblance to cane, especially in its pernicious habit of spreading by deep stolons in cultivated ground. It was impossible to give a botanical name to this grass till ten or twelve years ago when an observer in South Florida produced some specimens evidently of "maiden cane," with well developed inflorescence identical with that of *Panicum digitarioides*. I was the less surprised at this proof of identity because of having observed that this Panicum ceased to flower after the partial drainage of a swamp although seeming to grow as vigorously as before. Dry land seems to completely sterilize it. Analogous cases are found in *Smilax glauca* and *Hamamelis Virginica* which are abundant on dry ground, but produce flowers only in moist locations.

About fifteen years ago while attending the forestry congress at De Funiek Springs, in West Florida, I found a strange plant growing

in the edge of the pond in the centre of that town and showed it to Mr. Chas. Mohr, who was there also. Neither he nor I nor Dr. Gray, to whom I sent specimens, could guess its identity, there being no vestige of flowers or fruit. Three years ago I revisited the locality, but the nameless plant had disappeared.

On the eastern coast of Florida, at points a hundred miles apart, I have found an epiphytic orchid which remains nameless for the same reason.

As this may be considered a subject not deserving much space I will not enlarge on it further than by describing a curious incident of my botanical experience in Piedmont, Virginia. Two years before my removal to Florida (in 1873) I came across a vigorous young tree which I could not identify, there being no flowers or fruit and the foliage being strange to me. I sent specimens of it to three of the most eminent botanists of that time asking their opinions. One guessed Quercus, another Ilex, and the third Ericaceae. The last proved to be the correct guess, for the tree came into flower the next year, and I saw at a glance that it was a narrow leaved *Oxydendrum arboreum*, a tree abundant there and quite uniform as to foliage. I never revisited the locality, but have often wondered whether that was the beginning of a new species or the end of an old one, or only an accidental variation. But what of the outcome of such accidents?

ETYMOLOGY OF COLUMBINE.

By C. F. Saunders.

THE derivation of the word Columbine has been the subject of considerable speculation, and does not appear to have ever been surely solved. That it was from the Latin word *columba*, a dove, is generally assumed: but just what the connection is between the bird and the flower constitutes the rub. Under the word *columbine*, Webster's dictionary says "so called from beaklike spurs of the flowers". Prior, in his authoritative "Popular Names of the English Plants", elaborating on the same idea, attributes the name to the resemblance of the plant's "nectaries to the heads of pigeons in a ring round a disk, a favorite device of ancient artists". The Century dictionary adopts this explanation in its entirety; and Britten & Holland, authors of an exhaustive "Dictionary of English Plant names", cannily avoid the issue by venturing no explanation whatever.

The idea of "pigeons in a ring round a disk" is not very convincing, and it would be interesting to know if anyone has suggested a

derivation from the Latin *columbarium*, a dovecote. The flower of the columbine when regarded full in the face, presents a cluster of five round apertures—the mouths of the funnel shaped petals—which might have given to some imaginative mind in the past, the idea of resemblance to the abode of doves.

Philadelphia.

THE PRESERVATION AND PROTECTION OF NATIVE VEGETATION.*

By William Trelease.

IN conclusion, I wish to ask attention for a few minutes to a matter of prime interest to all botanists, since it will probably affect the very prosecution of many of their studies before the next century shall have been closed. I refer to the protection and preservation in every possible way of our native and natural vegetation. To the systematist, the physiologist, and the morphologist, this is alike of importance. Agricultural lands, in the main, of necessity must have their native plants replaced by others if the latter are more valuable to man, as surely as grazing lands have been stocked with cattle after the extermination of the less useful bison. But the erection of an agricultural practice, based on a preliminary clearing of the ground, is quite different from the denudation of the land without further purpose than the utilization of its native products. Primarily the question is an economic one and as such it interests the community at large; but it is also a question of the deepest concern to science. Climatology, the past, present and future geographical distribution of animals and plants, and ecology and evolution are so clearly connected that their devotees possess a common interest in the preservation of natural conditions at least until the factors in biologic nature shall have been directly ascertained and correlated; and I need scarcely add that what has thus far been done in this direction is little more than a rough blocking out for the future. Hence it is that local societies for the protection of animals and plants are worthy of general support in their efforts, and that the widespread forest protection movement, which is too commonly looked upon as simply an economic or sentimental matter, should receive the united encouragement and support of naturalists and meteorologists as a movement the success of which alone can perpetuate for any great time the conditions upon which much of their profounder study is to rest. It is to be hoped that whatever action may be taken shall rest not upon hasty impulse, but upon such recognition of the vast scientific as well as utilitarian importance of this movement as shall ensure the permanence of our interest in every step of the kind which may originate in the future.

*From "Some Twentieth Century Problems," address of the Vice-President of Section G (Botany) of the American Association for the Advancement of Science, given at the recent New York meeting.

EDITORIAL.

Mr. Charles Louis Pollard and Mr. William R. Maxon of the National Herbarium left Washington on July 7th for a two month's collecting trip through the Southern States. They will stop first at Auburn, Alabama, from which point they will make a trip by wagon through the northern part of the state. They will also visit the mountains of Tennessee, West Virginia and Georgia.

We note with regret that our contemporary *Erythea* was discontinued with the close of Volume VII, pressure of other duties on the part of the editor compelling its abandonment. However, Pacific coast botany is not to be unrepresented for *Zoë*, which has been undergoing a case of suspended animation for several years, now begins Volume V under the editorial supervision of Mrs. Kathrine C. Brandegee. This latter journal was always a spicy organ, and we are glad to welcome it again.

Another paper by the excentric botanist Rafinesque has just been brought to light by James Britten, and is republished in full in the June number of the *Journal of Botany*. It is a review of the encyclopædia of plants of Loudon, Lindley and Sowersby, published in 1832. It is written in his characteristic style and makes numerous corrections and changes of names, some of which may affect certain North American plants. As a very distinguished scientist once said of Rafinesque: "It would have been better for science had he never been born."

NOTES AND NEWS.

Rhodora for June contains a sketch of the late Edwin Faxon and is accompanied by a fine artotype portrait. Mr. Faxon is another example of a business man who yet found time to prosecute science.

In *The Asa Gray Bulletin* for June Mr. Shear continues his technical account of our puff-balls. There are also articles on Gradening in the Missouri public schools and the flora of a neglected dooryard.

The Canada thistle is made the subject of a recent circular by L. H. Dewey issued from the Division of Botany of the Department of Agriculture. It gives a complete history of this weed with its present distribution, methods of eradication, etc. It used to be supposed that this thistle was indigenous in western Canada, but Mr. Dewey is of the opinion that it was all introduced at a very early date and spread rapidly over Canada and New England.

Some idea of the agricultural productions of this country may be gained by a glance at the statistics for 1899 is recently published by the Department of Agriculture. Of corn the product was 2,078,143,938 bushels; wheat 547,303,846 bushels; oats 795,177,713 bushels; barley 73,381,563 bushels; rye 23,961,741 bushels; buckwheat 11,074,473 bushels; potatoes 228,783,232 bushels; cotton 11,189,205 commercial bales. The value of this entire product is something fabulous.

In the Torrey Bulletin for May there are a number of systematic articles of interest. Mr. E. P. Bicknell describes the British American species of Sisyrinchium, recognizing 8 species of which one is new. The North American Willows of the longifoliae group are made the subject of a careful article by Prof. W. W. Rowlee. He recognizes 12 species of which several are described as new. Prof. Aven Nelson describes some 20 new plants from Wyoming, and Dr. Small describes about a dozen new forms from various localities. The number also contains articles on fungi, mosses, etc.

The commercial growing of carnations, which has assumed large proportions in this country within the last few years, has received a serious check on account of a very destructive disease known generally as bacteriosis from the fact that bacteria were supposed to be the cause. The subject has been under investigation for some time by Mr. Albert F. Woods of the Department of Agriculture, and the results of his study has just been published as Bulletin 19 of the Division of Vegetable Physiology and Pathology. He concludes that, while bacteria are often present in the diseased areas, they have nothing to do with the real causation of the trouble, which results from the punctures made by aphids, thrips and red-spiders. It is believed that the insect injects some irritating substance of an acid nature into wound, and that this substance inteferes with the nutrition of the cells by destroying the chlorophyll. Mr. Woods proposes the name of Stigmonose for this disease.

"Practical Tree Planting in Operation" is the title of a recent bulletin by Prof. J. W. Toumey, issued by the Division of Forestry, Department of Agriculture. In July, 1899, the Division of Forestry issued a circular describing a plan of cooperation by which practical assistance was offered to persons desiring to establish woodlots, shelter belts, wind-breaks and other plantations of forest trees. Under the provisions of this circular the Division of Forestry offered to send expert tree planters to examine the land and prepare a plan for planting. Thirty-three working plans of this kind have been prepared and the present Bulletin gives the results attained, or rather outlined, as well as much valuable information regarding what has been accomplished during the past few years along these lines. This Bulletin should be in the hands of all residents of the vast treeless region of the West, where much may be done, when intelligently undertaken, to provide a forest covering. The Bulletin is illustrated by numerous plates showing successful and unsuccessful results.

BOOK REVIEWS.

BULLETIN OF THE NEW YORK STATE MUSEUM. Report of the State Botanist, 1898. By Charles H. Peck. *Albany, Univ. of the State of N. Y.*, 1899. Price 40 cents.

The present report, which is dated October 1899, contains among several interesting features, a list in parallel columns of 608 species known to occur within the state which bear different scientific names in Britton & Brown's Illustrated Flora and Gray's Manual. Mention is also made of 46 species of fungi which are described as new. Several pages are devoted to an interesting discussion of the flora of the open summit of Mt. Marcy, an Adirondack peak 5,344 feet high and the loftiest of the state. Descriptions of twelve additional edible mushrooms complete the pamphlet, the colored plates being issued separately in folio forms. The report is one of the best of recent years.—W. R. M.

PFEFFER'S PHYSIOLOGY OF PLANTS. Second edition. Translated and revised by E. J. Ewart. Vol. I. Oxford. The Clarendon Press. Price $7.00.

Professor Ewart has certainly rendered a very great service to English speaking students by the translation of Pfeffer's splendid work. From the appearance of the first edition in 1880 it has been the standard, but the difficulty of the original German has made its use, until now, a matter of considerable difficulty. As Pfeffer took occasion to say, this work is not intended as a text-book for beginners, but as a hand-book containing a complete account of the present state of our knowledge concerning the general processes of metabolism and the sources of energy in the plant. Inasmuch as investigation is advancing rapidly along these lines new editions become necessary in order to properly bring the subject abreast of information. This has been done both by the author and the translator, and it may be taken as representing the present status of the subject.

From the side of the book maker's art this volume is perfect. The paper, typography and binding are ideal for a work of the kind, although the consequent price may prove more or less of a drawback to its widest circulation.—F. H. K.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. AUGUST, 1900. NO. 8.

WHEN INCREASE IN THICKNESS BEGINS IN OUR TREES.

BY GEO. T. HASTINGS. PRESENTED BY W. W. ROWLEE.

AS far as could be ascertained no special attention has been given to the time when increase in thickness takes place in our trees. One finds only such general statements as this*: "The inner portion of any one annual ring—is found in the spring; while the outer portion—has arisen towards the conclusion of the period of wood forming activity."

Interest in the subject was aroused by the work of one of the students (Miss Hopkins) in the laboratory at Cornell last year. Twigs were gathered from several trees at weekly intervals through the spring and preserved in alcohol and sectioned during the winter; the object being to find when the cambial activity began. The results were decidedly contradictory; one twig cut early in May might show good cambial growth, while another, cut a week later, might show none. To account for these results it was suggested that the growth might begin at different times according to the location of the branch and the distance of the piece sectioned from the terminal bud.

To test this hypothesis six species of trees differing widely in their structure were chosen. They were *Acer negundo*, *Acer rubrum*, *Pinus Strobus*, *Quercus velutina*, *Salix fragilis*, and *Tilia Americana*. Twigs were cut from these during April, May, and June; each time selecting the terminal shoot from a large branch, often also the terminal shoot from one of the most vigorous upper branches, and sections made of the 1, 2 and 3 year old twigs, or a 5 or 6 year twig, and at the same time a piece was cut from the trunk and sections made from

*Sachs, Physiology of Plants. 1887, p. 162.

it. Most of the sections were stained with hæmatoxylon, but the best results were obtained by staining first with methyl blue, washing and staining lightly with hæmatoxylon; by this means the wood with thickened, lignified cell walls took a clear blue color, while the newly-formed, unlignified cells took a lavender color.

It was found that in the broad-leaved trees examined no increase in thickness took place until the buds had opened and the first leaves expanded; that the first formation of new wood was in the neighborhood of the terminal bud; that the first growth was not continuous around the stem, but of vessels and tracheids in irregular groups: that the growth was continued gradually from the 1 year twig to the 2 and 3 year twigs; and that when the new wood begins to form on 5 and 6 year twigs the process becomes very rapid, seeming as if at that time growth began simultaneously over the whole tree. Growth usually begins and extends more rapidly on the upper more exposed limbs, sometimes a week before any sign of growth can be seen on the lower limbs.

In the Pine an apparent exception was found, for increase in thickness began on 2 and 3 year twigs before it had begun on 1 year twigs and before the buds had opened. By the time the buds were well opened the growth had extended from the terminal shoot down the trunk and growth was just beginning on the lower branches. This seems to be due to the leaves remaining on the twig for 2 or 3 years, the growth begins earlier and a little back from the terminal bud and from there extends down the trunk as in other trees. In the Hemlock, which holds its leaves for 6 or 7 years, the growth, when examined about the end of May, was greatest on 6 year twigs and decreased up to the 1 year twigs where the growth was slight. On one of the deciduous Gymnosperms, the Bald Cypress (*Taxodium distichum*), the conditions seem to be as in the broad-leaved, deciduous trees; no growth in thickness begins till the leaves are expanded and then it begins at the younger branches and extends back to the older ones.

From the few observations made upon roots it seems probable that increase in thickness begins later than in stems and takes place more uniformity, though as in the stems it begins at the tips.

That the cambium is active before new wood begins to form is shown by the readiness with which the bark peals.

With the Willow the buds were opening on April 23 but no growth had occurred. Two weeks later, May 8, the buds were well

opened and the catkins in flower; growth was well started on the 1 year twigs and a ring of wood mostly of 1 layer of vessels thick was formed over the whole twig but no increase had begun on the 2 year twigs. On May 14, growth had extended to the 2 year twigs and the wood on the 1 year twigs was 2 or 3 vessels thick.

On May 22, growth was well advanced on the 1 and 2 year twigs, about 2 vessels thick on the 3 year and just beginning on the trunk, where a few thin-walled cells had been cut off by the cambium. On the root slight growth had taken place on 1 and 2 year rootlets but older ones showed none. On June 2, the growth on the trunk was considerably greater but none of the cell walls were thickened, and the older roots showed slight amounts of new wood. On June 15, when the twigs seemed to have nearly reached their full length by comparison with the lengths attained in previous years and by the number of leaves borne, the first elements formed on the trunk had thickened lignified walls.

With the Box Elder the buds were opening on April 30, and new wood was forming within 5 or 6 mm. of the terminal bud. On April 30, the buds were well opened and the first tow leaves expanded, and at this time the growth is continuous around the stem for 15 cm. below the bud; farther down the growth is irregular and on 2 year twigs none has occurred. On May 7, the growth had extended over the 2 year old twigs and was beginning to form on the 3 year old twigs. On May 31, traces of new growth could be seen on the trunk, and on June 12 the new wood on the trunk was thicker than on the twigs; on the 15th the twigs had nearly reached their full leangth and the new wood on the trunk was nearly all lignified.

With the Red Maple the flower buds were fully opened and the leaf buds beginning to open on April 24th, but no new wood had been formed. On May 10th, two pairs of tiny leaves had expanded, and traces of new wood were found within 2 mm. of the bud. On May 29, a ring of wood of a layer of vessels has been formed over the 1 year twig, and growth had begun on the upper parts of the 2 year, while not till the middle of June was growth evident on the trunk, and then no new wood had been formed on the older roots and very little on the young roots.

With the Basswood the buds did not open till the first week in May, but the progress in wood formation was the same as in the other cases.

Quercus velutina more than the others showed a much earlier start on the upper part of the tree than on the lower. On May 15, the upper branches had the buds well opened, and the growth extended to the 3 year twigs, while the lower branches had the buds but slightly opened, and the growth was just beginning on the 2 year branches. In other respects this resembled the other species.

With the Pine the first new wood was observed on May 19, when the buds were just opening, and the growth was much greater on 2 and 3 year twigs than on 1 year. On May 31 new wood, all thin walled, was found on the trunk, but on the lower branches growth had only extended to the 5 year branches. On June 20, the new growth was found on all parts of the tree, and the wood of the trunk had thickened cell walls.

JUDGING BY THE FRUITS.

By Byron D. Halsted.

THE present season the writer changed the text book with an elementary class in botany from Gray's Lessons to Coulter's Plant Relations. It was an experiment that has been watched with much interest.

The work with plants has been as nearly the same as possible, all being required to become familiar with and pass an examination upon twenty-five species representing several typical orders. Of course it is impossible to have the same student take both courses, and the nearest to that is to select two brothers who are very much alike and present the written work of each as done upon examination day.

The list of questions for 1899 from Gray's Lessons is as follows:

"Define:—1. Embryo. 2. Germinate. 3. Node. 4. Axil. 5. Hypogaeous. 6. Endosperm. 7. Bud. 8. Growth. 9. Secondary Root. 10. Parasites. 11. Winter Annuals. 12. Tendrils. 13. Peltate Leaf. 14. Leaflet. 15. Phyllodia. 16. Cladophylla. 17. Umbel. 18. Cyme. 19. Symmetrical Flower. 20. Dioecious. 21. Adnation. 22. Perigynous. 23. Diadelphous. 24. Versatile. 25. Compound Pistil. 26. Aggregate Fruit.

Draw:—27. Rose Leaf. 28. Tuber. 29. Section of Exogenous Stem. 30. Under Skin of Leaf.

Consider at Length:—

31. Describe ⅜ Phyllotoxy.

32. Prove that Flowers are Altered Branches.

33. How are Flowers Cross-Fertilized?

84. What is the function of Chlorophyll?

35. Write upon Plant Work and Movement."

The answers are as follows: Of course those of 27 to 33 are drawings and not reproduced.

1. An embryo is a plant as it is in the seed. It generally shows the cotyledons and stem.

2. To germinate is to grow from the seed. A plant germinates when placed under favorable conditions, the embryo bursts forth from the seed and begins to grow.

3. The node is the place on the stem of a plant where flowers and branches are produced.

4. The axil is the joint where the flower or branch is joined to the the stem.

5. The term hypogaeous is used when a plant comes from a seed with which the cotyledons remain under the ground.

6. The endosperm is the albuminous matter within a seed which supplies nourishment to the young plant when it first begins to grow and before it is able to obtain nourishment itself.

7. A bud is an undeveloped flower or branch. A flower bud contains all the parts wrapped up within it. A leaf bud is a bundle of leaves rolled together.

9. Growth is the producing of flowers, seeds, fruit, leaves, branches, etc., and a preparing for the winter season.

9. A secondary root is one which comes from the stem.

10. Parasites are plants which live on other living plants. Some attach themselves to the trunk of a tree and derive their nourishment from within the trunk. Others fasten themselves to the underground roots of trees.

11. Winter annuals.

12. Tendrils are leaves or branches altered so as to be able to fasten themselves to other objects in order to hold the plant. They fasten themselves either by disks or by twining around the object.

13. A peltate leaf is one which has numerous little holes in itself.

14. A leaflet is one of the parts of a compound leaf.

15. Phyllodia is the term used when a petiole broadens and becomes leaf-like in form.

16. Cladophylla means branch-leaves. This refers to the broadening of a branch and becoming leaf-like in form. The flower is born upon the surface of the leaf-like branch.

17. An umbel is a group of axillary flowers which have their peduncles rising from the same place and so lengthened as to cause each flower to be level and formed into a circle.

18. A cyme is a bunch of terminal flowers. From the terminus of the plant the flowers branch out and form a spherical shaped group of flowers, of which the oldest are in the center.

19. A symmetrical flower is one which has its parts in equal numbers or multiples of the number.

20. Dioecious is used when the male and female flowers are born on different plants of the same species.

21. Adnation is the union of unlike parts of a flower.

22. Stamens are perigynous where they are around the pistil and are born upon the calyx.

23. Diadelphous means two brotherhoods. It refers to the stamens when they are joined into two groups.

24. When an anther is fastened to the filament at about the center thus allowing it to move easily it is said to be versatile.

25. A compound pistil is one which has more than one set of ovules.

26. An aggregate fruit is one composed of several flowers joined together to form one fruit.

31. $\frac{3}{8}$ Phyllotoxy means that the ninth leaf is over the first, that it takes 8 before one is met which is directly over the one begun with, also that the leaves encircle the stem three times.

32. Flowers are altered branches because they are borne in the same place as branches. The sepals are like leaves in color and shape. The petals are like leaves in shape. Some plants show the transition between sepals and petals. Others show the transition between stamens and petals, and still others between pistils and petals. The different parts of the flower are borne on the torus or receptacle in the same way as the leaves are borne on the stems or branches.

33. Flowers are cross fertilized by having the pollen carried by the wind or by insects. Some have long stamens and short pistils while others have long pistils and short stamens so as to facilitate the carrying of pollen.

34. Chlorophyll breaks up the carbonic acid gas which the plant

takes in, prepares the carbon for the use of the plant and sets the oxygen free.

35. Some of the lowest orders of plants have the power of moving, especially those living in water. Some are long, thin in shape, thus facilitating locomotion. Plant work is to use the waste matters of man, to supply food for him, and to serve him in many other ways. Man would not be able to live without the plants which use the poisonous gas he emits, purifying the air, and also furnish oxygen.

The following are the questions for the examination for the class of 1900.

1. What are the Conditions for Germination?
2. What are the Uses of the Plant Organs?
3. How are Petioles sometimes Modified?
4. Contrast Transpiration with Respiration.
5. How is Mesophyll Protected?
6. Give Instances under the Three Types of Stems.
7. Describe Section of two year old stem—Dicotyledon.
8. How may plants Ward off Enemies?
9. What is Velamen?
10. Name (1) a Plumed Seed; (2) Winged Seed; (3) Barbed Seed.
11. How may Hydrotropism be shown?
12. What is the Meaning of Protandry?
13. What are Parasites?
14. Why do we have Early Flowering Herbs in Rich Woodland?
15. What are Carnivorous Plants?
16. What are Gametes?
17. What are Xerophytes?
18. How may a plant Prepare for Winter or Drouth?
19. Compare a Cactus Desert with a Thicket.
20. What are some of the Characteristics of a Prairie Flora?

The brother, presumably a year younger at the time of examination than the student whose answers were previously given, replied as follows:

1. For Germination there is required heat, moisture, and oxygen passing between the soil particles. The heat is obtained from the warmth of the soil itself and the moisture comes from the soil where it is contained as adhesive water or soil water. The oxygen passes through the little spaces between the soil particles.

II. The root is used to take the nourishment from the soil in the form of water and chemical elements. The stem is used in most plants as a medium of support and for carrying the food from the roots. The leaves are the organs of respiration, photosynthesis, and transpiration.

III. The petioles are very often lengthened at the base so as the lower leaves may not be shaded by the upper ones; but each may have all the light necessary for light relation.

IV. In transpiration the leaves give off moisture and in respiration the leaves take in oxygen and give off carbon dioxide the same as animals do.

V. The mesophyll is protected by the epidermal skin on the out side of the leaf. In the upper portion of the leaf the cells are raised on edge making a palisade tissue and also protecting the mesophyll. When water is scarce and the heat and light very intense the palisade tissue is often raised all over the leaf.

VI. The three types of stems are those bearing foliage leaves, those bearing scaly leaves, and those bearing floral leaves. An illustration of the first type is the maple tree, an illustration of the second type is the cactus, and an illustration of the third type is the buttercup.

VII. In a two year old stem-dicotyledon, there are four different divisions. In the center is the pith, about this is the vascular tissue with two rings indicating the number of seasons which the plant has been growing, next is the cortex or a green fibry skin under the epidermis which follows and is on the outside.

VIII. Plants ward off enemies by six different means. These are (1) by hairs, (2) by glandular secretion (3) by isolation, (4) by latex, (5) by protective forms, and (6) by protective closure.

IX. Velamen is the mossy or moss-like substance which grows on the roots of air plants.

X. The seed of the milkweed is a plumed seed. The seed of the basswood is a winged seed. The beggar's trick is a barbed seed.

XI. Hydrotropism may be shown by the following experiment. Take a small box like a cigar box and remove the bottom and put on instead some wire gauze and fill it with soil. If a seed is planted and germinates, the roots will come through and project beyond the wire: but if the ground is well saturated the roots will turn again and curve

around towards the soil and finally go in it, thus showing the influence of water or Hydrotropism.

XII. Protandry is the name give to that case in the flower pollination when the pollen is ready for distribution; but the stigmas are not yet ready to receive it.

XIII. Parasites are those plants that live on other plants called hosts. They attain from the hosts all their nourishment, getting it either from the limbs or from the roots of other trees.

XIV. We have early flowering herbs in rich woodland; because if they came late they would be entirely shaded by the heavy foliage and so could not thrive. So only by flowering early are they able to have sunlight.

XV. Carnivorous plants are those which, on account of the lack of protein or other substances in the soil, capture insects and get these substances from the bodies of the insects.

XVI. Gametes are the two germs which come together to form an egg in reproduction.

XVII. Xerophytes are plants which belong to that society which inhabits a dry and hot region. They inhabit a region where there is much light, a great scarcity of water, where there are dry winds, and where the air is always hot.

XVIII. Plants prepare for winter or drought, in many different ways. Some like the compass plants and others assume profile positions, in respect to the leaves, that is a position in which the leaves are set edgewise. Some fold their leaves up while some shed their leaves altogether. Some assume protective positions in the leaves by means of the palisade tissue and others by means of the hardening of the epidermis, thus forming the cuticle. Some plants dry up and become crumbled, but at the appearance of moisture come again. Other plants dry up in respect to the stem, while only the roots remain in the ground until there is moisture or heat again.

XIX. In a cactus desert the cacti of all kinds are scattered all about with their prickly forms everywhere in the way. There is almost nothing else for nothing else will live in this hot, rocky soil.

In a thicket there are quite a good many kinds of plants. There are small trees and under these are tall herbs and then small herbs in the undergrowth. There are also many briars and mosses and weeds making the way almost impassable.

XX. In a prairie the principal plants are the grasses which are

very widespread. There are no trees and no tall plants. Intermixed with the grasses are low heavy weeds which give a dark appearance to the prairie where there are a few of them clustered together. There are however usually few and scattered about among the lighter colored grasses.

It is due myself to state that there was no thought of making any public mention of the above facts, and nothing has been done for "stage effect". The thought of setting the old up against the new only occurred when the latter pile of examination papers were being read.

The interested reader, if there is one and the hope that there would be is the only reason for this paper, is left to conclude as to the better course without any word of comment from me.

RHODODENDRON FORESTS OF THE HIMALAYAS.

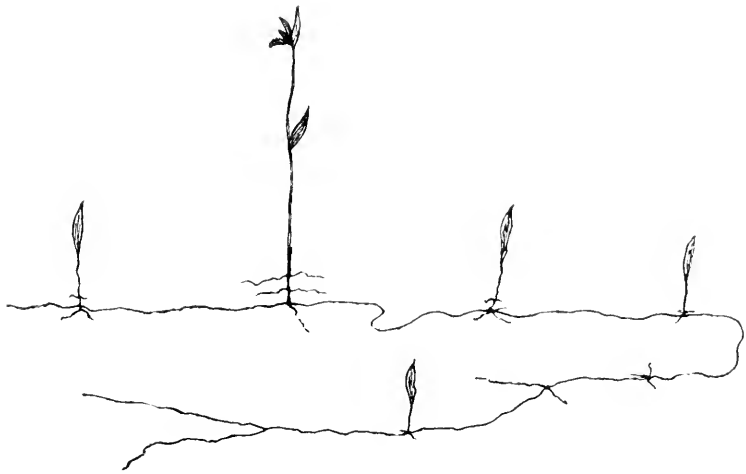
"Winding down this forest we reached the saddle in the ridge at a crumbling cavin or *Muni* (6,500 feet), when we halted for lunch; and then zig-zagged up through a burned forest, when the array of tall charred stems stood weird and uncanny-looking. Thence we ascended through a grade of feathery bamboos, through more gnarled oaks, and more stiffly, through dense thickets of dwarf bamboos, retrieved by the peach-like blossoms of the still leafless paper laurel (*Daphne papyrifera*), from whose tough bark the natives make their Japanese-like paper,—to a ridge, at about 9,000 feet elevation, when there burst upon our view the gorgeous Rhododendron forest in full bloom.

This glorious sight is equalled nowhere else in the world, for this is the home of the Rhododendrons. The whole hill-side for miles was aglow with the brilliant colors of the Rhododendron flowers. These ranged through almost every hue, from the brilliant vermilion of *cinnabarinum*, the flushing scarlet of *fulgens*, to the crimson of *arboreum* and *barbatum*; the rose-red of *virale* and *Hodgsoni*, the purple of *virgatum*, the yellow of *Wightii*, the bluish of *campanulatum*, to the cream of *Falconeri* and the white of *Dalhousii*, *anthopogon* and *argentum*. The variety in form and size of the flower was equally great, many of them were huge trees, like great oaks, and the profusion of their fallen petals carpeted the ground deep with fiery flakes like rosy snow, recalling somewhat the aspect of Japan during the gay festival of the Cherry-blossoms."—Major L. A. Waddell in *Among the Himalayas*.

ROOT SYSTEM OF THE SNAKE-MOUTH PAGONIA.

By C. F. Saunders.

THE roots of plants often present features which, if studied, will be found of great interest; and in view of the fact that the manuals of botany are frequently very deficient in the description of root characteristics, this department of plant study would seem to offer unusually good chances to the observing to add to the sum of botanical knowledge. The writer was reminded of this fact when collecting last July in a sphagnum marsh where the pretty little orchid, the snake-mouth pogonia (*P. ophioglossoides*), grew in such profusion as to color the bog in many places with rosy blushes of



bloom. Noticing in taking up some of the plants, even with what seemed an abundance of root, that some of the root strands invariably broke off and remained in the moss bed, I became interested in trying to get out a plant with root system intact. A half morning's work resulted in bringing a goodly number of plants to press, each with two or three feet of roots, but owing to the multitude of roots of other plants ramifying throughout the sphagnum and interlacing with the pogonia's, none of my root specimens when gotten out were found entirely unbroken. The specimens showed plainly, however, that in that marsh the relations of stem and root were about as represented in the accompanying diagram.

The books, as a rule, discuss the subject of the root of this

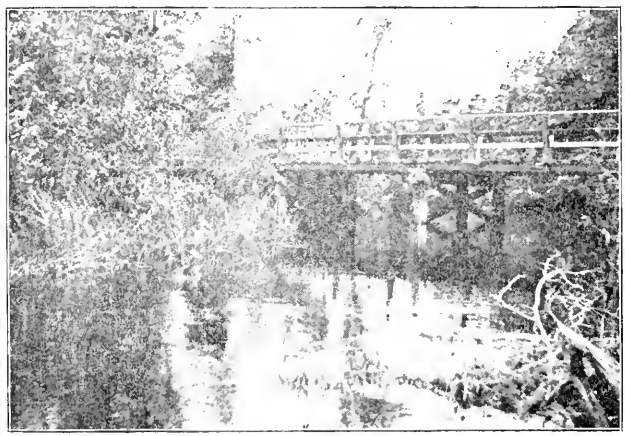
pogonia with such brief statements as "root of thick fibres," "coarsely fibrous," or simply "fibrous." It would seem, however, in view of the foregoing, that the root system would be more truthfully described as a slender, creeping rootstock, from which at intervals new stems put up. In this way, probably much more than from seeds, the colonies of this orchid multiply.

Philadelphia.

QUAKER BRIDGE, NEW JERSEY.

By C. F. Saunders.

A correspondent sends the above photograph of the old bridge whose name is doubtless familiar to some of our readers as that of the place where, early in the century now drawing to a close, the tiny fern *Schizæa pusilla* was first discovered. Quaker Bridge spans the Batsto River in the heart of a region almost uninhabited by man, and where cedar swamps, wild cranberry marshes,



and sandy barrens, both dry and damp, are as separate apartments in the wild home of a peculiar and interesting flora which has exercised a fascination on plant collectors for generations. *Schizæa pusilla*, since its first introduction to science at Quaker Bridge, has since been found at a few other places in New Jersey, but in no other state of our Union as yet, and in no other part of the world except sparingly in Nova Scotia and Newfoundland.

EDITORIAL.

With the approach of autumn the editors of THE PLANT WORLD, in provident forethought for Volume 4, have been actively engaged in making plans for new features and improvements in the journal. The promise which we long ago held out of an increase in the size of the monthly issue, will be redeemed at the first moment that our subscription list warrants it. The supplement, which has proved a popular feature with this volume, will be continued, carrying the series of articles well into the Dicotyledons; it is needless to add that the series will be profusely illustrated, as heretofore. We shall also begin the publication, at an early date of popular illustrated articles descriptive, of the plant life of a certain region; among those already arranged for are the following: "Botanizing in Cuba" by William Palmer. "Plant Life in Porto Rico" by A. A. Heller, and "Through Alabama in a Camp Wagon" by Charles L. Pollard.

We hope our readers will bear THE PLANT WORLD in mind at the opening of the century and say a kindly word for the journal when opportunity offers.

At the annual meeting of the American Association for the Advancement of Science in New York last June it was decided by the council that as a further inducement to membership the weekly journal "Science" should be sent free to each active member after January 1, 1901. This wise action will very effectually dispel the complaint that has been heard from various quarters to the effect that membership in the association was more of a name than a reality. "Science" is a most valuable publication, and one which no student of science can afford to be without. As for the Association itself, we have more than once made reference in these columns to the purely social as well as the scientific advantages of membership in this organization.

NOTES AND NEWS.

The Caraway plant (*Carum Carui*, *L.*) famous for its aromatic seeds, which go into countless cookies every year, is an immigrant into this country from Europe, and is a well known wayside weed in many parts of New York and Northern Pennsylvania.

The collection of water lilies and other blooming aquatics in the White House conservatories is probably finer than any similar collection in this country. There are over fifty varieties of *Castalia*, *Nymphaea* and *Nelumbo*, including both night and day flowering sorts. The range of color in these plants is remarkable, embracing almost every shade of red, blue and yellow.

The well known little *Ageratum conyzoides*, now so prized in cultivation, is one of the commonest plants in the lower ranges of the Himalayas where "it is rapidly overrunning the hill sides, springing up everywhere and fast displacing the native weeds on all the fresh landslips and clearings: even the hardy worm-wood is disappearing before it." Waddell in *Among the Himalayas*.

Congress has provided for the establishment of agricultural experiment stations in both Hawaii and Porto Rico, and special agents have already been selected to conduct the necessary preliminary investigations. These will be directed especially toward ascertaining what plants may be most profitably cultivated, how general agricultural information may be disseminated, and what are the best methods of securing irrigation.

A disease of peaches almost as destructive as the widely known peach yellows has been studied by Newton B. Pierce, of the Pacific Coast Laboratory at Santa Ana, California, and is to form the topic of Bulletin No. 20 of the Department of Agriculture. It is the so-called "peach leaf curl," and while extremely fatal to the trees, it may be prevented with comparative ease and certainty, according to Mr. Pierce's conclusions.

Many good Americans who admire and cultivate the white calla of the florist shops—an African plant—are quite ignorant that the cool northern bogs of their own country produce in abundance a native calla which is quite as charming. This wild calla (*C. palustris*) is much smaller than the green house species, and the white spathe instead of being funnel shaped, is rather flat and quaintly dented with a number of depressions about the size of pinheads, which seem as though they might have been made by the points of the pistils before the spathe unwrapped itself. Though abundant in bogs from Pennsylvania northward and west to the Mississippi River, it is easily overlooked because of its habitat being rather inaccessible except to rubber-booted explorers.—C. F. SAUNDERS.

"Much of the aconite of commerce, that finds its way to Europe, is gathered on this mountain [Sandook-phu, in the eastern Himalayas. The name means in the Bhotiya or Thibetan language 'The Hill of the Poison-plant or Aconite']; and I have found the Bhotiyas in the autumn, digging up the roots wholesale for transport to Calcutta. They pay a small fee to the Rajah of Sikhim for this privilege, and they get from the native dealers of Darjeeling about fourteen shillings for three-quarters of a hundred weight of the dried roots. There are several species of the plant growing here, including the greenish *A. palmatum* and the deeper blue, the virulent *A. ferox* that is exported for its poison, and which Hooker says is merely variety of the monkshood (*A. napellus*), of our gardens at home.

The root is also extensively employed throughout the Eastern Himalayas to poison the arrows that are used after big game and in warfare, as our troops found in the expeditions against the Sikhimese, and also the Abov and Aka tribes of Assam."—Waddell in *Among the Himalayas*.

BOOK REVIEWS.

ELEMENTS DE PALEOBOTANIQUE. By R. Zeiller. Paris, 1900.

The study of paleobotany, or fossil botany as it is often called, is a subject too often neglected, not to say decried, by botanists. While paleontological material is often fragmentary, a vast amount of information has gradually been accumulated regarding the plants that lived in past ages, and important light is constantly being shed on the origin and development of plant life. The task of sifting and arranging this mass of information for general use is of such magnitude that few competent persons have been found willing to undertake it. Hardly half a dozen works summarizing the results of modern research along these lines have been written. Professor Zeiller, than whom there is hardly any one more competent, is to be congratulated upon the production of this splendid text-book, which must so much to place the subject in the place it deserves. Although clearly hampered by lack of space, he has presented a succinct account what is now known regarding the paleontological history of plants. It is arranged systematically beginning with the algæ, and gives in as few words as possible an account of the various groups. Botanists will do well to familiarize themselves with the contents of this book. It will undoubtedly broaden the view of many who possess even a wide knowledge of recent plants.

This work is fully illustrated throughout, and in point of typography and press work may well be taken as a model.

F. H. K.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. SEPTEMBER, 1900. NO. 9.

THE HART'S-TONGUE IN NEW YORK AND TENNESSEE.*

By WILLIAM R. MAXON.

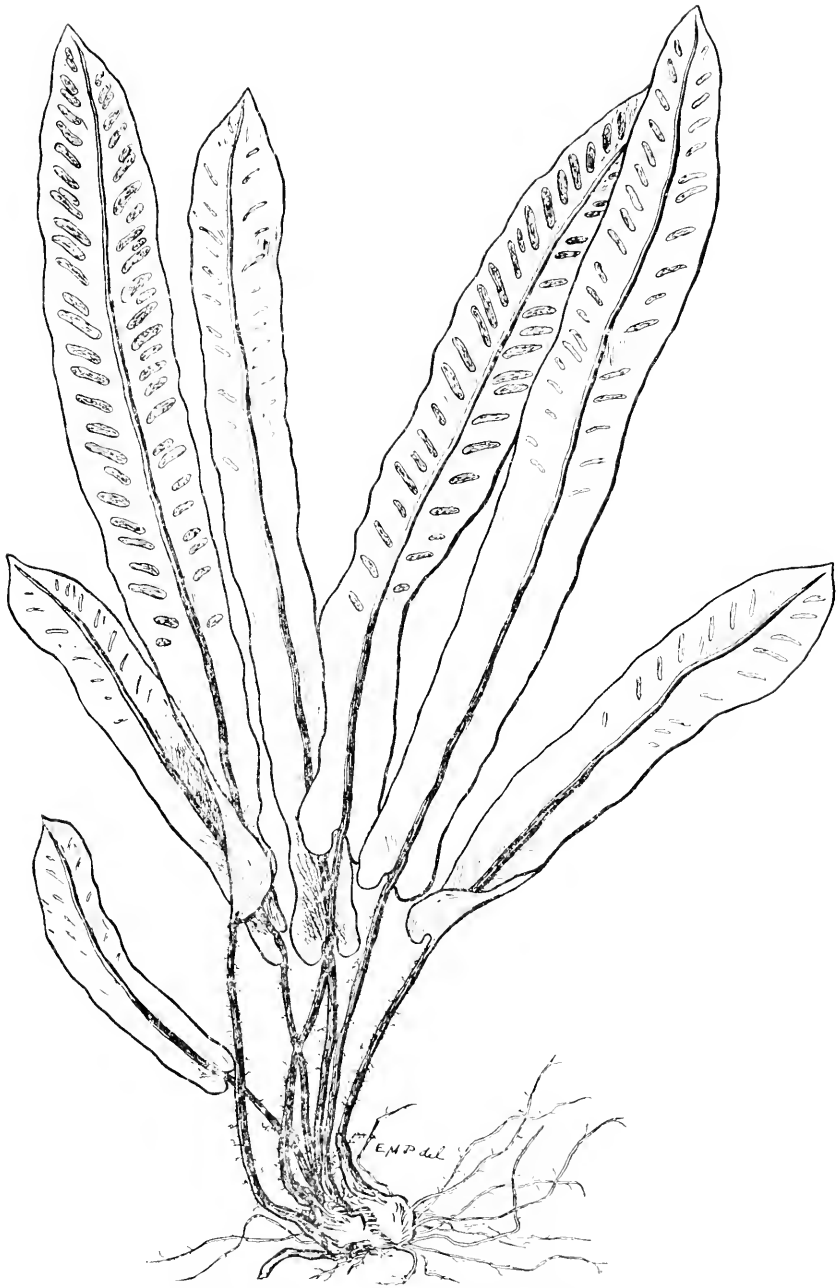
SO unique a fern is the Hart's-tongue (*Phyllitis scolopendrium* (L.) Newm.) among the species of the United Statest hat the average amateur may easily pass it without recognizing it as a fern at all. At a short distance it reminds one somewhat of narrow-dock, minus a stem, or even of the common broad-leaved wood-sedge, *Carex plantaginea*, which in fact sometimes occurs near it; but a second glance only is needed to prove the emptiness of such comparison. The leaves are a thousand times more beautiful; the plant itself a picture of perfect grace. The accompanying drawing shows well the outlines of the fronds and their way of clustered growth: but there is an indescribable charm in the fern itself which even a camera must fail to catch. Indeed, to one who knows the Hart's-tongue only in the herbarium a most pleasant surprise is in store if the fern be sought in its home.

An average plant at Chittenango Falls or at Jamesville, New York, will consist of some ten to twenty fronds, arranged in a circular crown, more or less irregularly for the fern spreads somewhat by giving rise to plants from the rootstock, the whole forming a dense cluster. The fronds neither stand erect nor rest upon the ground, but assume a half-reclining position with a lazy gracefulness that suggests an indolent rather than a slovenly bearing. No other of our northern ferns with which I am familiar, unless it be possibly Goldie's fern, carries with it a suggestion of such elegance. A single frond seems coarse enough, a plain leaf a foot or more long and an inch and-a-half wide, heart-

*Published by permission of the Secretary of the Smithsonian Institution.

shaped at the base and tapering rather sharply at the tip. The saving features are the intense greenness, the crispness and the waxiness of the fronds. There is nothing leathery about them, as has frequently been asserted; they are extremely succulent, and quick to wilt upon rough treatment. Every frond is coarsely fluted, so that each wave shows to advantage the peculiar characteristic glossiness. There has been no dearth of material in *their* making! and their very rankness seems in harmony with environment. Theirs is indeed an ideal habitat; usually a rough slope of limestone fragments,—the talus of high cliffs—protected by a tolerably dense growth of deciduous trees. The soil is of the richest,—dark-colored and as "woodsy" as wood-soil may be—supporting a variety of other ferns, such as the omnipresent *Dryopteris marginalis*, with *D. Goldiana*, and *Asplenium angustifolium*. Under such conditions the fern attains a magnificent development in a half dozen stations in Central New York, where it was first found in the United States early in this century by Pursh.

A very different order of things prevails in the Tennessee station at South Pittsburg. Here, hidden in a great pit or "sink-hole" some ninety feet deep and sixty by forty feet across at the opening, it was discovered by the late Major Cheathem in 1879. It was with great pleasure that Mr. Pollard and myself found ourselves able to visit this peculiar location upon the third of last August. The sink is located about two miles to the southwest of the village, half way up the slope of a spur of the Cumberlands that runs out to the eastward. Its walls are perpendicular and without foothold on two sides, and on the other two retreat to form a cave which extends beneath the cliffs. A little stream from the wooded hillside above winds among the rocks, and tumbles precipitately into the mouth of the sink, striking a projecting ledge below, and dripping from the cliffs in little jets and splashes. We gain a fair idea of the picturesqueness of the place from above; fortunately we are provided with seventy-five feet of rope; otherwise access is impossible without felling a goodsized tree,—unless one elects to tumble fifty or sixty feet. We find the rope and pulley serviceable, though somewhat jarring, and are landed sixty feet below upon the higher rocky slopes of the bottom. Across and above to the right is the miniature cascade. A few of the ferns are there upon the wet cliffs, almost within the spray; but the great majority—more than a hundred, I think—are at our feet on the leveler clayey floor under the partial shelter of the projecting ledge. The soil is a light-colored



The Hart's Tongue (*Phyllitis Scolopendrium*), one-half natural size

rather loose clay which becomes extremely sticky, upon moistening. What a difference from the black leaf-moulds of the northern woods! On the rocks and a rotted log or two below at the bottom of the pit are several liverworts we have not seen elsewhere; and in the crevices of the walls grow excellent plants of *Asplenium parvulum*. The Hart's-tongues are much smaller than in Central New York; the soil can be hardly so well suited to them. Were it not for the unusually low temperature of the cave, some 35 degrees lower than the outer atmosphere, I expect our northern fern would not be here at all. It seems to be a most interesting case of local adaptation and isolation.

Egress from the pit proves rather more troublesome than ingress. The rope and pulley are again put in commission, but the pulley snaps. It is not easy to climb sixty feet of *half-inch* manila unless one has had previous experience in that line; so that nothing remains for us but to have the rope passed about a nearby tree and be hauled out like so much coal, which indeed we somewhat resemble in our grime. I must confess that I have experienced pleasanter sensations than the fifteen minutes whirling which ensued, a long time, to be sure, for the rope was new and full of kinks. But at last *terra firma* was reached and the affair declared a great joke. Much of the difficulty could probably have been obviated, but even as it was we felt repaid. A similar escapade will however be undertaken only for a rarer fern.

U. S. National Museum, Washington, D. C.

SOME LOCAL COMMON NAMES OF PLANTS.

By C. F. Saunders.

WHILE on a botanical trip this summer in northeastern Pennsylvania, I noted the following common names in use which I do not find mentioned in the manuals:

Italian Daisy—Paint Brush, for *Hieracium aurantiacum* L.; Most commonly it went by the name of the Devil's Paint Brush,—a name already recorded which well embodies the popular feeling towards the obnoxious plants. They spread both by seed and runners until the ground in some places becomes a complete mat of the radical leaves.

Devil's-gut, for *Spergula arvensis* L.; another embodiment in speech of the farmer's dislike towards a pestiferous weed.

Poverty weed, for *Solidago lanceolata* L., probably because of its frequent presence in poor or neglected ground.

Nose-bleed, for *Trillium erectum* L.: doubtless suggested by the red fruit. Similarly in New York State, I am told by Mr. W. N. Clute, the plant goes by the name of *Bloody-noses*.

Pi-unkum, for *Hydrocotyle umbellata* L. This is said to have been the Indian name for the Squaw-weed (*Senecio sp.*,) and its application to *Hydrocotyle* may be a case of transference because of some similarity of leaf.

Dogberry, for *Viburnum lantanoides* Mich.

Camp-root, for *Geum strictum* Ait.

Simons' Weed, for *Galeopsis Tetrahit* L. An interesting instance of a common plant name adopted from the name of a person associated with the plant's appearance in a neighborhood. This plant, in the locality where the name above recorded is now in use, was first noticed on the land of a person named Simons. As it spread, it became something of a nuisance, so a name became a necessary, and Simons' Weed it naturally became. Similarly, I have heard that *Chrysanthemum Leucanthemum* L., the common ox-eye-daisy, was once locally known in southeastern Pennsylvania and Delaware as Richardson's Pink, from one Richardson, who brought the seed from Europe under the delusion that the plant would improve the pastures.

Philadelphia.

THE TWIN-FLOWER (LINNAEA BOREALIS) IN PENNSYLVANIA.

By Thos. C. Porter.

ON this beautiful little trailing plant with its erect peduncles bearing at their summits a few dainty, nodding, bell-shaped flowers, Gronovius founded a genus, in honor of the illustrious father of modern natural history. And the memorial is a fitting one, because, unique in its order, it is represented by a single species, and that an inhabitant of the high north, where Linnaeus himself, no doubt, gathered it during one or more of his journeys through Dalecarlia and the hyperborean country of the Lapps.

Not confined to Europe, it is spread also over the northern part of our own continent, from the Atlantic to the Rockies, and in the east

descends southward into New Jersey and Pennsylvania. It is reported too as growing in the mountains of western Maryland, and news of its occurrence, at greater altitudes, in Virginia and North Carolina, would occasion no surprise.

In Pennsylvania it is rare, and the only counties in which it has hitherto been discovered and collected are: Wayne, *Garber;* Susquehanna, *Graves;* Tioga, *Garber;* Sullivan, *C. E. Smith;* Wyoming, *Thorp;* Schuylkill, *Bishoff* and Huntingdon, *Buckhart.*

The station in the last county is worthy of special notice. It lies near Coleraine Forges, on Spruce Creek, a rapid stream that flows from northeast to southwest along the base of Tussey's Mountain, which is not a solitary peak or cone, but an elevated ridge many miles in length, with steep, wooded sides. On its western flank there is another lower ridge that runs parallel and coalesces with it and is broken at intervals by narrow ravines. Into one of these ravines the disintegrated rock-debris has washed down from above for ages, and forms a vast heap of loose material, coarse and fine, saturated with moisture from the rains and from the heaps of snow that accumulate and there melt late in the spring. During severe winters the whole mass is frozen solid to a considerable depth, and by digging ice has been obtained not far beneath the surface as late as the middle of August. Over and around such a spot the mean annual temperature must sink to a low figure, providing thus a congenial home for the *Linnæa,* where it was discovered, with several other northern plants, by Professor Buckhart, of the State College of Agriculture, to whom I am indebted for specimens. The elevation of the locality above sea level is 1,000 feet or more.

NATURALIZED COMPOSITÆ.

By Frank Dobbin.

IT is surprising to note how many of our common plants, especially members of the Composite family are naturalized from Europe. Many of them are unwelcome immigrants, and only by a determined effort on the part of the farmer can they be held in check. Of these the Burdock, (*Arctium Lappa L.*) is the most conspicuous. It is seldom seen in the open fields, but about the farm buildings if left alone it will crowd all other plants to the wall.

On the contrary the Common Daisy, (*Chrysanthemum Leucan-*

themum L.) is a lover of the open fields and meadows where it sometimes takes almost complete possession of the poorer soil. It is now so completely at home in its adopted country that to find a meadow without it is the exception rather than the rule.

It has been said that the Dandelion (*Taraxacum officinale* Weber,) was first brought to this country and cultivated as a garden flower. If so, it has wonderfully repaid such cultivation, for now it is one of the most common plants in the eastern states. The story is told of a surburban householder, who when asked by a friend how he kept his lawn so free from Dandelions replied: "that he had given up trying to raise grass, and was now trying to raise Dandelions."

The Fall Dandelion, (*Leontodon autumnale L.*) I have found in eastern New England, but it has not yet reached this locality, eastern New York.

The Elecampane (*Inula Helenium L.*) is now a common roadside weed, and indeed, it is seldom found elsewhere. The Tansy, (*Tanasetum vulgare L.*) has also taken up its abode by the roadside; whence it came from old gardens, where it was once cultivated for its medicinal properties. The May-weed (*Anthemis Cotula D. C.*) is common everywhere, and like the Tansy was probably once cultivated as a medicinal herb.

The Salsify or Oyster-plant (*Tragopogon porrifolius L.*) is another garden plant that has escaped to the fields, and like the Carrot and Parsnip bids fair to become a common weed, although it is as yet somewhat rare in the wild state.

In the early spring the Coltsfoot, (*Tussilago Farfara L.*) is often to be seen in low meadows and along water courses. It is a naturalized plant, as are also, two or three species of the Sow Thistle, (*Sonchus L.*) which can be found later in the season in neglected spots.

Until a year or two ago the Orange Hawkweed (*Hieracium aurantiacum L.*) was a total stranger in this locality. This year I have found it in three places within a radius, of five miles. Vermont farmers have been warned, through their Experiment Station, to be on the look out for this plant, and to exterminate it at once. It is claimed that it is almost as great a pest to the agriculturist as the Blue Thistle (*Echium vulgare L.*)

(*Cichorium Intybus L.*) or Chicory is another foreign plant that has become naturalized in America. I first saw it in a park in Troy, N. Y., in 1893, and have since found it in other localities.

It would be interesting to know just how each of these plants was first introduced into this country; whether by accident or design. But whatever their means of emigration they have usurped the soil, and are here to stay.

August 2, 1900.

A VISIT TO THE HOME OF NEVIUSIA.

By Charles Louis Pollard.

MANY years ago a clergyman of Tuscaloosa, Alabama, in company with one of the professors in the State University there, discovered on the banks of the picturesque Black Warrior River an odd-looking shrub. The season was springtime, and the shrub was putting forth a profusion of white flowers which strongly indicated, in their general structure, an affinity to the Rose family. After a vain attempt to identify the plant by consulting Chapman's flora, the discoverers followed what was in those days the universal practice,—they sent the plant to Dr. Gray, at Harvard. To their surprise, a reply came from the great botanist stating that the plant was not only unknown to science, but formed the type of a new genus of Rosaceae, well marked in its characters, and remarkably distinct even from the exotic genera to which it was most nearly related. As the clergyman, Dr. Nevius, had conducted most of the correspondence, Dr. Gray naturally gave him the honor of a dedication, and the plant was published as *Neviusia Alabamensis*.

During a recent collecting trip in the South a visit was made to Tuscaloosa for the purpose of seeing this and other rare plants of that region, and I was most fortunate in meeting Prof. W. S. Wyman, who was Dr. Nevius' companion on the trip during which the discovery was made. From his interesting account I learned that Dr. Gray erred ascribing the discovery of the plant to Dr. Nevius; for it was first observed by Dr. Wyman, who had proceeded some distance ahead of his associate. These facts never have been made public, so far as I am aware, and it is unfortunate that the laws of botanical nomenclature forbid the substitution of *Wymania* for *Neviusia*.

The original station for the plant was, as stated, on the banks of the Black Warrior River, not far from the University. Unfortunately blasting operations along the river front have completely destroyed it

in this locality, and it is now only to be found farther up on the opposite bank. There is at this point a high cliff so densely clothed with shrubs and trees, many of which in their foliage so exactly resembled *Nerissia*, that even with the aid of Dr. Wyman's careful instructions I was unable to find the shrub. The next morning, however, I had the satisfaction of examining a fine plant, transplanted from the type station, and growing in the garden of Dr. Smith, the State geologist. It is a shrub about four or five feet in height, with long slender branches and elm-like leaves; in the early spring it bears a profusion of delicate white flowers somewhat like those of a blackberry. The most wonderful fact in connection with the plant, however, is that up to the present time it has never been found elsewhere in the world; and the chances are that in a few years it will be entirely unknown in a wild state, though not uncommon in cultivation.

PLANT NAMES OF THE SOUTHWESTERN UNITED STATES

By Myrtle Zuck Hough.

As might be inferred, the common names of plants in the southwest are of Mexican origin. The Mexicans are skilled in the medicinal properties of herbs, and as a result the names have a meaning and lore as well as sonorousness of the Castilian quite at variance with the rough-and-ready nicknames applied by settlers from the states. Moreover, the Mexicans, like the Moki and other Indian tribes, had utilized most of the plants in the scanty flora of the southwest for various purposes, and had given them well-recognized names. Lists of these plants, which could easily be gleaned from Mexicans in Arizona, New Mexico, California and Texas, would prove interesting and reveal a wide field of beliefs and customs connected with primitive botany.

The following list, though incomplete, is presented for the purpose of attracting further contributions to the subject.

Adam's needle—Yucca glauca Nutt.

Alamo—Populus deltoides Marsh. This tree gives its name to a number of towns in the southwest.

Alfileria, alfileree, fileree—Erodium cicutarium L'Her. From Spanish word for pin, because of the pin-like tails of the carpels.

Anil de la muerte (New Mexico)—Actinella sp.

Bear-grass—Yucca glauca Nutt.

Broom-sage—Chrysothamnus depressus Nutt.

Canaigre—Rumex hymenosepalus Torr. Contains a valuable tanning material.

Carrizo—Calamovilfa longifolia (Hook) Hack.

Chaparral—Thick underbrush of dwarf oaks, mesquit or other thorny growths.

Cholla—Opuntia. Applied to species with cylindrical stems.

Cliff-rose—Cowania mexicana Don.

Colcomicate (New Mexico)—Biscutella?

Cottonwood—Populus deltoides Marsh.

Cream-cups—Platystemon californicus Benth.

Entamario—Tessaria borealis D. C.

Flor del cardo—Argemone platyceras Link & Otto. Because of the prickly plant, similar to the genus Carduus.

Flor de peña—Selaginella lepidophylla Spring.

Fox-tail grass—Phalaris sp.

Grama grass—Bouteloua oligostachya (Nutt.) Torr., and other species.

Grease-wood—Sarcobatus vermiculatus (Hook.) Torr. Northern Arizona.

Grease-wood—Covillea mexicana Morie. Southern Arizana.

Guayuli (New Mexico)—Ceanothus sp.

Hosh-kawn (Navajo)—Yucca baccata Torr.

Indian pink—Castilleja.

Iodeodonda (New Mexico)—Covillea mexicana.

Jimpson weed—Datura meteloides D. C.

Junco—Koeberlinia.

La capa—Phoradendron juniperinum Engelm.

Loco-weed—Astragalus. The name arises because animals after eating this weed become "loco"—crazy.

Manzanita—Arctostaphylos. Name meaning "little apple," so-called from the fruit.

Mariposa lily—Calochortus aureus and many other species—butterfly lily.

Marrubia (Lower Rio Grande)—Marrubium vulgare L.

Mescal—Southern Arizona)—Agave sp.

Mesquit—Prosopis juliflora (Sw.) D. C.

Miembre—Salix sp.

Mistletoe—Phoradendron juniperinum Engelm.
Mitamoreol (Lower Rio Grande)—Ephedra sp.
Mormon tea—Ephedra trifurca Torr. and other species. The Mormons consider this a blood purifier, and discovered it while crossing the desert to Utah.
Ocotillo—Fouquiera splendens Engelm.
Oreja de raton—Rat's ear (Lower Rio Grande)—Myosotis sp.
Palmillo—Yucca angustifolia.
Palo blanco—Forestiera neo-mexicana. Where this shrub grows, water is known to be near the surface.
Palo verde—Parkinsonia aculeata L; Parkinsonia microphylla Torr.
Peleo (Lower Rio Grande)—Monarda sp.
Peloto (Lower Rio Grande)—Mamillaria sp.
Pigweed—Portulaca retusa Engelm.
Piñon—Pinus monophylla Torr. & Frem.
Pitahaya—Cereus giganteus Engelm.
Prickly pear—Opuntia.
Rabbit Brush—Gutierrezia Sarothrae.
Rocky Mt. bee plant—Cleome integrifolia.
Romeria—Diotis lanata.
Rosin wood—Covillea mexicana.
Rosita (New Mexico)—Cryptanthe sp.
Sacacil (Lower Rio Grand)—Cereus sp.
Sacate, Sacaton—Epicampes macroura.
Sage-brush—Antemisia and Atriplex canescens.
Saltweed—Atriplex argentea Nuttallii.
Salt and pepper plant—Plantago.
Sand-burr—Franseria Hookeriana.
Sandia—Citrullus vulgaris.
Sapo (New Mexico)—Eriocarpum spinulosum.
Schuara—Cereus giganteus.
Skunk-weed—Croton texensis.
Soapberry—Sapindus marginatus.
Soapweed—Yucca angustifolia.
Sotol—Dasylirion texanum Scheele. A "yucca" of Western Texas. Herdsmen in the dry seasons slice the sotol and water their sheep on it.
Spanish bayonet—Yucca angustifolia macrocarpa.
Tuna—Opuntia.
Una de gato (Cat's claw)—Acacia.
Una del diable—Martynia proboscidea.
Vara des San Jose (wand of St. Joseph) (New Mexico)—Pentstemon sp.
Yerba de la vivera—Opuntia.
Yucca palm—Yucca.

THE SOUTHERN LIMIT OF JUNIPERUS SABINA.

By E. J. Hill.

IN the latest issue of the valuable Minnesota Botanical Studies, Second Series, Part IV, there is an account of the flora of a portion of Houston County in the extreme southeast part of the state. Mr. W. A. Wheeler, the collector of the plants enumerated and author of the contribution, says in connection with *Juniperus Sabina* L., sparingly found there; "this is about the most southern point of collection for the species in the United States, according to Britton and Brown." The error involved in the inference is due to the oversight of the authority cited rather than to Mr. Wheeler, and the use of other handbooks might lead to no better result. But the procumbent Juniper has been known to collectors for more than a quarter of a century to be a denizen of a small area of low sand dunes on the west shore of Lake Michigan at Wauhegan, Ill. I visited the locality in 1886, and found it abundant, or as the note made in the fieldbook at the time states it, "everywhere on the ground, often covering it like a mat." Wauhegan is thirty-five miles north of Chicago, and gives a station for the plant about one degree south of that in Minnesota. I do not know that it occurs elsewhere so far south on either shore of the lake or its immediate vicinity. If so this station may be considered its southern limit. It was published by Prof. H. H. Babcock in his "Flora of Chicago and vicinity." (The Lens, Chicago, 1872), and in Patterson's Catalogue of the plants of Illinois (1876). The geographical range should therefore include northeastern Illinois. In Michigan I have found it on the Manitou Islands near the northern end of the lake, and it appears on the main land of the southern Peninsula in about the same latitude at the head of Grand Traverse Bay and of Little Traverse Bay. North of this range it becomes more frequent, but should be sought for father south along the east shore of Lake Michigan. Otherwise the appearance at Wauhegan is quite isolated. Sand dune areas along the west shore are small, far apart, and an exceptional feature of its topography. It may be noted that if Wauhegan is the southern limit of this Juniper it coincides very nearly with that of another conifer, *Pinus divaricata*, which finds its most southern station in the dune area at the head of Lake Michigan in Lake and Porter Counties, Indiana, about fifty miles south of Wauhegan.

Chicago, Ill.

EDITORIAL.

We desire to call especial attention to the article by Dr. Halsted in the last number of THE PLANT WORLD in which is brought out so strongly the difference between the so-called old and new elementary text-books in botany. As nearly as possible the capacity of the students whose examination papers were there given was equal, and with no attempt at stage effect, the results are so strikingly different, and the advantage of the one over the other so plain, that he who runs may read. Most of us can remember with regret how we were obliged to memorize the names signifying the shapes of buds, leaves, flowers, etc., with the sole object of being able to trace a plant to its scientific name, as a bear is tracked to his den! We were taught little or nothing of the functions of plant organs, of the reasons for the multitudinous shapes assumed by plant structures, of plant societies and the like, and it is small wonder that most of the other members of our botany class dropped the subject as soon as the curriculum permitted. It is, of course, not possible that all who study botany in the secondary schools or even in college, will become professional botanists, for the study of the vegetable kingdom is but one phase of what is called a liberal education, but with a work like Coulter's as a text-book, we shall certainly expect to find an increasing number who are interested in, and have some definite knowledge of the varied phenomena of plant life.

America is doing well in preserving areas of special interest by government purchases. In England, there is a public society known as the National Trust, that is buying up tracts for the purpose of preserving wild plants and animals of rare value in natural history. Part of a huge swamp, known as Wicken Fen, has recently been purchased by this society for this laudible purpose,—*Meehans' Monthly* for September.

NOTES AND NEWS.

Among a number of other new plants, Mr. Elias Nelson has recently described a new rose (*Rosa grossi-serrata*) from the Yellowstone National Park. It is a low much branched shrub with flowers in clusters of two or three.

In the July number of the *Torrey Bulletin*, Mr. E. P. Bicknell continues his studies of Sisyrinchium, the present paper being a study of *S. Californicum* and related species of the neglected genus Hydrostylus which he enlarges to include 12 species, 9 of which are described as new.

To those who are familiar with the wild ginseng of our northern woods (*Panax quinquefolia*) it may be an interesting fact that in southern Georgia a certain coarse composite (*Tetragonotheca helianthoides*) passes under this name, and is much esteemed as a local remedy.

One of the great advantages of a love of gardening is the break it makes on the continuous strain of business thought. No real lover, and possessor of a garden ever died of insomnia. This is a desease which follows those by night who cannot throw off the thoughts of daily life. They retire to think, instead of to sleep,—and the darkness and quietness of the night favor the thought. To leave behind the business of the city for the pleasure of the trees and flowers of the suburbs has saved numerous lives that would have otherwise been broken down. This seems better understood in the Old World than with us. The famous jurist, Lord Penzance, did not take his law studies to his country home. There he thought only of his garden, and the floral treasures it contained. One of his hobbies in the garden was the improvement of the Sweet Briar, and the many beautiful varieties he raised, obtained as much fame for himself as did his legal opinions, to say nothing of the pleasures the flowers brought him.—*Meehans' Monthly* for September.

The common pipsissewa (*Chimaphila umbellata*) is always a beautiful little plant when in flower, but the specimen represented in the figure, which was reproduced from a photograph kindly sent us by

Mr. Guy L. Stewart is unusually handsome with its long spray of blossoms. We believe this plant has not been extensively cultivated in hardy herbaceous borders, but it certainly deserves a place in such situations.

BOOK REVIEWS.

ENCYCLOPEDIA OF HORTICULTURE. By L. H. Bailey. Vol. II, E.–M. New York, Macmillan & Co.

The second volume of Professor Bailey's monumental work, carrying it through the letter M, maintains the same standard of excellence as the first. The profusion of illustrations adds materially to the attractions of such a book, and Professor Bailey may well point with pride to the fact that the reader will always find at least one cut on whatever page he may open.

An encyclopedia or dictionary of any description is essentially a work of reference, and one therefore expects to find a citation of all words or topics germane to the general subject. In looking for a given genus, therefore, one naturally expects a short account, but it is an agreeable surprise to find that in most cases the author and the specialists associated with him have presented in addition to the horticultural treatment, the sketch, at least, of a systematic arrangement of the principal species. Botanists and gardeners will await with interest the completion of the work.—C. L. P.

A GUIDE TO THE TREES. By Alice Lownsberry. Illustrated with 64 colored and 164 black-and-white plates and 54 diagrams by Mrs. Ellis Rowan and an introduction by Dr. N. L. Britton. New York: Frederick A. Stokes & Co. $2.50.

This handsome book is a companion volume to the author's *Guide to the Wild Flowers*, which we had the pleasure of noticing in these pages some months ago. It is arranged on the same plan, that is according to the habitat in which the various species of trees are normally found. Thus we have trees preferring to grow near water—as in swamps and by running streams; in moist soil—as in lowlands and meadows; in rich soil—as in forests and thickets; in sandy or rocky soil—as on hillsides and barrens; in light or dry soil—as upland places and roadsides. We can not but feel that the line between certain of these groups will be a hard one for the beginner to draw, but if a particular species is not found in one group the student must look in the one next most likely, and so on until he comes to it. The information under each species is full and satisfactory, giving the common and scientific names, family, shape, height, range and time of blooming as well as much popular instruction. The book is fully and beautifully illustrated and should prove a powerful factor in increasing a popular knowledge of our trees.—F. H. K.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. OCTOBER, 1900. NO. 10.

NOTES FOR THE BEGINNER IN THE STUDY OF MOSSES.

By F. H. KNOWLTON.

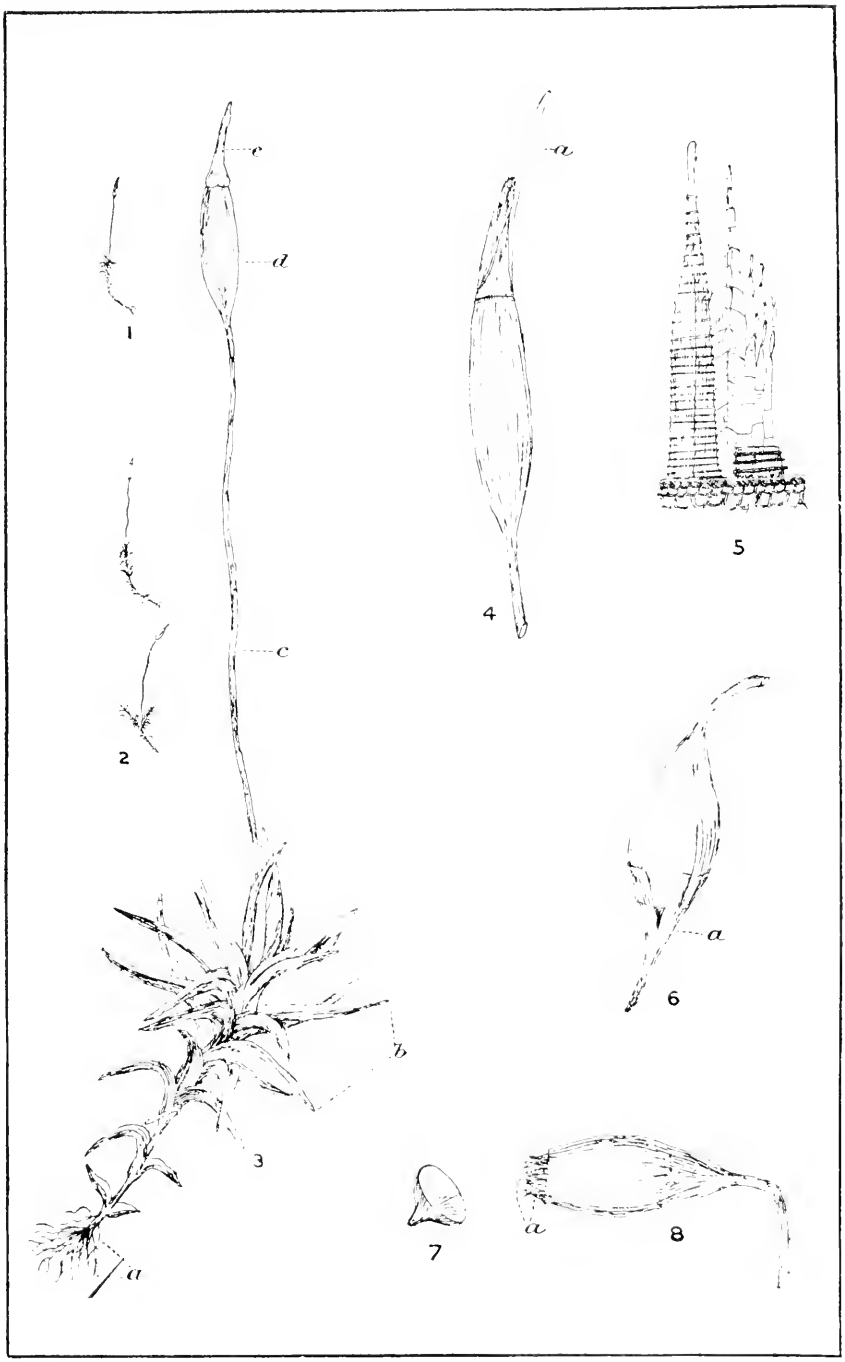
MOSSES never form a very conspicuous element in the flora of any locality, yet they usually are quite abundant, and even a little study is sufficient to reveal the fact that they are objects of exceptional interest. Their small size and their supposed difficulty doubtless deters many from undertaking their study, but as a matter of fact any one with a little patience may become familiar with at least the common and more conspicuous forms in his locality. There are, of course, difficult and obscure genera among the mosses, just as there are among the flowering plants, but the beginner will soon learn to avoid these as he does *Carex*, *Panicum*, *Aster*, *Erigeron*, *Crataegus*, etc., until his experience qualifies him to take them up.

In the first place mosses are found almost anywhere—from the tropics to the high north, and from the level of the sea to the summits of lofty mountains (over 20,000 feet in the Himalayas). While they mainly delight in moist shaded situations, they are found in a great variety of places, as exposed rocks, tree-trunks and on the ground. In collecting them it is only necessary to tear away cushions and patches that are seen to be in fruit. They may be placed in old envelopes, paper bags, or even loose in the collecting case or basket. They require no pressing, or at most only very slight pressure, and dry in a short time. Some moss-collectors, however, prefer to place them under light pressure for a day. The beginner had best use only fresh specimens, yet dried material can be prepared by slightly moistening it.

The student should be provided with some sort of a microscope.

Much can be done with a strong pocket lens, but it is best to have a compound microscope with a low power, ranging, perhaps, from 12 to 25 diameters. He should also have a pair of slender, fine-pointed tweezers and a couple of dissecting needles, which may be easily made by pushing a strong needle into a slender, soft pine handle. For studying the cellular structure of leaves a number of glass slips and cover glasses, such as are used in mounting microscopical preparations should be at hand. In studying the moss fruit under the microscope it is desirable to view it from all sides, and at all angles. In order to hold it in position, so that an accidental jar or a chance breath may not displace it, press a bit of common beeswax on the center of a glass slip. This should be perhaps 1-16 of an inch in thickness and cover an area half an inch in diameter. With the tweezers the moss fruit and its various parts may be stuck lightly to the wax, and disposed in any position in which it is desired to study them. The glass slip can now be placed under the microscope and the latter tilted at the most convenient angle as regards light.

We may now assume that the beginner has before him the implements above mentioned, and has provided himself with a "cushion" of moss which shows a number of well-developed fruits. By gently tearing it apart a single plant may be isolated, such as that shown in figures 1 and 2, which is magnified about 10 times in figure 3. It is seen to consist of a slender stem often with several branches, one of which bears the so-called fruit. At the base of the stem will be seen a number of fine root-like processes. These are the *rhizoids* (fig. 3*a*) which serve mainly to hold it to the substratum on which it grows. The stem is more or less thickly beset with *leaves* (fig. 3*b*) which are distinct and sessile—that is attached to the stem by their whole base. From the apex of the stem arises the slender, wire-like *pedicel* (fig. 3*c*) which bears the *capsule* or moss fruit (fig. 3*d*) at its summit. Surmounting the capsule is a thin, delicate, scale-like organ known as the *calyptra* (fig. 4*a*, 6*a*), which once formed a covering for the young capsule and was pushed off and borne upon its summit as it reached maturity. The calyptra soon falls, and when the spores are mature, the capsule opens by the separation of the upper portion in the form of a lid or *operculum* (fig. 7), as it is called. When the operculum is removed there is exposed just inside it a ring of delicate teeth known collectively as the *peristome* (fig. 8*a*). Often there is a ring, or rings, of still more delicate teeth inside the outer ring, the first made up of



Figs. 1, 2. Barbula semitorta, natural size. Fig. 3. Same enlarged about 10 times, showing *a* rhizoids, *b* leaves, *c* pedicel, *d* calyptra, *e* capsule, *c* operculum. Fig. 4. Capsule of same further enlarged, showing calyptra at *a*. Fig. 6. Grimmia California, showing calyptra of different shape. Fig. 8. Capsule of Bryum Bigelovii with operculum removed, showing peristome at *a*. Fig. 5. Showing teeth of peristome greatly enlarged. Fig. 7. Operculum of Bryum Bigelovii.

cilia and the other of *cilioles* (fig. 5). The prolongation of the pedicel through the center of the capsule makes the *columella*, but this can only be seen in cutting the capsule open. The *spores* are found mixed with various delicate hairs inside the capsule.

After the student has demonstrated the presence of, and become familiar with the parts of a moss plant as above outlined, he may wish to compare it with a description of the species he has in hand. For this reason it is perhaps best to begin with a named specimen. Such a specimen can easily be procured, often by simply enclosing a stamp, from some well-known student of mosses.* By comparing this, part by part, with a good description of their species they will have something definite to start from. Unfortunately the literature at present available on our mosses is scattered and not thoroughly abreast of present knowledge. We are promised a moss flora of the Eastern United States by a well-known specialist, but it is not yet ready, and almost the only thing is Lesquereux and James' *Mosses of North America*. This work is illustrated by the copper plates, showing all the North American genera, that accompanied Sullivant's account of the mosses in the second edition of Gray's *Manual*, published in 1856. This book is provided with artificial keys, by the aid of which the student will soon be able to locate at least any genus he is likely to meet with. He may expect to have difficulties and perplexities in studying mosses, but they are no greater in their way than those surrounding the study of many a group of flowering plants, and when once the ice is broken he will find opening before him a wide and interesting field.

COLLECTING SETS OF PLANTS FOR EXCHANGE.

By A. S. Hitchcock.

MANY educational institutions with limited funds at their disposal for herbarium purposes are able to augment their collections by exchanges. The same is often true of the amateur who is accumulating a private herbarium. While the latter may be able to exchange upon the basis of desiderata chosen from lists, the curators of herbaria in public institutions rarely have time for this but prefer to make "blanket" exchanges. For these reasons and others

*The editors of *The Plant World* will take pleasure in having a specimen determined for any of our readers who wish to take up the study of mosses.

which I will mention, it is advisable to make collections for exchange in sets or uniform series. Besides the advantage of convenience in exchange is the fact that the plants can be referred to by number, and being distributed in several herbaria, become standard reference specimens.

For the benefit of beginners who might wish to undertake a collection of this kind, I will give a few instructions. Each professional collector has his own method which he has elaborated through experience, and I can only present my plan, which when modified to meet particular conditions, I am sure will be successful.

We will suppose the usual and probably the most favorable case where the collector is located at a comfortable and convenient station, and works the region in the immediate vicinity. He should be provided with a quantity of the best quality, standard size driers, the amount depending upon the number of sets he proposes to collect. If he does not prepare more than twenty-five sets three thousand sheets will be sufficient. But for rapid and neat work he must not be scrimping with his driers. A good collector will put in at least two hundred specimens a day. Furthermore he should have a stock of inner papers standard size, at least ten thousand sheets. This can be replenished as desired. I assume that the collector understands the methods of putting plants in press, and will only remark that the specimens are arranged between two sheets of common newspaper stock cut the same size as mounting paper ($11\frac{1}{2}$ by $16\frac{1}{2}$), the "inner sheets" mentioned above, and these between the driers which are cut larger (12 by 18). An indispensable tool for the collector is a suitable digger. The one I use, and which I can heartily recommend, is a small mattock with handle about eighteen inches long. The blade is nine inches long including the eye for the handle which is at one end. It is hand forged, with a hardened tool-steel cutting edge, which is two inches wide and is kept sharp. The shank is stout so that in digging there is no fear of anything breaking when the roots are pried out of the ground.

For the field press use the light covers with a handle, held together by one or two straps. I use stout pasteboard for one side, and a light wire frame provided with a handle, for the other side, and use a single strap passing twice around the press. The collector takes into the field the press with a sufficient quantity of inner papers for the trip, and also a suitable notebook. I find it convenient to keep the notebook and a carpenter's pencil in the press. Having found a species in

suitable condition for collecting, a sufficient number of specimens are procured, and put at once into press. A convenient method is to count out twice as many inner sheets as there are sets to be collected, thus being in no danger of losing track of the count while putting away the specimens; place the field number on the lowermost of each pair of papers, arrange the specimens neatly within the papers, and when all are in, strap up the press moderately tight. It is best to have a drier between the specimens, and the stock of unused paper. Care should be taken to select perfect specimens, and representative parts of the plants too large to include whole, and of small plants to gather sufficient to cover the sheet fairly well. It should be remembered that care at this point determines the character of the finished specimen. Immediately upon putting a number in press the notes should be recorded in the notebook. Do not be stingy with the notes, the more information recorded, the better. It not infrequently happens that a sufficient number of plants cannot be obtained in one place. In such cases, make a record of the number obtained, and finish out the set later. If there is any doubt as to the identity of two lots gathered in this way a separate field number should be given. Some go so far as to give a separate field number in all such cases. On returning home the plants are put between driers as soon as convenient. They will keep for a day or two without deterioration, but of course do not dry. Two driers should be placed between each pair of inner sheets. With specimens that give up their moisture easily, three driers can be used to advantage. The pile is built up until all are in press, preferably in one pile. A piece of stout pasteboard is placed at the top and bottom of pile. Pressure is applied by means of two $1\frac{1}{4}$ inch strips about ten feet long, each being placed about one-third the distance from the end. The buckle should be near one end of the pile, or else the latter will be curved by unequal pressure. Specimens that are put into press one day should be changed the following morning. All the thin specimens such as grasses and small herbs will be dry at the second change. More succulent plants take longer. Some plants dry so slowly that after the third or fourth change they can be left over for several days without change. When the plants come out they are tied up in convenient bundles and put in a dry place. As the upper inner paper of each specimen has now served its purpose these can be taken out before the bundles are tied up, thus making the inner papers go twice as far. In order to save carrying a great weight of paper into the field it may be

more convenient to put the second paper on the specimen as they are put in the driers. Also for convenience the specimens should always be kept right side up through all the operations, that is the sheet with the field number should be beneath the specimen, and each bundle of driers should be labelled with the date when the plants were put in, and each day's collection kept in a separate bundle. If the collector is not putting all his time in on this work the method would be somewhat modified. The greatest amount of drudgery connected with this work is the drying of the driers. They should be spread out in the sun until they are thoroughly dry and gathered in while hot. They retain the heat, and are thus prevented from absorbing moisture from the atmosphere. This task, however, can often be relegated to a cheap boy. While collecting in south Florida this summer, it being the rainy season, I was obliged to exercise great care in this part of the work. I could not trust help I was able to obtain. On account of sudden showers it was necessary to stand right by the papers until dry, but twenty minutes of bright sunshine on single layers was sufficient. With the field press the collector is able to make extended trips on bicycle or by rail, as the plants will keep for 48 hours if carefully packed, and can if convenient be sent to the central station by express where they can be cared for by an associate.

Large fruits should be air dried if necessary, and preserved in sacks.

The above remarks apply to the collection of flowering plants and ferns. Special methods are necessary for the collection of the lower cryptogams.

Manhattan, Kansas.

NUMBER OF PLANTS KNOWN TO SCIENCE.

IN an early number of *The Plant World* we presented the statistics then available as to the number of plants in the world. The following estimate is given by Professor S. H. Vines, in his address as vice-president of the botanical section of the British Association for the Advancement of Science:

Species of Phanerogams indicated in Bentham and Hooker's *Genera Plantarum*.

Dicotyledons	78,200
Monocotyledons	19,600
Gymnosperms	2,420
Estimated subsequent additions	5,011
Total Phanerogams	105,231
Filicinæ (including Isoëtes), about	3,000
Lycopodinæ, about	432
Equisetinæ, about	20
Total Pteridophyta	3,452
Musci	4,609
Hepaticae	3,041
Total Bryophyta	7,650
Fungi (including Bacteria)	39,663
Lichens	5,600
Algæ (including 6000 Diatoms)	14,000
Total Thallophyta	59,263

Adding these totals together—

Phanerogams	105,231
Pterodophyta	3,452
Bryophyta	7,650
Thallophyta	59,263
We have a grand total of	175,596

Professor Vines' prediction as to the probable number in the world is as follows: "We may venture to cast a forward glance upon the possible future development of the knowledge of species. Various partial estimates have been made as to the probable number of existing species of this or that group, but the only comprehensive estimate with which I am acquainted is that of Professor Saccardo. He begins with a somewhat startling calculation to the effect that there are at least 250,000 existing species of Fungi alone, and he goes on to suggest that probably the number of species belonging to the various other groups would amount to 150,000; hence the total number of species now living is to be estimated at over 400,000. On the basis of this estimate it appears that we have not yet made the acquaintance of half the contemporary species; so that there remains plenty of occupation for systematic and descriptive botanists, especially in the department of Fungology."—F. H. K.

AN OBSERVATION ON THE WATER-SHIELD (BRASENIA PELTATA).

By E. J. Hill.

WHEN examining *Brasenia peltata* the early part of September for fruit nearly all the peduncles bearing carpels were found detached and floating in the water beneath the peltate leaves. If a stem had more than one cluster of carpels—two or three being common—it was broken off as a whole. This at first was deemed accidental, but it appeared too general to be explained in this way. Nor was there any apparent external force to cause it. I had not observed it before and am not aware that it has been mentioned by others, and write in part to call attention to the phenomenon to see if it shall be verified hereafter. This would manifestly be an advantage to the plant in the dissemination of its seed. It usually grows in rather dense patches, often nearly or wholly excluding from the area it occupies with other prominent pond vegetation. As it fruits quite freely, there would be much less advantage to it in dropping its seed in the muddy bottom beneath, already well provided with the rootstocks of the plant, than to have it carried to some other place by the water to start new communities.

Chicago, Ill.

RADIATE STRUCTURE OF THE WILD GOURD (CUCURBITA FOETIDISSIMA).

By Charles Newton Gould.

OF the plants of the plains none is more uniquely conspicuous in time of drouth than the wild gourd, *Cucurbita foetidissima*. While the number of individuals of this species on a given area is ordinarily not as great as that of many other plants, its large size and uniform dark green color combined with the fact that it apparently thrives best when most others have succumbed to the heat, all tend to render the species worthy of remark. In fact with the exception of some species of *Artemisia* and the hardy *Ipomœa pandurata* this plant is more frequently remarked than any other.

During the past summer while travelling in Western Oklahoma with the Oklahoma Geological Survey my attention was repeatedly called to the peculiar radiate structure assumed by the plant. A par-

ticularly fine specimen was encountered July 5, 1900, near the woods, Woodward County line, 17 miles west of Alva, Oklahoma. It grew on a large deserted prairie dog mound. The material which had been brought up from beneath consisted of sand and clay of the Tertiary or Red-beds, which by disintegration had formed a fertile soil. The plant rooted near the center of the mound, where main branches left the ground. At a short distance from the root these subdivided rapidly and the vines ran off straight to all points of the compass, like the spokes of a wheel. There were 52 of these varying in length from 9 to 15 feet. Usually the vines grew singly but occasionally 2 or even 3 were entwined for a part or all of their length. So dense was the foliage that when viewed from a short distance the plant seemed to form a perfect mat of green which contrasted strangely with the brown buffalo grass. The average diameter of the mat was perhaps 20 feet and its circumference between 70 and 75 feet. The deep yellow flowers, the large green triangular leaves with upturned edges, and the abundance of white and green striped fruit all combined to make a lasting impression on the mind.

The radiate structure seems to be normal in this species. In smaller specimens the vines invariably run straight out from the center. As is the case of the *Ipomoea* and the *Artemisia* the persistent verdure of the plant is due in a large measure to its enormous root. In general the *Cucurbita* root is cylindrical and tapers gradually to a fine rootlet. I have seen specimens 8 feet long and as large as a man's arm at the point where the root was broken off. Such a root if continued to its full length could scarcely fail to reach a substratum of moist earth even in the dryest weather.

University of Oklahoma.

NOTES ON OPHIOGLOSSUM.

By Joseph Crawford.

As some little interest in life history of Ophioglossum has been manifested since my article in the *Fern Bulletin* on Resting of Ophioglossum, I made a trip in the early part of July, corresponding nearly to date of last season's noting, to Holly Beach, N. J. to get the condition of *Ophioglossum arenarium*. I am pleased to report that a much larger number had made their appearance than last sea-

son, perhaps 40 or 50, and nearly all were fertile but rapidly passing with decay.

They corresponded more in number, size and condition to the second year's appearance three seasons ago, as their decay is quite rapid when once it has commenced it is fair to presume that the number of individuals this year was double or treble, perhaps reaching 100 or 150, early in the season. No molestation has occurred to the clump, conditions remaining the same as last year.

It has now been shown that every third season is one of either great profusion or nearly absence and the intervening year of intermediate quantities. The real proof however must be shown next season.

I had no opportunities to study *O. vulgatum* beds.

I would like to hear the results of those able to work out these underground intricacies.

Xenia, or the immediate effects of Pollen on Maize. This is the title of Bulletin No. 22, Division of Vegetable Physiology and Pathology, by Herbert J. Webber, in charge of the Plant Breeding Laboratory of that Division. The paper is technical, but the subject discussed has a broad practical application in the work on plant breeding now under way.

Xenia is the supposed immediate or direct effect of pollen on the character of seed and fruits, and is a phenomenon which for years has puzzled botanists and plant breeders. Until recently no satisfactory theory has been advanced to explain how the influence of hybridization could pass outside of the fecundated embryo and cause changes in other portions of the seed or fruit. However, in a recent article, DeVries calls attention to the discovery of double fecundation as probably furnishing an explanation of the phenomenon of xenia. Almost simultaneously with appearance of DeVries's paper Currens published a summary of his studies on xenia on maize in which the same conclusion is reached.

A number of experiments were conducted by Mr. Webber, with a view of obtaining evidence of the bearing of double fecundation on the problems of hybridization and the results of this examination are given in the bulletin. It is illustrated with 4 plates.

EDITORIAL.

We believe that lack of interest in any particular group of plants is often to be attributed to failure to understand the best methods of study and observation. This is, especially true of the lower cryptogams, in which the various parts of the plant are usually designated by names very distinct from those with which we are familiar in their more conspicuous relatives, the phanerogams. In short, one must know just what to look for, and how to look for it, in order to appreciate the beauties of structure in this vast class of small organisms. In another part of this issue we print an article, the first of a general series, dealing with the mosses, and giving hints for their collection and study. The language has been made as free from technicality as possible, and we trust that the carefully executed plate that accompanies the article will be of service to the student in his work of identifying the various parts of a moss plant. From time to time, we shall print articles in similar vein by well-known specialists, treating such groups as the Myxomycetes, the fleshy fungi, the parasitic fungi, the lichens, etc. It is certainly necessary in the progressive age for even the amateur to know something of the lower plants, in order to gain a clearer understanding of the greater problems of plant descent and relationship.

NOTES AND NEWS.

Dr. Hermann von Schrenk has just issued a small bulletin (No. 21 U. S. Department of Agriculture) on two destructive fungus diseases of the Red Cedar. They are caused by species of Polyporus, one of which is described as new.

Dr. Byron D. Halsted has recently issued a valuable little pamphlet (Bulletin 144 of the New Jersey Experiment Station) on live covers for country homes, in which he enumerates and describes the vines that have been found most valuable for covering porches, trellises, etc. The home-like appearance of a house may be greatly enhanced by the planting of a vine or two where it may climb over the porch or side of the house, as can well be seen by a glance at the beautiful pictures of well-known homes in this pamphlet. We would like to see this little report in the hands of every owner of a country home in the land.

"It is not unlikely that some of the curious alterations in the distribution of forest trees which geologists have recognized," says Professor N. S. Shaler in the *Forester* for September, "may have been due to the development in former ages of the Gypsy Moth or other like destructive species of insect. Thus in the early Miocene Tertiary Europe was tenanted by a host of species closely akin to those that now form our admirable American broadleaf forests. Magnolias, the Gums and the Tulip trees were then as well developed in Europe as they are in this country. Suddenly all these species disappeared from the Old World. There is no reason to believe that the change was due to an alteration in climate. There are many evidences indeed that such was not the case. It is a very reasonable conjecture that that alteration was brought about by the invasion of an insect enemy which may have been the Gypsy Moth."

Zoe for July has just reached us and contains a number of interesting articles. T. S. Brandegee gives an account of the voyage of the schooner *Wahlberg*, which visited various small islands off the coast of California. Lists of species are given for many of the islands. Miss Alice Eastwood speaks of the neglected species *Aquilegia eximia*, and Mrs. Brandegee continues her *Notes on Cactew* with descriptions of several new species.

In *Science* for October 5th Mr. O. F. Cook gives an interesting account of comphor secreted by a small diplopod animal known as *Polyzonium*. Heretofore the production of camphor has been supposed to be confined to the vegetable kingdom, being mainly the product of *Cinnamomum Camphora* of the Laurel family, but also found to some extent in plants of other families. Its presence as an animal secretion is of interest.

BOOK REVIEWS.

Among the Mushrooms. A Guide for Beginners. By Ellen M. Dallas and Caroline A. Burgin. Drexel Biddle, Publisher. New York. 1900.

Since mushrooms have been attracting renewed attention as articles of food a number of more or less popular books have appeared that are designed to aid the beginner in their study. In this class belongs the little book before us and which will undoubtedly be found of considerable value. The language is thoroughly popular and understandable by beginners, albeit there are some, to say the least, curious statements. Thus on page 29, we are informed that "Mushrooms consist wholly of cells." "The food of fungi must form a part of some animal or plant." It is indeed "interesting to know that even before the Tertary period the undergrowth consisted of ferns and fleshy fungi. What a time of delight for the botanist! But there were no human

beings in those days to roam amongst that luxuriant undergrowth, and only the fossil remains in the deposits of coal and peat are left to tell of their former existence."

In spite of these defects, and there are several, the book contains much that is good. The descriptions of the species treated are full and usable. There are numerous keys based on color of pileus, color of spores, habitat, etc. There is also a full glossary, and numerous full page half tones from photographs. While this may not be the ideal popular work on our fleshy fungi, it is a step.—F. H. K.

Our Native Trees and how to Identify them. A popular study of their habits and their peculiarities. By Harriet L. Keeler. With 178 illustrations from photographs and with 162 illustrations from drawings. Charles Scribner's sons. New York. 1900. Price $2.00.

For a popular treatise on trees, this book is far better than any similar publication within the reach of the amateur botanist and student of nature. The book is intended to cover the Northern States east of the Rocky Mountains, and following the older systematic arrangement of Bentham and Hooker, fully describes and illustrates all the native trees of that region together with a few of the more common introduced ones. In addition to the full and well arranged descriptions, the text contains many notes of interest in regard to the economic and historic feature of each species. It is fully indexed and supplied with analytical keys, a good glossary and a chapter on structural botany.

The feature that makes this work so valuable to everyone is the photographic illustrations of almost every species treated in the text. Often there are two or three plates illustrating one species. The photographs in this volume will give a better idea of our native trees than all the volumes of description that could be written. With them to guide him, the amateur can become acquainted with his local sylva with greater ease and to an extent that before was possible only to those in direct contact with herbarium and library facilities out of the reach of all but the few. One fault in the illustrations is the failure to include in the explanation any statement as to the amount of reduction from natural size. This, however, is not likely to lead to much confusion.—J. B. N.

Our Native Ferns and their Allies. Sixth edition. By Lucien Marcus Underwood. Henry Holt & Co. New York. 1900.

Opinion upon the sixth edition of Dr. Underwood's compact synopsis of our American ferns will undoubtedly be more or less divided according to the point of view taken by the reader on the question of nomenclature, for it is chiefly in this particular that this book, which for the past twenty years has occupied an authoritative place in the literature of our native species, differs from previous editions. The goodly number of innovations in systematic classification, while bound to meet with disapproval from perhaps a majority of amateur students, will nevertheless be regarded by those who have come to believe in the feasibility of an approximate stability in nomenclature as a distinct advance. Unfortunately, but as is inevitable in a work of this popular nature, the reasons for many of the changes incorporated are not discussed, but are nevertheless evident to those who are engaged in active botanical study and familiar with the recent work of the author.

As to the actual changes involved: the recognition of several of the genera usually regarded as sections of the genus *Polypodium* is entirely logical, the unfortunate feature being that the segregation here begun stops necessarily with our native species. Likewise the restoration of the genus *Cheiroglossa* for the Linnaean *Ophioglossum palmatum*, the revival of *Polystichum*, and the insertion of *Pteridium* for *Pteris* in part, need no defence. It is rather in the substitution of old generic names for the well established ones, such as *Gymnopteris* for *Gymnogramme*, *Struthiopteris* for *Lomaria*, and the like, that many will be disposed to object; and it is indeed singularly fortunate even for those who desire to keep abreast with current ideas, that the generic names thus replaced happen to be associated with so few species. If temporary confusion arise it is but the penalty of past lawlessness, and is at best of short duration. In very many cases the ranges of species might have been considerably extended, and there is often noticed a singular lack of uniformity of spelling of authors' abbreviated names in citation; but these features will not serve to detract greatly from a work which finally places the study of our species on a secure basis. —W. R. M.

Flowers of *Bidens heterophylla*. The three light flowers have canary yellow rays tipped with white.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. NOVEMBER, 1900. NO. 11.

AN ORNAMENTAL SPECIES OF BIDENS.

By G. N. COLLINS.

TWENTY years ago Dr. Edward Palmer brought the first seed of *Cosmos* from the canyons near Guadalajara, Mexico, and proposed it as an ornamental. Like so many other valuable novelties it received little attention at first and was cast aside as a worthless weed. Only after considerable time, and the wide distribution of seed by the Department of Agriculture, was the plant gradually taken up by seedsmen, and made a popular flower.

Among the many species brought more recently from Mexico by Doctor Palmer were some seeds of *Bidens heterophylla*, which he thinks even more deserving of popularity than *Cosmos*. The seed was sown last spring on the trial grounds of the Department of Agriculture on the Potomac Flats. The plants have made a vigorous growth, and have produced such an abundance of handsome yellow flowers, quite unlike those of the more northern members of the genus, that it appears not impossible that this species may some day rival *Cosmos* and repeat its history. The plants have a rather spreading habit and have reached a height of four feet. The leaves, as the specific name implies, are variable in shape being either simple or two or three parted. The flower-heads are often two-and-a-half inches across with 5 to 10 rays and quite closely resemble those of *Cosmos* except in color. The disk is orange, varied with black after the dark anthers have protruded from the open flowers. The rays are orange, tipped with a lighter shade of yellow.

This species exhibits a marked tendency to sport in the color of its flowers. One well marked form found among the plants growing

at Washington has the ray flowers canary yellow tipped with white. Dr. Palmer says that in its wild state in Durango, Mexico, the flowers assume every conceivable shade of yellow and orange and that the intergradations and mingling of these colors is truly marvelous. This marked tendency to color variation would doubtless make it easy for the plant breeder to develop well marked varieties, though the natural beauty of the wild plants leaves little to be desired.

In its natural habitat *Bidens heterophylla* selects moist bottom lands and fields, and is able to thrive in a soil containing considerable alkali. The strong healthy growth of the plant on the Potomac Flats at Washington shows that it readily adapts itself to changed conditions. The time of flowering is rather later than *Cosmos;* this and the fact that it supplies the various shades of yellow lacking in *Cosmos* should certainly recommend it to admirers of that flower. Its only possible competitor in this field is *Cosmos sulphureus*, a species that is very little cultivated.

The leaves of this species of Bidens are used to some extent in Mexico as a substitute for tea, and it is cultivated about San Luis Potosi for that purpose. The beverage is prepared in the same manner as ordinary tea and is believed by the Mexicans to be slightly stimulating. When properly prepared it is not unpalatable.

In making photographs of the flowers of this plant a peculiar phenomenon was observed. The difference in color between the base and tip of the rays is barely perceptible to the eye but on the photographic plate the contrast is most striking, the bases taking black, much darker than the dark green of the leaves, while the tips appeared so dense as to print pure white, as shown in the illustrations.

The only possible explanation that suggests itself is that the base has a pure spectrum color of a very non-actinic character, while the color of the tip may be a mixture of a lower spectrum yellow with highly actinic blue or violet in proportions which approximate to our eyes the color of the base. This explanation is supported by the fact that when viewed through a blue glass the tips appear nearly white, and this also renders it impossible that the actinic character of the tips is due to the emission of ultra-violet light.

As might be expected if the above explanation is correct the contrast is somewhat reduced when an orthochromatic plate is used and with the correct color screen in entirely disappears.

U. S. Dept. of Agriculture, Washington, D. C.

Flowers of *Bidens heterophylla*, natural size. The upper taken on an ordinary plate, the lower on an orthochromatic plate with a color screen.

DRYING BOTANICAL DRYERS IN WET WEATHER.

By F. H. Burglehaus.

IN his article "Collecting Sets of Plants for Exchange" in the October PLANT WORLD, Mr. Hitchcock seems to make no reference to drying papers in damp or cloudy weather.

It is well known to all who have had much experience in the field, that a several days' stretch with no sunshine is most disasterous and will result in many black and discolored specimens—an "eye sore" to any collector who takes pride in preserving the natural colors, and making the most valuable collections.

But there is a way out of this danger if the collector is willing to do a little disagreeable work. I have preserved many valuable specimens and in first class condition, in camp, when there was no sunshine for a week or more at a time. On one occasion while collecting at Deer Lake, Wisconsin, it was a question of taking home discolored and poor specimens or devising some method for drying papers during the rainy weather. Our camp stove was small and would accommodate but a single sheet at one time, on top, so a frame of sticks was made on all sides and a few inches from the stove, where several thicknesses of paper could stand on edge and receive the full benefit of the heat.

Of course it is necessary to watch the papers closely and remove them as soon as dry, to prevent scorching. After a little experience one can tell by touching the paper with the palm of the hand if all moisture has departed.

In this way sufficient paper was dried to make several nice sets and I felt well repaid for the tedious job, regardless of the many complaints from the other members of camp who seemed to dislike more or less the odors of scorched felt.

When collecting in Western Minnesota one time the use of a farm kitchen was secured for a few hours by offering a nominal inducement to the landlady. A roaring fire in the range with two persons to handle the papers made short work of drying 2500 sheets. It is needless to say that the kitchen bore a faint (?) odor of scorched wool and the landlady might ask more for such a privilege to the next collector.

Toledo, Ohio, Nov. 13, 1900.

JACK OAKS IN OKLAHOMA.

By Charles Newton Gould.

THE rivers in Oklahoma flow southeast. Beginning on the north they are: Arkansas, Salt Fork, Cimarron, North Canada, South Canada, Washita and Red River. Throughout the Territory these streams average 25 miles a part. The country through which they flow slopes gently to the southeast. Throughout there entire course in the Territory these rivers flow across the Red-beds. This formation which comprises nearly all the rocks of the Territory consists principally of red sandstones and shales. The rivers, however, take their rise in the Tertiary formations of the Plains in the western part of the Territory or northern Texas and have brought great quantities of sand from their upper courses. With the exception of the Washita, which has a deep and narrow bed, all the streams have low sandy banks and channels from one hundred yards to half a mile wide. If there be any water in these channels it is usually a small stream scarcely more than ankle deep meandering over the sandy bed.

With reference to general topography and character of soil the whole country lies in zones or bands parallel to the course of the streams. Generally the channel hugs the sand bank. This causes the steeper slope to be on the south. In this slope numerous canyons have been carved out from the red clay and sandstone by the action of the water. North of the streams the slopes are ordinarily gentle, and are in many cases covered with sand hills. On the divide between the streams the country is usually level, and extremely fertile. So in traveling southwest at the right angles to the course of the streams one would cross first a high level prairie, then a sand hill country, then the river bottom with its bed of sand, then a rather steep slope more or less cut up with canyons, and finally the high prairie again.

It is in the sand hill region of the north slopes of the different streams that the jack oak (*Quercus Marylandica*) is found in great abundance. Whatever be the origin of these sand hills,—whether they are wind-blown deposits from the rivers to the south, or remnants of the Tertiary formation which once covered the entire country—the fact remains that here, and here alone the jack oak flourishes in central Oklahoma.

In the southeastern part of the Territory this tree is much more abundant. The sand hills of Pottawatamie, Lincoln and the eastern

part of Cleveland, Logan and Payne counties are covered with this species. It occurs to the north along the Kansas line. The post oak (*Quercus minor*) and several species of hickory and a few other hard wood trees are also found in this region. From this main body, which is a western continuation of the Ozark Forest, narrow tongues consisting almost entirely of *Q. Marylandica* extend from a distance of from fifty to several hundred miles along the northern slopes of the streams, as indicated above.

During the past summer while engaged in a geological survey of Oklahoma I had occasion to cross the different streams a number of times, and at various places. I was particularly interested in noting the habitat of this tree, and especially the most western point at which it was to be found on each river. The result is as follows: On the Arkansas a few miles north of Arkansas City, Kans., on Salt Folk, near the Salt plains in northeastern Woods county; on the Cimarron, west of Cloe in western Woods county; on the North Canadian, at Curtis in eastern Woodward county, and on the South Canadian the tree is said to extend through Day county into the panhandle of Texas. A line drawn from the point of entrance into the Territory of Arkansas and South Canadian rivers would mark approximately the northwestern limit of the tree in Oklahoma so far as noticed. I did not observe this species on the Washita. It is improbable that it grows on the upper course of this stream on account of the absence of sand hills. In regard to the Red river I am not able to speak definitely, having never examined the locality, but I have been informed that the tree is found there.

It should not be inferred that jack oaks are to be found at all points to the north of these streams. It often occurs that no trees will be seen for several miles, as for example at the ox-bow bend of the South Canadian at Taloga, but at this place the trees again appear a few miles up the river.

The sand hills among which these trees grow are ordinarily low, irregular and rounded, enclosing numerous small basin-like depressions which in wet weather sometimes catch water and are converted into miniature lakes. In dry weather these basins are grassy glades and on account of their appearance form pleasing breaks to the monotony of a jack oak thicket. For there is nothing beautiful about a jack oak forest. If there is anything more distressingly monotonous than a day's drive through such a forest it has not been my lot to ran across

it. Jack oaks are jack oaks the world over. Always the twisted black trunk, with scales of rugged bark just ready to fall off, the same dark green paddle-shaped leaves, the same half dead bristling branches, the whole thing too large for a shrub and too small for a respectable tree. In the jack oak timber the ground covering is the same too: a scant growth of bunch grass, a few tall spindling sunflowers and other weeds, and the rest sand: sand into which the wagon wheels sink over the fellows, and through which the tired horses drag the heavy wagon. Only occasionally does one encounter an open space where the grass grows high, and even these glades are but a temporary relief and by contrast only serve to increase the monotony.

There is one flower, however, that grows abundantly in the sand hills and particularly in the more open spaces among the trees that may be considered the one redeeming feature of a jack oak forest. It is the tall yellow evening primrose (*Œnothera rhombipetala*). It is a tall wand-like plant 3 to 5 feet high, with clusters of bright yellow, four-sided flowers an inch or two in diameter. It frequently grows in clumps on the sides of sand hills, and when seen in the early morning before the ephemeral flowers have begun to wither, it is a sight not easily forgotten.

But any number of species of beautiful flowers cannot compensate for the dreary monotony of a journey through the jack oaks. The tree is practically worthless, except for fuel, and the trunk is so gnarled and knotty that its value in this line is considerably lessened. It is too small for lumber, and rots so readily in the ground that it cannot be used for fence posts. In central Oklahoma, however, it is in many localities the only native tree that grows. For this reason it supplies quite a large area with fuel, and is therefore of considerable economic importance.

The University of Oklahoma, Oct. 22, 1900.

Mr. Edward L. Morris has published, in the Proceedings of the Biological Society of Washington, a paper on some West Virginia plants, being in part an enumeration of his collections made during the past season in the southeastern part of the state. It includes 47 species unreported from West Virginia, and two new subspecies, *Polypodium vulgare orcophilum* and *Vernonia gigantea pubescens*.

THE VARIETAL FRUIT CHARACTERS OF PLANTS.

By Charles A. White.

THE term fruit-character is here used to designate the sum of those peculiarities which distinguish each of the recognized varieties of fruit, or of food products, of cultivated plants, such as form, size, color, flavor, consistence and nutrient properties; and the object of the following remarks is to trace in untechnical language the shifting location within the plant of those and other varietal characters in their manifest, and more especially in their occult state.

The maintenance of plant varieties is accomplished partly by propagation from seed which has received pure pollination and partly by subdivision of already improved plants into cuttings or scions and either the grafting or re-rooting of the same. Some plants when reproduced from seed that has been fertilized by pollen from flowers of the same variety will produce fruit true to their respective varieties, and some will not. In the latter case, however, scions or cuttings will always produce plants that are true to their varietal nature, though separated from the parent stock and made to live under changed conditions These facts are respectively exemplified by the perfect reproduction from year to year of fine varieties of garden vegetables from their seed; by the production of different, and usually worthless, fruit from grape vines, garden shrubs and orchard trees which have grown from seed, and by the perfect reproduction of the fruit characters of each kind of those woody plants by means of scions or cuttings.

It is when we consider the impunity with which we are able to subdivide the woody plants referred to, and yet preserve their life and varietal nature in each subdivision, and how small a proportion of any plant is seen by ordinary observation to be concerned in the process of fruit production, that we are strongly led to inquire in what particular parts of the plant does the varietal nature of the plant and of its fruit occultly reside, and how is it transmitted from plant to plant and from one part of a plant to other parts of the same? In the case of those plants whose varieties of fruit or of food products are perpetuated by the reproduction of the plant from seed, all the varietal characteristics, while they may in a general way be said to be common property of the whole plant, unquestionably exists in immediately trans-

missible force in the embryo of its seed, and are transmitted therefrom to various points of special activity in the new plant to which the seed gives origin. In the case of those varieties of fruit which may be perpetuated only by the subdivision of the plant, the improved fruit characters of each as unquestionably do not reside in the embryo but in certain parts of the growing plant, and these must be transmitted to new plants by means of the subdivision of those already matured. In the former case the plants specially referred to are annuals, and the gardener who wishes to perpetuate their varieties needs therefore to concern himself only to secure their proper fertilization from other plants of the same variety. The fruit grower, however, need not concern himself at all about the fertilization of the seeds of his fruits unless he wishes to produce new varieties from them. His plants are of the kind whose fruit characters do not reside in the seeds, but exist with special vitality in the buds of the plant and potentially, or latently, in the growing parts of its stem and branches. The fruit characters also reside latently, in the root if the variety be represented by a directly rooted plant, and not by a grafted scion.

The determinate location in the plant of its varietal fruit characters as they have just been indicated, may be demonstrated by the process of grafting. A scion taken from a plant of an established variety and introduced into an uncultivated stock bears fruit true to that variety and not to the grafted stock. Therefore the fruit-characters are located within the scion. If the grafting be done by the process known as budding, when a single bud only is introduced into the uncultivated stock, the resulting branch is equally true to the fruit characters of the plant from which the bud was taken. Therefore the fruit-characters are located in the bud. So much we may regard as demonstrated, and we may theoretically assume that the fruit-characters in question actively exist with dominant vitality in the apical cell of the bud, are in fact, in the nucleus of that cell, just as, in other cases, they exist in the germ cell, and its nucleus, in the the earliest stage of the forming embryo.

The statement that scions of any given variety when grafted upon the stock of another kind are always true to their own variety while generally correct, needs a slight modification because the food-sap elaborated by the stock plant and supplied to the scion sometimes produces certain physiological effects upon the latter, especially if the difference between the scion and stock is considerable. A marked example of

this differentiating effect results from the grafting of scions of the pear upon stumps of young plants of the quince. In this case the scion, although taken from a standard tree, produces a dwarfed trees, and the fruit, although true to its variety as regards form, size, color, etc., differs slightly from the fruit of the standard tree from which the scion was taken. But these facts are not at variance with the truth of the statements that have been made nor with those which follow.

The potential, or latent, existence of the improved fruit-characters of a plant in its stem and branches is proved by the frequent springing therefrom of adventitious buds, which produce branches that bear fruit of the same variety as do branches from the regular axillary buds; and yet those adventitious buds originate from common cambium cells which, but for some accidental cause, would have remained reproductively inert. The latent existence of varietal fruit-characters in the root is proved by the varietal identity of the fruit of certain shrubs and trees, which have originated as suckers, with that of the original plants from the roots of which they respectively spring.

The question of how varietal fruit-characters, as well as the distinguishing varietal features of the plant, are transmitted from generation to generation and from one part of a plant to other parts of the same is an intricate and mysterious one, but certain facts concerning it seem to have been clearly ascertained. It is known that every plant is not only of cell origin but that it consists throughout of a mass of cells; that the so-called wall of each cell is the partially hardened self-covering of a protoplast or a minute individual mass of protoplasm; that the protoplasts, or as is usually said, the cells, increase by self division and with great rapidity, and that the growth of the plant really consists of this rapid and abundant cell division. It is further known that although each cell is distinct it is connected with all adjacent cells in the growing parts of the plant by exceedingly minute filaments of protoplasm, and that the physiological functions of the plant are carried on by the transmission of liquids and gases through and among this complicated colony of living protoplasts. The inference seems to be necessary that all the varietal characteristics of a plant, including its fruit-characters, are also transmitted along these physiological lines, and that every cell in every growing part of the plant receives their influence which it retains, at least latently, so long as it retains vitality. Wherever a bud is formed the entire varietal nature

of the plant of which it is a part seems to dominantly occupy in its apical cell, and the manifestation of that nature reaches its culmination in the ovary. It is within the ovary that the varietal nature is imparted to the seeds of certain plants, but not of all and only in the covering of the ovary of our ordinary fruit plants that the varietal fruit characters are developed.

Smithsonian Institute, November, 1900.

AMERICAN AND ENGLISH WEEDS COMPARED.

By Byron D. Halsted.

DR. W. G. Smith, Lecturer on Agricultural Botany in the Yorkshire College, Leeds, England, has recently published a list of "One Hundred Yorkshire Weeds". A comparison of this list has been made with the "First Century of American Weeds" prepared and widely distributed by the writer in 1890.

Below we give this list with a numeral added after those species which are in the English century. No attempt has been made to revise the nomenclature, and it is therefore fully ten years old.

1. Ranunculus acris, L. (1)
2. Ranunculus bulbosus, L. (2)
3. Barbarea Barbarea L.
4. Brassica nigra L.
5. Brassica sinapistrum Bois. (3)
6. Bursa pastoris L. (4)
7. Lepidium campestre L.
8. Lepidium Virginicum L.
9. Raphanus Raphanistrum L. (5)
10. Sisymbrium officinale L. (6)
11. Agrostemma Githago L. (7)
12. Saponaria officinalis L.
13. Alsine media L. (8)
14. Portulaca oleracea L.
15. Hypericum perforatum L.
16. Abutilon Abutilon L.
17. Hibiscus Trionum L.
18. Malva rotundifolia L.
19. Medicago lupulina L. (9)
20. Melilotus alba L.
21. Sedum Telephium L.
22. Oenothera biennis L.
23. Passiflora incarnata L.
24. Mollugo verticillata L.
25. Daucus Carota L. (10)
26. Pastinaca sativa L.
27. Diodia teres Walt.
28. Dipsacus sylvaticus Hud.
29. Achillea Millefolium L. (11)
30. Ambrosia artemisiaefolia L.
31. Ambrosia trifida L.
32. Anthemis arvensis L.
33. Anthemis Cotula L.
34. Arctium Lappa L.
35. Bidens bipinnata L.
36. Bidens frondosa L.
37. Chrysanthemum Leucanthemum L. (12)
38. Cichorium Intybus L.
39. Cnicus arvensis L. (13)
40. Erechtites hieracifolia L.
41. Erigeron Canadensis L.
42. Erigeron ramosus Walt.
43. Helenium tenuifolium Nutt.
44. Hieracium aurantiacum L.
45. Lactuca Scariola L.

46. Rudbeckia hirta L.
47. Sonchus oleraceus L. (14)
48. Taraxacum Taraxacum L. (15)
49. Xanthium Canadense Mill.
50. Apocynum cannabinum L.
51. Asclepias Syriaca L.
52. Cynoglossum officinale L.
53. Echium vulgare L. (16)
54. Lappula Lappula L.
55. Convolvulus arvensis L. (17)
56. Convolvulus sepium L.
57. Ipomoea pandurata L.
58. Datura Tatula L.
59. Physalis Virginiana Mill.
60. Solanum Carolinense L.
61. Solanum rostratum Dun.
62. Linaria Linaria L.
63. Verbascum Blattaria L.
64. Verbascum Thapsus L.
65. Veronica peregrina L.
66. Orobanche ramosa L.
67. Brunella vulgaris L. (18)
68. Lamium amplexicaule L.
69. Leonurus Cardiaca L.
70. Nepeta Cataria L.
71. Nepeta hederacea L.
72. Plantago lanceolata L. (19)
73. Plantago Rugelii Dec.
74. Amarantus albus L.
75. Amaranthus blitoides Wat.
76. Amaranthus chlorostachys Wild.
77. Amaranthus retroflexus L.
78. Chenopodium album L. (20)
79. Chenopodium ambrosoides L.
80. Phytolacca decandra L.
81. Polygonum aviculare L. (21)
82. Polygonum Convolvulus L. (22)
83. Polygonum Pennsylvanicum L.
84. Rumex acetosella L. (23)
85. Rumex crispus L.
86. Acalypha Virginica L.
87. Euphorbia Preslii Guss.
88. Euphorbia maculata L.
89. Allium vineale L.
90. Cyperus esculentus L.
91. Agropyrum repens L. (24)
92. Bromus secalinus L.
93. Bromus tectorum L.
94. Cenchus tribuloides L.
95. Eleusine Indica L.
96. Panicum capillare L.
97. Panicum crus-galli L.
98. Panicum sanguinale L.
99. Chamaeraphis glauca L.
100. Chamaeraphis viridis L.

It is seen that there is less than one quarter of the species common to the two lists. A large per cent of the crowfoots and mustards are alike to the two countries. We do not have the two poppies that are beatifully and ruinously conspicuous in the English fields, and no geraniums with us stand for the three species of the British Isles. The number of leguminous weeds of the worst class is large (7) in Doctor Smith's list; in the American century it is limited to the Trefoil common to both lists, and the white sweet clover

We have none of the rose family that is ranked in the worst hundred, while the English list includes seven species, three of them being potentillas and represented with us by the cinquefoil of the infertile open ground. The wild carrot is common to both lists; but not so the "fool's parsley" (*Ethusa cynapium* L.) of Great Britain and wild Parsnip with us.

Of the great weed order Compositae there are twenty representatives in Doctor Smith's list, and twenty-one in the American century with but five species in common, namely, yarrow, ox-eye daisy, field

(Canada) thistle, dandelion, and sow thistle. Five others of the English list are included in the second century of American weeds, published in the New Jersey Station report for 1892, thus showing that a full half are serious pests with us. It is interesting to note that *Bellis perennis* L.; *Matricaria inodora* L.; *Lampsana communis* L., and *Hypochoeris radicata* L., are proscribed in England, while with us they all, while occasionally met with, are rare as weeds of any concern to the crop growers. On the other hand we list two ragweeds (*Artemisia*) that are giant intruders in the rich prairie fields in particular; two "beggars ticks" (*Bidens*); two fleabanes (*Erigeron*), while our budrock (*Arctium*) and Cocklebur (*Xanthium*) are not the least of the composite group of which we have enough and to spare.

It is surprising that while the Solanaceae gives us *Datura Tatula*, *Solanum rostratum* and *S. Carolinense* (L.) Don., as sample species, the English list has no representative of the order. The "Scrophs", nearly equal in number, are distinct lists, the Mulleins and toad-flax evidently not being pests in the British Isles; while they instead have three Veronicas, an *Euphrasia* and *Rhinanthus crista-galli* L., the latter unfamiliar as a pest with us.

We are so familiar with the various pigweeds (*Amaranthus*), four being listed, that it seems strange to not meet any in the English century. Two spurges (*Euphorbia*) are represented in each list; but they are different species.

The number of very weedy grasses in England is much less than with us, and the couch grass (*Agropyron repens* L.) is the only one in common.

It should be said that the English list is for a comparatively small locality, while the American one pretends to cover the whole United States. It is likely that where New England only included in the American century it would be still more resemble the one for North England and Yorkshire in particular.

The Forester for November contains a number of valuable articles on forest problems in Michigan, Wisconsin, Minnesota, etc., showing that while much has been accomplished in awakening public interest, much remains to be done in way of effective legislation. It is one thing to know what should be done and quite another to pass and execute the laws for doing it.

EDITORIAL.

One of the results of the last census seems to be a conclusive demonstration of the fact that an increased proportion of those having business interests in cities are going to the country for homes. Modern rapid transit places suburban points within easy reach of these business centers, and many a person is thus enabled to own a home surrounded often by a considerable plot of land, and this leads us to our thesis, namely: a plea for the use of native plants in the beautifying of the home grounds. We have in mind such a home, the residence of one of our most distinguished ornithologists, that is a delight, not only to the owner, but to his friends and neighbors. On a piece of ground only 300 feet square over one hundred and fifty species of North American plants are growing under conditions as nearly natural as possible. They comprise trees, shrubs, and perennial and annual herbs, the whole forming in effect a miniature botanical garden, but without the stiffness and formality usually seen in such gardens. In one corner for instance, is a tangle of cat-briars, blackberry vines and wild grapes. In another corner are various species of Cornus, flanked by Viburnums, Ilexes and Rhododendrons, which furnish shade suitable for Cypripediums, Trillums, Blood-roots and ferns. Trumpet creeper, Virginia creeper and Decumaria clamber up the trunks of tall pines, and magnolias of several species, silver-bell trees and Gordonias are covered with blossoms. Individual examples of not a few forest trees are also in evidence. With larger pieces of ground the possibilities for landscape effect are of course greatly increased, and while we do not argue for the exclusion of all exotic forms, we do urge the employment of our native plants. They have been too long neglected.

NOTES AND NEWS.

In 1823 only 4,272 bushels of wheat were exported from the United States, and in 1899 the quantity had increased to 139,432,815 bushels. The export of corn shows 749,034 bushels in 1823 and 174,089,094 in 1899.

Mr. C. L. Pollard has recently described in the Proceedings of the Biological Society of Washington, a new violet (*Viola Alabamensis*) from the south. It is a dwarf, stemless plant of spreading habit related to *V. villosa* and *V. carolina*.

Small plants like Desmids, Diatoms, etc., may be preserved in water, in homeopathic vials, provided a drop of carbolic acid is added to each bottle of material. In this way they will keep for a long time with very little change of color and contents.—J. H. S., in *O. S. U. Naturalist*.

In the October number of the *Asa Gray Bulletin*, Mr. V. K. Chesnut has a valuable article on the poisonous properties of the Green spoored Lepiota (*L. Morgani*). This plant, which grows in open grassy places, is 6 to 8 inches high and has the pileus 5 to 12 inches broad. It is well distinguished by its sordid green-spores. Curiously enough, some persons appear to be able to eat this fungus without experiencing injurious effects, while others are made violently ill by it. One fatal case is recorded against it, and many in which it has produced extreme illness, and on the whole it would seem best to let it severely alone.

In the November number of the *American Journal of Science*, Prof. Lester F. Ward presents an elaboration of the fossil cycads in the Yale Museum. This collection, now by far the largest in the world, includes, no less than 731 trunks and fragments of trunks from the Black Hills of South Dakota. They are disposed by Professor Ward into 29 species, 7 of which are here described for the first time.

It has been decided to erect a separate building at the Pan-American Exposition for exhibits in Forestry. The building known as the Forestry and Mines Building, which stands on the western Mirror Lake near the buildings devoted to Horticulture and Graphic Arts, will be used exclusively for the exhibits in Mining and a structure of logs will be erected for the Forestry exhibit.

The latter building, will be about 160 feet long and constructed of hemlock logs put up in stockade fashion. The lumber interests of the Pacific Coast are taking special interest in the exhibits to be made in this building.

Special attention has been directed to *Science* by the fact that the American Association for the Advancement of Science at its recent meeting in New York decided to publish in the journal the official notices and proceedings of the Association, and to send it free of charge to all the members and fellows. The large increase in the circulation of the journal will lead to still greater influence and efficiency.

Science was reorganized six years ago, and has since been under the charge of an editorial committee, consisting of leading men of science in America, with Prof. J. McKeen Cattell, head of the Department of Psychology and Anthropology of Columbia University, as the responsible editor. It has, during this period, adequately and fully reflected the progress of science, and has been an important factor in its advancement. Its contents have maintained a high and even standard, comparing favorably with any journal in the country. It has stimulated scientific activity and interest in America and has led to a fuller recognition of American science abroad.

The first number of the *O. S. U. Naturalist*, the organ of the Biological Club of the Ohio State University, has just appeared. It contains an article on *Ampelopsis cordata* in Ohio by Dr. W. A. Kellerman, a list of additions to the Ohio flora and some directions for collecting and preserving microscopic plants.

Mr. C. D. Beadle continues his studies in Crataegus in the November *Botanical Gazette* in which he describes no less than 10 new species. The same number of the *Gazette* contains some observations on the root system of certain Cactaceæ, by C. E. Preston, in which he shows that root systems are somewhat smaller than would be naturally expected. His conclusions are as follows: "In the majority of the larger Cactaceæ there are two distinct root systems—one horizontal for absorption purposes: the other passing downward for anchorage". Mr. Preston also has a short note on the non-sexual propagation of Opuntia in which he shows that the joints intended for dissemination are obovate and have the largest spines at the distal end, and when the joints fall to the ground the spines hold up this end and press the other on the soil in the best possible position for striking root.

The *Bulletin of the Torrey Botanical Club* for October contains several of the papers which formed a part of the exercises of Torrey Day, celebrated at the New York Botanical Garden, June 27, 1900, in connection with the Botanical Section of the American Association. The first, by Dr. N. L. Britton, considers Dr. Torrey as a botanist, and shows the vast amount of work he was enabled to accomplish often in the midst of time filed with other engrossing official duties. It forms as Dr. Britton well says "a grand contribution to science, and among the most prominent of that of all students of the North American flora". This paper is accompanied by a complete bibliography of Dr. Torrey's writings, showing that his first botanical paper was published in 1819 and the last in 1874.

The work of the Torrey Botanical Club by Dr. Edward S. Burgess is the subject of the second paper, in which he sketches the activity of the club from its foundation in 1870 to the present day. Then follows a number of short reminiscenses of Dr. Torrey by Dr. James Hyatt, Prof. T. C. Porter and Prof. Charles H. Peck.

BOOK REVIEWS.

NATURE'S GARDEN. An Aid to Knowledge of our Wild Flowers and their Insect Visitors. By Neltje Blanchan. New York, Doubleday, Page & Co., 1900.

Charming in its language, instructive and entertaining in its descriptions, and above all, fascinating in its wealth of beautifully executed illustrations, "Nature's Garden" is a book which is a rare pleasure to review, and one which the scientist can recommend to his lay brethren without fear or reproach.

The arrangement is an artificial one, based on the color of the flowers. The same method was pursued in Mrs. Dana's "How to Know the Wild Flowers" and at first glance would seem to be a happy solution of the difficulties attending scientific analysis. But when it is remembered that the hues of some blossoms defy description and that frequently no two people will agree on the terminology to be employed, the color scheme for identification becomes rather visionary. Who, for example, would venture to say where pink leaves off and red begins? A very large proportion of the species, however, is supplemented by illustrations, some by the method of color photography so successfully employed in this series of popular scientific works, the majority by beautiful half tones from ordinary photographs. We can recall no similar work in which there is such a wealth of pictures to delight the eye.

By far the most valuable feature of "Nature's Garden", is the entertaining description of the modus operandi in all cases where fertilization is accomplished by insect agency. The works of Darwin, and in recent years the lectures of William Hamilton Gibson have unfolded some of the wonders of Nature's workings in this respect. But we have hitherto had no book in which there has been included as part of the specific description a statement of the exact condition by which fertilization is effected in that particular instance. The fact that the accounts are usually admirable complete and satisfactory shows the author to be a close observer and student. The book should certainly be in the hands of everyone interested in plants and their habits.—C. L. P.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

VOL. III. DECEMBER, 1900. NO. 12.

IRISES.

By F. H. KNOWLTON.

A WRITER in one of the magazines recently said that from the moment when he caught sight, for the first time, of a meadow of blue flags (*Iris versicolor*), he became a devoted admirer of all irises My own experience was similar, and I well recall the day in a New England meadow when my eyes were first opened to the curious structure and beauty of an iris flower. As a thoughtless boy I had gathered them or trampled them under foot, and they were simply *flags*, but now I was astonished that there could be such beauty and delicacy of coloring in a flower so common and well known. Since that day I have studied and collected irises in many parts of this country, and have cultivated numerous others from distant countries, and they are still, to my mind, among the most beautiful of our flowers.

Iris is a large and widely distributed genus, comprising about 160 species, mainly of the north temperate zone, being found in Europe, north Africa and temperate Asia and North America. We have in this country some 22 native species, of which number 12 are found in the northeastern states, and the remainder in the southern and western states, 5 or 6 being on the Pacific coast. Apparently the only species of the Great Basin is *Iris missouriensis*, where in many localities it is very abundant. It is a plant with tall naked stems and pale blue flowers with the sepals and petals two inches or more in length.

The dissection and study of the various parts of an iris flower will well repay a few minutes spent on it. The floral envelope is brightly colored and consists of six clawed segments united below into a tube. The three outer segments, often called sepals, are usually

dilated, spreading and reflexed, while the three inner segments are usually narrower, though sometimes nearly as broad as the outer ones. Usually they are erect and form a more or less closed dome over the other parts of the flower. There are three stamens, one before each outer perianth segment. The style is divided into three petal-like branches which arch over the stamens and bear the stigmas immediately under these mostly two-lobed tips.

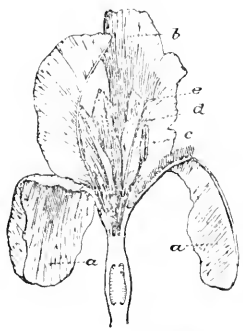


FIG. 1.—*Iris pumila.*

A section through a flower of *Iris pumila* is shown in figure 1. In this *a. a.* are outer perianth segments, *b.* inner segments, *c.* a stamen, and *d. d.* parts of two style-branches with the stigma at *e.* It will be seen that the stigma forms a shelf-like plate above the anther, and as the latter faces outward it is impossible for the pollen to reach the stigma without aid. But in this we see an admirable adaptation for the conveyance of the pollen by insects. A bee, standing on the only landing place, the reflexed sepal, thrusts its head down below the anther in searching for nectar, and on removing it carries off some of the pollen on its back which is scraped off by the stigma of the next flower visited.


FIG. 2.—*Iris cristata*

It is perhaps hardly necessary to say that Irises grow in a variety of situations from dry sand to swamps and river-banks. Thus the little *Iris verna* and *I. cristata* [see figure 2]

delight in loose soil of hillsides and shaded woods, while *I. versicolor*, the common blue flag, is at home in wet meadows and swamps. I have the former growing in my grounds and a single small plant produced seventeen blooms last spring. The latter with a number of its relatives also blooms freely for me every spring.

It may surprise some to know that over one hundred species and innumerable varieties are offered for sale by plant dealers in this country. They are very readily divisible into two groups, in the first of which the rootstock is a short, thick, or creeping rhizome and in the second the rootstock is bulbous. It would require pages upon pages to properly describe these beautiful flowers, but we shall have to be contented with mentioning a few of the principal groups. Perhaps the German Irises and their numerous varieties and allied species, are in most general cultivation. Hardly an old time garden without its clump of fleur-de-lis. They are of various colors from pure white through shades of mauve and blue to darkest purple. They are all hardy and flower in May and June.

The Japanese Irises (*I. laevigata* or *Kaempferi*) form another striking group in which the inner and outer segments are of approximately the same size and width. They range in color from white through blue to dark purple, often variously variegated and streaked. They are hardy and bloom in July.

The Oncocyclus Irises are curious dwarf plants of Persia, Palestine and Armenia, bearing solitary flowers of immense size. They may be known by the inner segments being larger than the outer, and in color they range from blue or brown to almost black. They are tender plants not much cultivated here.

The bulbous irises may be typified by the Spanish iris (*I. xiphium* or *Hispanica*), and the English iris (*I. xiphioides*) both common in cultivation.

All of our native species may be successfully grown in the home grounds, doing best of course when their native situation is imitated, but thriving under almost any treatment. By careful selection these may be planted with various exotic forms so as to give a succession of iris flowers from early spring to late July. We trust that our readers will try the transplanting of as many native species as grow in their particular localities, and give us the results of close observation on their habits and peculiarities. We venture to say that they will not regret it.

A FEW OBSERVATIONS OF ROOT-HAIRS.

By W. J. Beal.

THE root-hairs of *Agrostemma Githago L.*, and *Silene noctiflora L.*, seem to come in vertical rows from the roots. Between each two rows of hairs, there are two to three rows of cells that are destitute of hairs. Two of the first crop of hairs as seen on *Agrostemma* are here represented in Figure 1. At a later period or farther back from the root-tip appear from other cells root-hairs that are fully twice the distance of those of the first crop. Figure 2 illustrates four hairs in a row magnified to the same extent as those in Figure 1. These are about one-sixth as long as the narrow hairs in the same vicinity.

On roots of *Agrostemma* the hairs spring each from the outer or lower end of a cell as shown in Figure 3. This seems to be the rule in most plants examined though the hairs on roots of *Leonurus Cardiaca L.*, spring from the middle of the cell instead of the lower end. (Figure 4.)

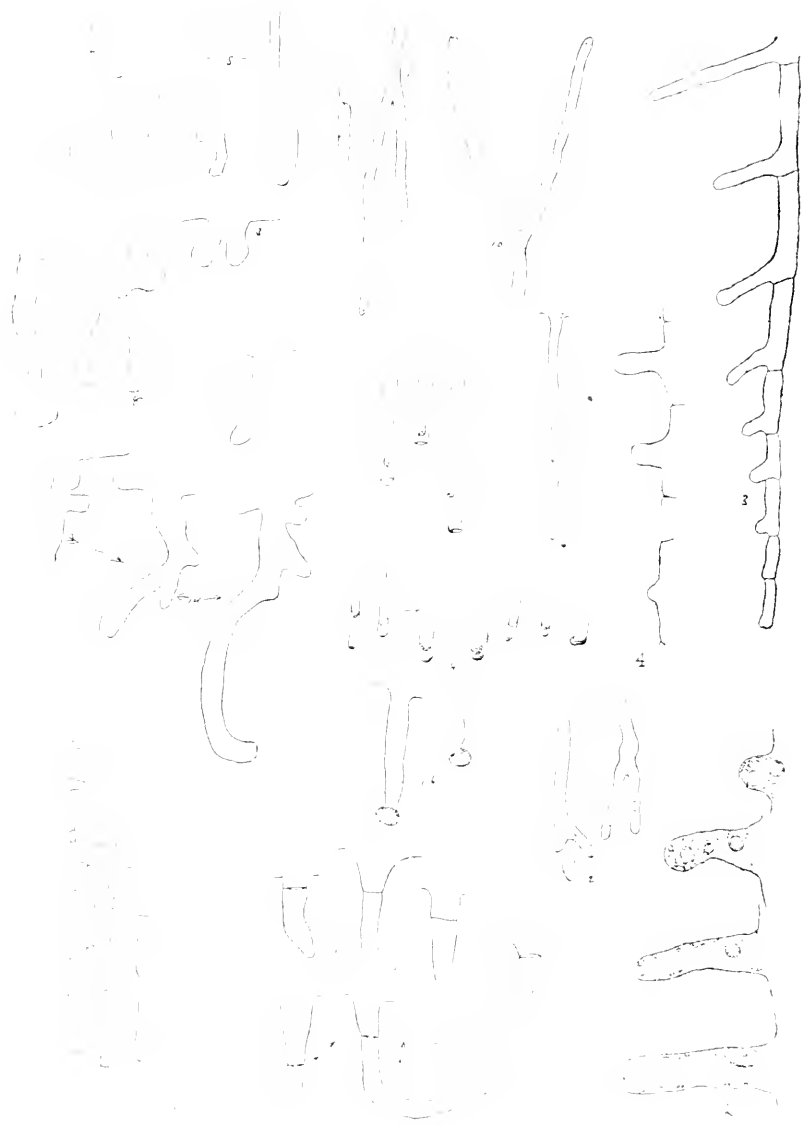
The moving contents of the hairs of *Leonurus* are thin and clear with small, distinct grains, while that of *Agrostemma* is much denser with a motion like thin flowing wax.

Root-hairs are extremely delicate and sensitive, easily affected by change of temperature, moisture and contact with foreign substances. This is a fact well-known. In my brief and interrupted observations, I could not help being impressed with the thought that where some particular conditions had caused one or two hairs to assume a particular shape, others in the immediate vicinity were likely to closely resemble them. Here on roots of wheat are numbers of hairs near each other much the shape of a stocking, (5) and in another place, they are wavy for most of their length, (6) and in another place groups are found that are enlarged or swollen near the base (7).

On one side of the root of *Rumex crispus L.*, 4 mm. long, I counted fourteen hairs with tips having a spherical expansion at the apex, (8) and several hairs on another root were of the same shape, while others were found one to three in a place like those illustrated in Figure 9.

Roots of *Plantago lanceolata L.*, were seen with many many hairs the shape of stockings. Some roots of *Chenopodium hybridum L.*, had groups of hairs with expanded spherical tips.

Root hairs of wheat are occasionally found forked, branching with



the branches of the same length (10) or of unequal length (11). One hair separated into four a little way from the base (12). *Agrostemma* bears roots which sometimes have forked hairs. I found two such near each other (13).

In close proximity, one root of *Leonurus* bore three unusual forms of hairs as represented in Figure 14.

Diligent search was made on twenty or more kinds of seedlings for septate hairs, and finally a nice lot of them was found on *Chenopodium hybridum L.*, as shown in Figure (15).

When root-hairs of wheat or other plants were very slightly dried or exposed to cold, they were seen to collapse a little back of a rather thick apex, as seen in the Figure (16).

Some of them resemble glove fingers inverted at the apex (17).

Some germinating wheat on a dinner plate covered by thick felt paper and an inverted plate was left in the laboratory for four or five weeks with very little attention. Nearly all the roots had turned brown and all the hairs had died. Perhaps half a dozen root-tips were slowly moving forward each bearing hairs. The contents of hairs found on such roots had usually disappeared, and the tips were much thickened with cellulese, in some instances to such an extent that the thickening was four times as long as the hairs were wide. Figures are given showing a variety of hairs found on such roots.

AN EXAMPLE OF DEDUCTIVE REASONING.

By Arthur Hollick.

IN nearly all scientific work two stages of progress may be noted—first the discovery of facts, second the drawing of inferences or conclusions from the facts. In some cases the latter remain as mere theories, in others they are verified by subsequent discoveries. It was my good fortune to be connected with an instance of this latter kind, which was not only exceedingly satisfactory in itself, but which was of more than local significance.

On Staten Island the Terminal Moraine is represented by a series of characteristic rounded hills and basin-like depressions, many of which latter are occupied by ponds or swamps, more or less filled up with sedimentary material, consisting of vegetable debris and inorganic silt, either blown in by the wind or washed in by the rain from the

adjacent hillsides. Theoretically such sediments must have been in process of accumulation ever since the depressions were first formed, that is since the final recession of the ice sheet from the region, so that the bottom layers should represent deposits of Quaternary age.

One of these swamps had often claimed my attention by reason of it being an excellent botanical collecting ground, consisting of a small pool of water near the middle, around which was a margin of *Sphagnum*, interspersed with tussocks of *Carex* and *Juncus*.

In the development of the land for cemetery purposes it was decided to clean out the swamp and convert it into a pond, for a better landscape effect, and in the progress of this work the entire series of sediments was removed, down to the bottom of the morainal basin.

The surface consisted of peat and black organic mud, such as may be seen in almost any swamp where there is a growth of *Sphagnum* and an accumulation of decaying vegetation. Below this however was a more sandy deposit, distinctly stratified, containing a number of logs and branches, partly lignitised, while below these, at a depth of about ten feet, was a stratum in which were finer vegetable fragments, largely consisting of cone scales and some perfect cones of a gymnosperm.

This was the first intimation of different conditions having prevailed at some period from those now in existence in the vicinity, as the present forest growth is entirely angiospermous and was such ever since the time of the earliest historical records of the Island. Furthermore, a careful examination of the cones showed them to belong to the White Spruce (*Picea Canadensis* B. S. P.)—a tree of northern range, which does not extend further south than northern New York, Vermont, New Hampshire and Maine.

This was the fact discovered and the obvious inference drawn was that the portion of the deposits in which the cones were found must represent material which had accumulated when the climate was considerably colder than now obtains on Staten Island and that it was perhaps of Quaternary age.

The evidence, however, was not conclusive, so a careful watch was maintained for any future developments, and finally, close to the bottom, at a depth of about twenty-three feet, the workmen unearthed some hard fragments which turned out to be pieces of a Mastodon's molar and the required evidence was at hand.

Columbia University, Dec. 5, 1900.

AN INDOOR ROCKERY.

Magnificent quartz crystals like the 60-lb specimen shown in the illustration, apparently fashioned for its present use, are not met with every day. However, something else would answer as well for a beehive in the stone wall, consequently the original tenants were turned out before the Pellaeas moved in. Roomy apartments on the top, grin-

ning fissures at the sides, cosy nooks and pockets here and there tempt the fern culturist to rival nature if he can. Intelligent and artistic filling of such a subject requires time and thought as well as proper selection of plants and implements for the work.

My "stock" for the occasion consisted of fine specimens of *Pellaea atropurpurea*, *Asplenium Ruta muraria*, both rare and beautiful;

Asplenium Trichomanes, the dainty English maidenhair; plenty of walking-leaf—comrades all on the limestone cliff. A *Cheilanthes* and *Scolopendrium* with *Polypodium vulgare* and dormant roots of *Phegopteris* complete the fern list. Sundry wild flowers are also in evidence. Mosses galore are essential, a few lichens, a basket of leaf mold and disintegrated lime rock are all the material we could ask of nature.

As for implements, I have discovered that a small spoon is better than a trowel for throwing loose soil into the crevices, and that a hardwood meat-skewer makes a satisfactory tamping implement. A quantity of invisible hairpins or fine brass wire, which can be easily cut and bent, is imperative for pinning the mosses closely about the fern roots; every plant is thus carpeted to prevent rapid evaporation and to beautify both rock and stone as we see it everywhere in nature. Lacquered trays are easily obtained, to show the stone to good advantage, and to make all cavities available, it is raised on a flat piece of limestone; the rest of the tray is carpeted with sphagnum or other dry moss for drainage; a light layer of soil over this gives a good base of operation. Mats of walking-leaf with the most beautiful mosses the autumn woods could furnish, relieved by wildings, herb Robert and mitrewort, form an effective setting for the clear white crystal. All of these of course are fastened with heavier pins, and no breaks, gaps or seems mar the picture before us. The subject permits much that is artistic, as clearly shown in the photograph. The combination of walking-leaf and wall rue (*Asplenium Ruta-muraria*) are, to my mind, particularly pleasing; the splendid specimens of each on the lower right of the rock are highly effective against the crystal. The splendid roots of the *Pellaea* on the top have ample room, and seams in the rock insure perfect drainage. The root of every plant is carefully tamped in and nearly all are as well supplied with room and soil as their out-of-door kin.

In the care of such an affair extremes must be avoided. An excess of moisture is as disastrous as the lack of it. An angle-necked rubber sprinkler is the only apparatus which reaches all points and can be regulated at will. Not a plant or bit of moss has a decent excuse for not doing honor to its kind, and up to date the privilege is not abused. —G. A. Woolson in *The American Agriculturist*.

HORTICULTURE AND LANDSCAPE GARDENING AT THE PAN-AMERICAN EXPOSITION.*

By Edward Hale Brush.

A THING that is almost certain to surprise the visitor to the grounds of the Pan-American Exposition is the attractiveness of the scene which is already presented six months in advance of the opening day. This is due in no small degree to the landscape effects which are in a most unusual state of forwardness.

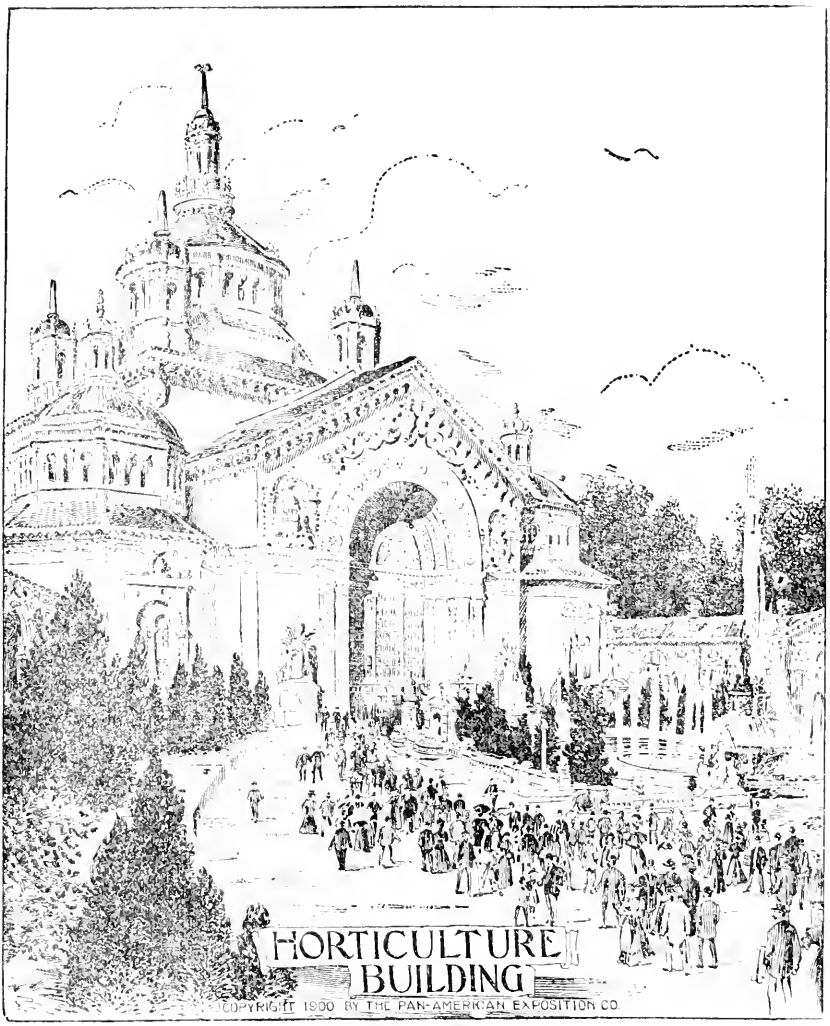
Already there are within the big fence which encloses the grounds seemingly boundless stretches of velvety lawn. A few months ago this was chiefly hard, dry, almost bare, clay. The work of the landscape architect and the horticultural department has wrought a remarkable transformation. The grass which covers these newly made portions of the site is as fresh and green as the grass of April or early May. The promenade bordered with poplars that surrounds the Grand Canal which completely encircles the grounds is already a delightful place for a stroll. The banks of the Canal are green and inviting and the poplars have attained such a growth that they already afford a pleasing shade.

Of course it is of the greatest advantage to the Exposition to have as a part of the grounds the finest portion of Delaware Park, with its lake, wooded hills, winding roads and pathways and rare shrubbery, plants and flowers. All this represents a work of 30 years and an expenditure of millions of dollars. It would be folly to alter in any radical manner the character or adornments of this beautiful park. It is natural gardening and the buildings of the Exposition which are situated in Delaware Park proper will not disturb to any material extent its present character but will add to, rather than detract from, the natural beauty of the landscape.

Highly colored and formal beds would be out of place in the environment of this park. But as one passes from the Delaware Park proper into the newly made park adjoining it where the principal group of Exposition buildings is situated the scene changes. One scarcely knows where the old park ends and the new park begins but the change is striking. Formal avenues take the place of winding roads. Straight line terraces with sharp angles, and a more generally formal arrangement of the landscape denote the gardens of the Orient and of Europe for centuries past.

*Published by courtesy of the Press Bureau of the Pan-American Exposition.

Beds of flowering plants are introduced profusely to add to the brilliancy of the general effect. In the wide spaces on either side of the great Esplanade, facing the buildings of the Government group on



the one hand and of Horticulture, Mines and Graphic Arts on the other, will be Sunken Gardens, surrounded by the choicest of flowers and bordering with such rare aquatics as the exotic Nymphæas and the Egyptian Lotus. The fountains in the center of these Sunken Gardens,

are now being constructed, the grading has been done and many of the beds of flowers are assuming shape.

In the space to the southwest of the Horticultural group, across the Grand Canal, is an extensive area which is partly wooded and partly planted with shrubs. Here, and in an adjoining area which has been left mostly clear of trees and shrubs, some of the finest floral exhibits will be made. Nurserymen, florists and horticulturists generally realize the opportunity which they will have at the Pan-American and are competing eagerly for places for exhibits. Thus the display of this character is sure to be the finest of its kind ever made and will greatly enhance the beauty of the landscape and the attractions of the Exposition as a whole.

The work on the Horticulture Building is making fine progress and the other buildings of the group, those of Mines and Graphic Arts, are nearly completed. The conservatories connecting the latter buildings with that of Horticulture are among the most beautiful architectural features of the Exposition and when filled with rare plants next summer will be a great center of interest. The conservatories are now completed and will be heated so that early in the winter they can be utilized for plants. Although not modern constructed conservatories, they have all the requisites to the growth and welfare of any plants which it will be desirable to display. During the Exposition these conservatories will be kept constantly gay with blooming plants and fine foliage, and, in fact everything new and beautiful in ornamental plants.

The many little lagoons bordering and running up from the Mirror Lakes, profusely planted with a great variety of water lilies and other aquatics, give the aspect of having been the work of years instead of months. The plants have made a vigorous growth and most of the varieties are now, in October, in the flowering stage, all of which assures beyond a doubt a fine display next year.

On the borders and margins of all the new plantations of shrubbery, groups of hard perennials have been planted, all the known hardy varieties are represented and of these 200,000 have been used. These will add a very natural and charming appearance to the grounds.

SPOT DISEASE OF THE VIOLET.

The annual sales of violets throughout the United States is estimated at not less than $1,000,000. One of the most widespread and destructive maladies known to attack the violet is the spot disease. This disease has been discussed in the florists' journals under a variety of names, but is commonly known as the "violet disease," growers not generally recognizing the fact that there is more than one malady attacking the violet.

Owing to the ravages of this disease the cultivation of the violet has been abandoned in many sections of the country, and in others it has become necessary to adopt new methods of handling the plants during the growing season.

In view of the general interest in violet culture and the importance of the knowledge of a means of preventing the disease, a bulletin has been prepared by Mr. P. H. Dorsett, of the Division of Vegetable Physiology and Pathology of the U. S. Department of Agriculture, and will soon be issued as a Bulletin No. 23, of that Division, entitled "Spot Disease of the Violet."

The bulletin says the disease attacks the plants at any stage of their growth, from the small unrooted cutting in the cutting bed to the mature plant in full flower. Plants that make a vigorous, rapid, but soft or succulent growth, are most subject to the disease. Its first appearance is characterized by small, definite, usually circular, greenish or yellowish white spots, resembling the bite or sting of an insect. They vary in size from dots scarcely perceptible to the unaided eye to spots a thirty-second of an inch or more in diameter. The point of infection is surrounded by a narrow ring of discolored tissue, usually black or very dark brown, but it changes to a lighter shade as the spots grow older. As the spot develops, the central portion remains unchanged in appearance, while the tissues immediately surrounding it, either to one side or more frequently in a circle, becomes diseased by the ramifying growth of the mycelium of the fungus through this portion of the leaf.

Various opinions have been expressed as to the cause of the disease, and suggestions as to the possible cause of treatment are numerous. Weakness of the plants, improper soil conditions, growing them in the open fields where they are exposed to drought, rains, dews, and direct rays of the summer sun, and lack of attention to proper heating, ventilation, and fumigation of the houses, are among the explanations advanced.

So far as the writer is aware, there is at present no effective remedy for the disease when it has a foothold. The principal fungicides in common use for the prevention and check of plant diseases have frequently been tried for this trouble, but with varying results.

EDITORIAL.

It is our sad duty to announce to the readers of THE PLANT WORLD the sudden death on December 23, through heart failure, of Mr. Thomas A. Williams, editor-in-chief of *The Asa Gray Bulletin* and assistant agrostologist in the U. S. Department of Agriculture.

Less than a month ago Mr. Williams signed an agreement with The Plant World Company whereby *The Asa Gray Bulletin* was to cease publication and become consolidated with THE PLANT WORLD. Mr. Williams had consented to join our editorial staff and to take charge of the cryptogamic department, in which his ripe experience and skill as a writer of popular articles would have been invaluable. In his sudden death the scientific public has lost an earnest worker, an able investigator, and a companion whose charming personality could not fail to endear him to all his associates. A biographical sketch will appear in this journal at an early date.

While the death of Mr. Williams has deprived us of the cooperation we had anticipated, the same consolidation of the two journals will take place, and with the January issue THE PLANT WORLD will be increased to 28 pages monthly, the subscription price remaining as at present. The *Asa Gray Bulletin*, which concludes its eighth volume with the December issue, has been practically a pioneer among popular American botanical journals. Originating as a Chapter publication, it has steadily developed and improved under the wise management, first of the late Gilbert H. Hicks, and afterward of Mr. Thomas A. Williams, who has just passed away. In its recent volumes the *Bulletin* has made a special feature of its mycological articles and of topics intended to be of practical aid to teachers of botany in secondary schools. Both of these lines of study will be given prominence henceforth in THE PLANT WORLD, although we are not now prepared to announce Mr. Williams' editorial successor. The Supplement, concerning which we have received many words of commendation, will be continued, the treatment extending forward through many of the higher families of plants, while the illustrations will be full and explanatory as heretofore.

We feel justified in asking not only the continued support of our subscribers, but their best efforts to aid us in securing additional readers and an increased field of usefulness in all parts of the country.

NOTES AND NEWS.

Probably the largest specimen Empress Tree—*Paulownia imperialis*—in America, is in Independence Square, Philadelphia. It is one of the first lot introduced into America about fifty years ago, and was a gift to the city by the late Robert Buist, one of America's famous nurserymen. It is now eleven feet in circumference, equalling in girth some of the old American Elms that were in the plot before the Revolution. The wood is in great demand in Japan. It is light and strong. When American forests disappear, and the planting for timber becomes a flourishing branch of agriculture, the Empress Tree will give a very good account of herself.—*Meehans' Monthly for November.*

Notwithstanding the great amount of work that has been spent on the destructive disease known as peach yellows, little or nothing is actually known as to its nature and causes. In *Science* for December 7, Mr. O. F. Cook reviews the subject and ventures the proposition that it may be the result of the poisoning of the protoplasm of the living cells by the bite of a small arthropod, probably a mite of the family Phytoptidæ. It is a well known fact that plant cells may be so poisoned by mites as to become yellow and still retain their vitality for many months or even years, as palms of the genus *Thrinax* which had been infested the so-called 'red-spider.' The proving or disproving of this theory, which will require long and close observation, will be watched with interest.

The great work by Engler and Prantl on the Natural Families of Plants (Die Natürlichen Pflanzen familien) is now approaching completion. The first part was published in 1887 and about 900 pages have been printed. This work is a Genera Plantarum, that is a descriptive of all known genera of plants. Dr. Engler now announces the inauguration of a still greater work (Das Pflanzenreich) which is to contain full descriptions of all known species of plants. When we remember that there are upwards of 300,000 species now known, we can gain some idea of the vastness of this undertaking. It will take 20 or 30 years for its completion and will of course fill thousand of pages. We shall give a more complete account of this work when the first number (which will be the family *Musaceæ*) is received.

In a letter to the editor, Mr. Walter Deane of Cambridge, Mass., states that his private herbarium now numbers 35,000 sheets. Mr. Deane's herbarium is practically confined to plants of the Gray's *Manual* region, and he has brought together the most magnificent and complete representation ever made of this flora. It is especially rich in features not usually seen in herbarium specimens, such as series from seed to mature plant, complete root-systems, etc.

Not only in Florida, but in California, orange orchards or groves are liable to injury from frost, and experiments of various kinds are being made to protect them. At the famous Riverside, in California the thermometer falls at times to freezing point. For protection, a grower at that place constructed a hot-water boiler, at a cost of $200, to run hot-water along open furrows. The water passed from the boiler at 85° when the outside temperature was 32°, the earth at 666 feet from the boiler was found to be 36° and the vapor arising from the warmed earth, protected the plants.—*Mechans' Monthly for November.*

BOOK REVIEWS.

WEBSTER'S INTERNATIONAL DICTIONARY. A New Edition revised throughout with a supplement of 25,000 additional words. Royal 4to, 2,364 pages, 5,000 illustrations. The G. and C. Merriam Co., Springfield, Mass.

The publishers of the original Webster's Unabridged Dictionary, issued in 1847, have just brought out a new edition of Webster's International Dictionary, the first edition of which appeared in 1890. In the new edition the publishers, following the example set by the Century and Standard Dictionaries, have secured the assistance of recognized authorities to prepare the definitions in the various departments of science. It is a matter of congratulation that the public interest in a precise knowledge of scientific terminology has been so strong as to effectively demand such definitions in our general dictionaries.

The definitions in botany have been prepared by Professor Lester

F. Ward, assisted by Dr. F. H. Knowlton and Mr. Charles L. Pollard. These names, well-known to the readers of THE PLANT WORLD, are in themselves a guarantee of the high character of the botanical portion of the dictionary, for those who are taking a prominent part the making of the standard literature of a science are of necessity well equipped in the knowledge of their tools. In addition to their scientific research work, too, all these gentlemen have been associated in one way or another with the popularization of botanical science.

The new dictionary adopts the classification of Engler and Prantl, the now everywhere recognized standard of general systematic botany. We can find a short, non-technical, and easily understood definition of *Archichlamydeae*. It is refreshing to find the Maple Family under the heading *Aceraceae*, distinguished from the *Sapindaceae*, with which on technical grounds and against one's scientific instinct the older botanical works included it. The number of genera and species and the general geographic distribution of each family of plants is given. The names of many tropical plants, such as *acle* and *gugal*, are a source of gratification to those botanists to whom recent political changes and commercial expansion have brought both the necessity and the desire to become better informed on tropical botany. The definitions under *lily* will bring relief to many a puzzled plant-lover misled by the popular misapplication of this name to wholly different types of plants.

The definitions are concise and plain, and one finds the modern standard botanical terms for which he is looking. It is a pleasure to welcome the old "Webster's" into the group of dictionaries in which one can find not only the words of polite literature, but the words, in which are written the scientific contributions to knowledge which have made the passing century more notable than any of its predecessors in forwarding the material progress of the world.—FREDERICK V. COVILLE.

STUDIES OF AMERICAN FUNGI: MUSHROOMS EDIBLE, POISONOUS, ETC. By George Francis Atkinson. Andrus & Church, Ithaca, N. Y. 8ov. pp. i-vi; 1-275., with 76 plates and over 150 text illustrations. Price $3.00 post paid.

This is without doubt the most important and valuable work of its kind that has appeared in this country in recent years. It is beautifully printed on heavy plate paper, and is provided with a wealth of beautiful illustrations. In preparing the book the selection has been made of

those species representing the more important genera, for the purpose of illustrating, as far as possible, all the genera of agarics found in the United States. This has been accomplished except in a few cases of the more unimportant ones. Nearly all of these genera, then, are illustrated by photographs and descriptions of one or several species, and in the more important genera like *Amanita*, *Lepiota*, *Pleurotus*, *Mycena*, *Lactarius*, *Russula*, *Paxillus*, *Agaricus*, *Coprinus*, etc., a larger number of species are very fully illustrated, showing stages of development in many instances, and with a careful comparison of the different kinds.

Among the other orders of the higher fungi many genera and species of *Polypores*, *Hedgehog Fungi*, *Coral Fungi*, *Trembling Fungi*, *Puff Balls*, *Stinkhorns*, *Molds*, etc., are illustrated and described. Among these such genera as *Boletus*, *Fistulina*, *Polyporus*, *Hydnum*, *Clavaria*, *Tremella*, *Morchella*, etc., come in for a large number of species with beautiful photographs and careful descriptions. In making the descriptions they have been drawn from studies of living specimens, in many cases showing important characters of development. An attempt has also been made to avoid, as far as possible, technical terms, or to use but few such terms, and the descriptions are intelligible to one who is not a professional student of the fungi. There is some progression in the use of the technical terms in the book, fewer of them being employed in the first part of the book; here they are explained, so that the reader becomes gradually familiar with them. The first few chapters are devoted to a description, in plain language, of the form and characters of mushrooms, as well as the course of development. In addition, there is a chapter, at the close, dealing with the more technical characters, and illustrating them.

There are chapters on the collection and preservation of the fleshy fungi; how to photograph them and keep records of the important characters, which often disappear in drying; on the selection of the plants for the table, etc. Mrs. Rorer contributes an excellent chapter on "Receipts for cooking Mushrooms", and Mr. J. F. Clark one on the chemistry and toxicology of mushrooms. There are also complete analytical keys to the genera of the agarics found in the United States, and keys to the orders of the higher fungi. The glossary deals only with the few technical characters employed in the book.

We can recommend this book and confidently state that no student, either amateur or professional, can afford to be without it.—F. H. K.