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THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

Vol. IV. JANUARY, 1901. No. 1.

SOME FILIPINO BOTANY.

By Alice Carter Cook.

THE acquisition of our island territories has enlarged the field of American science, and awakened the interest of American botanists in tropical life, for even those who may never expect to see or to specialize upon the new floras, must have some knowledge of them. Hence has arisen a demand for the literature of the subject, and conspicuous among the few books brought to light upon the natural history of the Philippines, is Blanco's monumental "Flora," published in four immense volumes at the expense of the Augustinians in 1880, and now to be obtained with difficulty for the sum of $150. It is a typical Spanish Church work, and whatever is true of the rest of it, the part of the fourth volume entitled "The Declaration of the virtue of the trees and plants which are in this land," by the parish priest, Ignasio de Mercado, Filipino, with "scientific classification" by Fra Fernandez-Villar will doubtless be found to contain many facts new to all readers, and is worthy of some attention as indicative of the high state of scientific attainment reached by the brotherhood.

The plant world of the islands has evidently followed a course quite unknown in the Western Hemisphere, and one which seems calculated to upset current theories. For example, if the seeds of calabashes "are sown without the shell, those which are formed within the fruit afterwards will be ready husked." The fruit of *Eurycles Amboinensis* "is the root," and *Tacca palmata*, which is able to preserve from the bites of serpents and beetles the one who carries the root in his hand, "has no flower nor fruit." The fruit of a species of *Anacardium* is the size of a large apple, spongy and "without seed, for this it bears outside like a great nugget."

Here is a good example of lucidity. "The Calingag and the canela are the true cinnamon, and, meanwhile, the finer is the better. The

tree of the Calingag is like that of the canela so that between the two there is no more difference than that the canela is fine and the Calingag of the mountain. But, in reality, of a truth, the canela, I speak of the Calingag, is canela, although coarse, and has the effects of the genuine and fine." Anyone should certainly be able to recognize these two varieties on first sight.

Mercado was evidently a man of broad sympathies and philosophic tendencies. Witness the following, and may it be remembered by our own tree-carvers. "For an unfortunate tree we hold the Calumpang; after having received benefits from its branches and leaves, men despise it. I say this because if the sun is hot they use the shade of the Calumpang, if it rains they do the same, if they are hungry beneath it they eat and the recompense that it finds from the passers by is that all hack its trunk, as if it were a crime to have comforted with its branches the thankless ones who come to use them when exhausted by hunger or weariness or because the skies are threatening or too intense."

In the same musing strain he speaks of *Pittosporum:* "There are some things which have a bad face and good works and others the contrary. And also there are others which are throughout good or bad. This Mamalis is beautiful inasmuch as it puts out its branches each one like a palm. Now we do not know whether it is beautiful in its properties; that depends on how one wishes to use it; because the bark of the root which looks towards the east makes a good plaster for stomach-ache," but causes great injury to certain persons. Again *Barleria* has flowers provided with numerous tiny, hurtful spines. "Of them we might say that they have good face and bad works, like some women."

The peculiar power, mentioned above, of the parts of the plant which face the rising sun is repeatedly referred to, and to the same class of facts belongs this, that the root of *Smilax China*, "which God created here," plucked when the moon is on the increase, is an even better remedy for pains, tumors, etc., than the celebrated Palo de China, which "rots the bones." Let them that do not believe this "take from the sepulchre one who has been cured by the Palo de China and they shall see all his bones rotted."

A marvelous example of magic attributes is contained in the story of a French monk who in 1658 cured a native supposed to be suffering from dropsy, by administering the powdered fruits of *Quisqualis* until he was relieved of a worm "26 yards long and of the thickness of a toston (shilling), all tubular like a reed or more like a cane." Seeing that he was still not well, the same remedy was continued until the appearance of a second parasite 14 yards long. "From this case we

conclude that Pinones are a very efficacious counteractant against poison, for this Indian was undoubtedly bewitched." The powdered root of *Aristolochia* may be also used in drink as an antidote to enchantment if the body be afterwards rubbed with a mixture of the same powder and other herbs.

Our respect for the abilities of plants cannot but be increased by the study of this work. Saffron (*Carthamus*) has so great power that, placed in the hand, it penetrates immediately to the heart. A little bag of it put on the stomach keeps one from breakfasting, and "it is certain that if given to drink in quantity it despatches from this life to the other the patient who dies at once and laughing." The seeds of *Datura metel* act like laughing gas, keeping one unconscious for a long time, "laughing, weeping, sleeping, speaking and answering while in reality ignorant of what he does." The antidote is the root itself gathered on the side which faces the east.

The water in which Romero (*Rosmarinus*) has been boiled prevents wrinkles, and is a "most healthful bath, cleansing the body from all weakness, pain, weariness, melancholy, sorrow and anxiety, preserving the strength and enlivening all the members and feelings and who uses it twice a month and sweats need fear no infirmity."

He who takes the "holy plant," *Artemisia grata*, with him when walking, will suffer no ill from the sun nor from the moon.

The sacred quality of certain plants and divine interposition in their use as medicines, are commonly spoken of. *Diospyros* is recommended for a certain skin disease if it be newly developed, but if it be of long standing, "only God our Lord will be able to take it away." The leaves of *Fleurya* applied to the pulses of one who has chills, will effect a cure in five days "by the help of God." Of *Asparagus officinalis* we are told, "blessed be God who created this plant for the aid of the poor." "It suffices for the praise" of *Brassica* that Christ our Lord compared "the holy Faith, living and pure, to the grain of mustard. But, nevertheless, we will mention here, for our advantage, some properties and virtues of this seed according to Pliny, Dioscorides and Avicena."

We clearly have much to learn of the properties of common articles of food. For example, "He who eats the least of melons is the best off for they are all congealed water and without sustaining power." Very ripe guavas are a healthful food, and two of them should be eaten after a meal, for they aid digestion, "tightening the mouth of the stomach so that its natural heat connot escape and making the food sink to the bottom of it." We have been accustomed to think of Spanish garlic as vigorous, but hardly to the extent here asserted: "He who eats a

raw ajo (*Allium sativum*) will break a bottle by blowing upon it immediately afterwards."

The medicinal value of many plants is truly marvelous, and their explanation equally so. Cane sugar given in cold water is more refreshing to one who has fever than water alone. The "reason for the water's appearing more refreshing with it is that since it is so tempered it converts itself immediately into the nature of him to whom it is given; and as it receives into itself the coldness of the water because of its spongy substance, the coldness of the latter is more felt with it than when taken alone, by the consistency of the body of the sugar itself."

With the powdered leaves of *Artocarpus integrifolius* penitents are cured, also pimples and spasms.

A native carpenter cut a toe with a hatchet so that it merely hung by the skin. The bark of the root of *Ficus altimaloo* having been applied, he returned to work on the following day, the toe healed without swelling or pain. The tree is, by the way, disliked by planters, since it often breaks down walls in its growth. The only way to kill it is said to be to cut off the branches and insert the spines of certain fish in the wounds.

Kalanchoe is another invaluable healer. If the head of a chicken be cut its whole length with a sharp knife which has been rubbed with the juice of this herb, and afterwards both parts of the wound be again anointed with the same juice, "within a Credo" the fowl will revive as if nothing had happened.

A general rule for the application of medicines speaks volumes for the trust of the physician in the common sense of the average Filipino patient. It is preceded by reference to a saying of Laguna's that every kind of sour herb may be used as a substitute for sorrel. "I say this because there are some so manacled that not having the very thing of which the book teaches them, they do not know how to avail themselves nor how to put out the hand to another fit and equivalent thing in its place." "On this account every time that there is to be found a thing equivalent in the essential particular, according to the good counsel of the reason it should be used. For example, if for a swelling, a plaster of habas be ordered when there are none, then use the flour of frijoles, or gulay Patnai, for all these seeds are, in the most essential, of the quality of habas. * * * The same is to be considered in all things which should be applied in the place of something else."

A part of the dissertation on Agarics may be quoted for the encouragement of the modern student who is perplexed by the apparent multiplicity of species of the genus: "The Agaric is some mushrooms which arise on the trunks of old trees and are so hard that they appear to be wood. There are white and black. The transparent is the bet-

ter and the most spongy and light." Then follows an enumeration of its virtues, the powder being "one of the greatest medicines there is," and to the conclusion we should like to call the attention of homeopathists: "This may be given as a general rule for the application of all remedies, 'in sicknesses and indispositions of a hot nature, things naturally cold should be used; and in cold, things hot; because every infirmity is cured by its contrary.'"

HINTS FOR BEGINNERS IN THE DETERMINATION OF GRASSES.

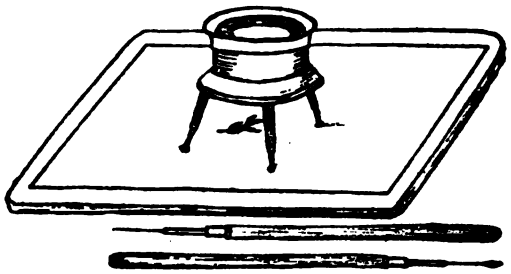
By. C. F. Saunders.

THE average botanical amateur is apt to fight shy of the grasses, as a family either too poor in interest or too full of technical difficulties to warrant his spending time upon them. Nevertheless, grasses are well worth the student's attention, if for no other reasons than the immense value they are to mankind, and their wide distribution in the earth; and when once he comes under the spell of their fascination, he will find in their study a variety of structure and a beauty of form and texture that will be as a new world to him.

The technical difficulties, so far as the thousand species of United States grasses are concerned, are far less than most beginners suppose, and if one have good eyesight, he need experience no serious trouble in the determination of his collections, except in the case of a very few genera, like *Panicum*, for instance, about which even experts find cause for disagreements. It is true, the smallness of the flower-parts in many species makes discrimination and care particularly needful, but this very fact increases the disciplinary value of their study, and adds zest to the hunt.

The following suggestions to beginners in the determination of grasses are offered by the writer with a lively recollection of his own first futile attempts, which were finally directed into easier channels by a kind friend whose method was about as follows:

Buy for about fifty cents at any store where botanical supplies are kept, a small double lens of 8 or 10 diameter power, with adjustable focus, set upon a tripod. At the same place get two dissecting needles with long handles; or, instead of these latter, you can, by sinking an ordinary needle in the end of a wooden penholder, provide yourself with a good enough substitute. One needle should be sharp and the other blunt for holding the object in place. Then, with a child's common slate (which, being black, is restful to the eye, besides throwing



Inexpensive outfit for determining grasses.

the object examined into strong relief) for an operating table, you are ready for the fray.

Grasses, unlike carices, are in best condition for working up when they are in flower, and if collected then, you may use your pleasure about studying them at once or laying them aside until a more convenient time, as, for instance, winter time. When ready to examine the specimen, break off a spikelet or two, and lay them on the slate under the field of the tripod lens; then applying your eye to the lens, and with a dissecting needle in each hand to manoeuvre the spikelet, you will have little difficulty in dividing part from part and noting thoroughly all the characteristics. A pocket lens will, of course, be the readiest means of examining other characters than those of the flowers.

Admirably arranged keys to genera and species are given in Britton and Brown's Illustrated Flora, which reduce to a minimum the difficulties of hunting down the name. Students will also find much that is helpful in F. Lamson-Scribner's illustrated publications on American Grasses, issued as Bulletins No. 7 and 17 of the United States Department of Agriculture, Division of Agrostology.

Philadelphia, Pa.

The botanical department of the Iowa State Agricultural College and Experiment Station suffered severely from the effects of a disasterous fire a few weeks ago. More than two-thirds of the general collection, including many valuable duplicates, was burned, and most of the microscopes and other laboratory apparatus were destroyed. Fortunately the herbarium of the late C. C. Parry, which is of great importance to botanists on account of the types which it contains, was saved. Dr. Pammel will have the sympathy of all scientists in the loss of so much material, accumulated after years of hard work.

THE THREATENED DESTRUCTION OF THE BIG TREES OF CALIFORNIA.

BEFORE the glacial period the genus of big trees called *Sequoia* flourished widely in the temperate zones of three continents. There were many species, and Europe, Asia and America had each its share. But when the ice fields moved down out of the north, the luxuriant vegetation declined, and with it these multitudes of trees. One after another the different kinds gave way, their remains became buried, and when the ice receded, just two species, the Big Tree and Redwood, survived. Both grew in California, each separate from the other, and each occupying, in comparison with its former area, a mere island of space. As we know them now, the Redwood (*Sequoia sempervirens*) lives only in a narrow strip of the Coast Range, 10 to 30 miles wide, extending from just within the southern border of Oregon to the bay of Monterey, while the Big Tree (*Sequoia Washingtoniana*) is found only in small groves scattered along the west slope of the Sierra Nevada mountains, from the middle fork of the American river to the head of Deer creek, a distance of 260 miles. The utmost search reveals but ten main groups, and the total number of sizable trees in these groups must be limited to figures in the thousands. It is, moreover, the plain truth, that all the specimens which are remarkable for their size, do not exceed 500.

The Big Trees are unique in the world—the grandest, the largest, the oldest, the most majestic, graceful of all trees—and if it were not enough to be all this, they are among the scarcest of known species, and have the extreme scientific value of being the oldest living representatives of a former geologic age. It is a tree which has come down to us through the vicissitudes of many centuries, solely because of its superb qualifications. Its bark is often two feet thick, and almost noncombustible. The oldest specimens felled are still sound at the heart, and fungus is an enemy unknown to it. Yet with all these means of maintenance, the Big Trees have apparently not increased their range since the glacial epoch. They have only just managed to hold their own on the little strip of country where the climate is locally favorable.

At the present time the only grove thoroughly safe from destruction is the Mariposa, and this is far from being the most interesting. Most of the other groves are either in process of, or in danger of, being logged. The very finest of all, the Calaveras Grove, with the biggest and tallest trees, the most uncontaminated surroundings, and practically all the literary and scientific associations of the species connected with it, has been purchased recently by a lumberman, who came into full possession on the 1st of April, 1900. The Sequoia and General Grant

National Parks, which are supposed to embrace and give security to a large part of the remaining Big Trees, are eaten into by a sawmill each, and by private lumber claims amounting to 1,172 acres. The rest of the scanty patches of Big Trees are in a fair way to disappear—in Calaveras, Tuloumne, Fresno and Tulare counties they are now disappearing—by the ax. In brief, the majority of the Big Trees of California, certainly the best of them, are owned by people who have every right, and in many cases every intention, to cut them into lumber.

The lumbering of the Big Tree is destructive to a most unusual degree. In the first place, the enormous size and weight of the trees necessarily entails very considerable breakage when one of them falls. Such a tree strikes the ground with a force of many hundreds or even thousands of tons, so that even slight inequalities are sufficient to smash the brittle trunk at its upper extremity into almost useless fragments. The loss from this cause is very great, but it is only one of the sources of waste. The great diameter of the logs, and, in spite of the lightness of the wood, their enormous weight, makes it impossible to handle many of them without breaking them up. For this purpose gunpowder is the most available means. The fragments of logs blown apart in this way are not only often of wasteful shapes, but unless very nice judgment is exercised in preparing the blast, a great deal of the wood itself is scattered in useless splinters. This waste, added as it is to the other sources of loss already mentioned, makes a total probably often considerably in excess of half the total volume of the standing tree; and this is only one side of the matter.

From Bulletin 28, of the Division of Forestry, U. S. Department of Agriculture.

It is a well known fact that there is often great variation in the leaves that may be selected from the same tree, or even from the same branch, but we do not recall having seen quite so striking differences as are exhibited in the specimen here figured. This specimen is a twig from the common Japanese honeysuckle (*Lonicera Japonica*) and was sent in by Dr. Charles A White, of Washington, D. C. He also sent a number of separate leaves, all taken from the same plant, showing a range from perfectly circular to ovate and narrowly linear, and from entire to deeply lobed. Three distinct types are shown in the little branch figured.—F. H. K.

The giant *Sequoia* of California.

After Pinchot, Bulletin No. 28, Division of Forestry, U. S. Department of Agriculture.

THE ROSY TRICHOLOMA.

(*Tricholoma rubicunda* Peck.)*

By E. M. Williams.

WHILE the boundary lines of the genus *Tricholoma* are hard to define, the typical species are well marked, have much in common, and are not difficult to separate from those of other genera. In general they may be said to be quite fleshy, more so than in any other genus of the gill-bearing fungi, though among the many species some may be found that are slender, and some of diminutive size. Most of the species have firm, and a few have tough flesh. The stems are generally stout, the gills numerous, often crowded and sinuate behind. Theoretically the gills must always have more or less of a sinus to belong to this genus, but a few species in which the sinus is almost if not quite wanting, are admitted because of very evident relationships in other respects. The stem is usually stout, and though in some instances quite tough, it is but little firmer in texture than the rest of the plant, and is in all species without a tough, bark-like outer skin. Neither volva nor annulus is to be found upon the stems of the Tricholomas. Variations from this rule, so far as the veil is concerned, are to be rarely met with, the species illustrated in the acompanying plate being one of these exceptions. This species, which for the present we shall designate as *Tricholoma rubicunda* Peck, has generally been considered identical with the European plant (*Tricholoma russula* Shaeffer). *Tricholoma russula* was originally described as follows: "Est fungus bicolor, solitarius, farcatus, carnosus, varius; pileo ab initio globoso, post convexo, denique infundibuliformi, subtiliter punctato; petiolo crasso, ad basin saepe tuberoso; velo, annulo, * * * nullo."†

In 1873 Professor Peck described a fungus under the name of *Tricholoma rubicunda* which differs from this in several respects, particularly in being tomentose on the margin, and in having lamellae close, sometimes forked, etc. In a later report‡ he refers the plant to the European species, quoting Fries' description, omitting any refer-

*Tricholoma rubicunda Peck. Pileus convex, then expanded or centrally depressed, viscid, slightly tomentose on the margin when young, smooth or sometimes with a few scales either on the disk or on the margin, red; lamellae close, white, becoming spotted with red, some of them forked; stem firm, equal, solid, slightly pruinose, white, often stained with red; spores .00028 x .00016 in. Plant 3-5 in. high, pileus 3-5 in. broad, stem 6-8 lines thick. Ground in woods. New Scotland, Albany county, Oct. The plant is rarely cespitose. The thin cuticle is separable. The color is suggestive of species of *Russula*.—*26th Rep. N. Y. State Museum, p. 51, 1873.*

†Fung. Bav. et Pal. No. 51, *pl. 58.*

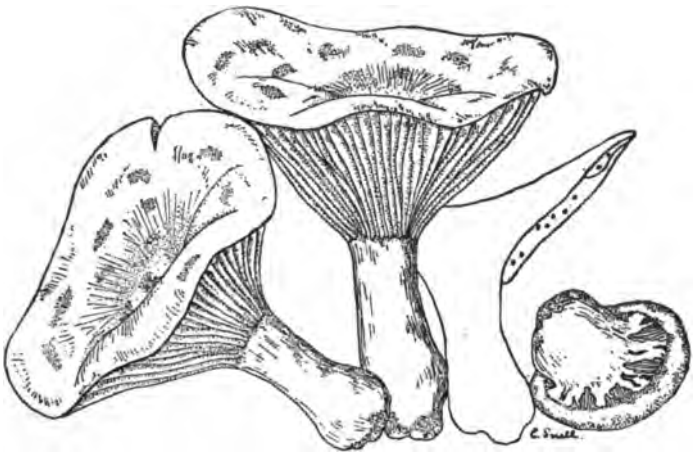
‡44th Rep. N. Y. State Mus. 42.

ence to the tomentose margin and forked gills, and being apparently satisfied that the plants are identical.

Three years ago the writer found a number of plants of what seemed to be a puzzling species of *Tricholoma* and made notes and a drawing which is reproduced in the accompanying figure. The notes are as follows: "Pileus 2-3 in. broad, slightly viscid, white or pinkish, streaked and spotted with red, rounded at first, becoming plane or centrally depressed, inflexed at first, finally expanded and often irregularly cracked and broken. Flesh white, pink under the cuticle, firm, brittle, with a pleasant taste and odor. Gills adnate when young, slightly decurrent when old, narrowed at both ends, rather crowded, occasionally forked, brittle, white, often spotted or blotched with red. Stipe 1-3 in. long, white, clothed with white or reddish fibrils and streaked or spotted with red, generally even, sometimes bulbous and sometimes attenuate, often clothed at the base with a white mycelium. In young specimens a veil is present which is somewhat fibrous as in *Cortinarius* but of a little firmer texture than is common in that genus. This veil is white or reddish and soon disappears. Spores elliptical. Found in mixed woods on high ground in Rock Creek Park, D. C., Nov. 21, 1897." It has been found several times since in similar locations about Washington, and seems to be fairly common. It is sometimes solitary, when the individuals attain considerable size, but more often occurs in clusters sometimes containing nearly a dozen individuals. It is quite a late species, seldom occurring before the latter part of September, and continuing from that time till frost. Dried plants sent to Professor Peck were said by him to be identical with his New York plant, first described as *T. rubicunda*, and later referred to Shaeffer's species.

It seems hardly likely that a plant so well known in Europe would have such an important character as the presence of a veil, even though an evanescent one, overlooked by so many botanists. Our plant has not been so thoroughly studied, but nearly all the descriptions which have come under my observation, mention the tomentose margin of the pileus, which indicates that the veil may be present. Capt. McIlvaine* lists the plant, and quotes Professor Peck's later description, adding that the margin is often downy, that the margin is frequently cracked in both young and old plants, that the apex of the stem is often not squamulose, and that the interior of the stem is fibrous and has fibrous connections with the cap of a very marked character. His plate would also indicate that the gills were somewhat forked. In Bulletin No. 5 (1897) of the Boston Mycological Club, *Tricholoma russula* is listed

* One Thousand American Fungi, 65.



The Rosy Tricholoma (*Tricholoma rubicunda* Peck).

among the edible species of the genus, but the description is very brief, and sheds no light on the characters in question. In view of these apparent discrepancies, it seems well, for the present at least, to retain for our American plant the name originally given it by Professor Peck.

However our plant may differ from the European one, it can scarcely be inferior in flavor, since it is one of the best we have. Being a clean, large-sized fungus, it is easily prepared for cooking. It is excellent fried with a little butter in a very hot skillet.

Washington, D. C.

BRIEFER ARTICLES.

The Canadian Pleistocene Flora.

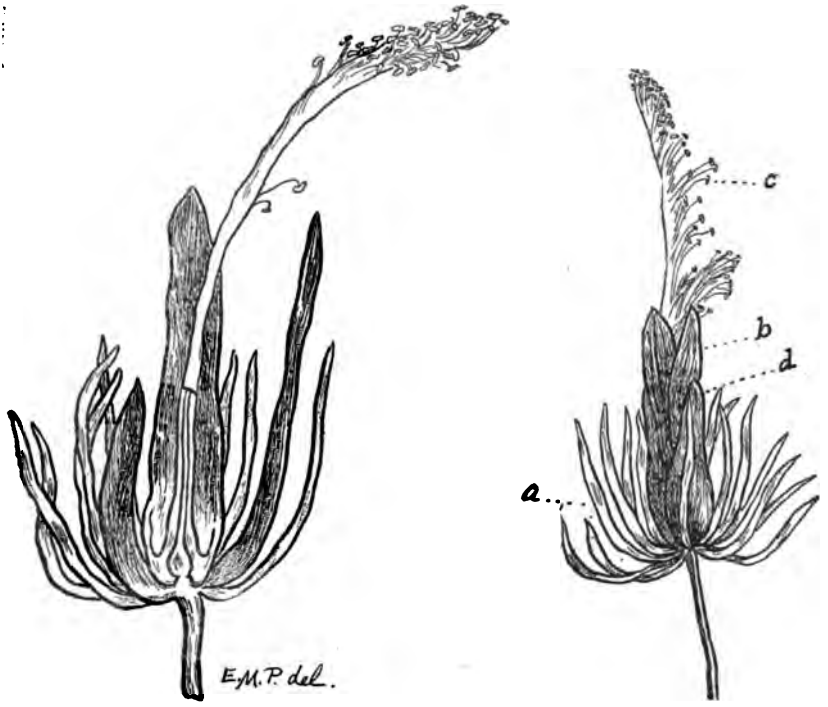
Professor D. P. Penhallow, of McGill University, has recently published (British Association for the Advancement of Science, 1900) a short but exceedingly interesting report on the Canadian Pleistocene flora. It presents the final results of investigations that have been carried on for many years regarding the plants that grew in Canada before or after the various ice invasions, or in Pleistocene time. Plants from eighteen special localities have been studied, ranging from Manitoba to Cape Breton, and particular attention has been directed to those from at least twelve locations, chiefly from the vicinity of Toronto. Eighty-three species in all have been detected, only one—a species of maple—being now extinct. The remains are mainly in the form of seeds, but leaves, twigs, and wood have also been found. They belong to plants common in some portion of Atlantic America at the present time, such as balsam fir (*Abies balsamea*), sugar and mountain maples (*Acer saccharum* and *spicatum*), papaw (*Asimina triloba*), water-shield (*Brasenia*), sundew (*Drosera rotundifolia*), Equisetums (*limosum, scirpoides* and *sylvaticum*) white, blue and black oaks, huckleberry (*Gaylussacia resinosa*), cedar (*Juniperus Virginiana*), tamarack, osage orange, black and white spruces, white pine, sycamore, oaks, of seven species, locust (*Robinia Pseudacacia*), willow, yew (*Taxus Canadensis*) arborvitæ, basswood, elms (*Ulmus Americana* and *racemosa*), cat-tail, blueberry (*Vaccinium uliginosum*), etc.

From a study of these plant-remains, Professor Penhallow concludes that in the region of Toronto during Pleistocene times there were at least two distinct periods, characterized, on the one hand, by a climate equivalent to that of the middle United States at the present day, and, on the other hand, a climate equivalent to that of northern Quebec and Labrador.

We know almost nothing of the Pleistocene flora of the United States, and a rich field is open to any one who has the time and opportunity to undertake its study.—F. H. K.

An Unusual Flower.

The accompanying picture represents the flower of a tropical plant not uncommonly cultivated in greenhouses. As it is somewhat pecu-



liar in structure, we have indicated the various parts by letters, and would be glad to receive guesses from our readers as to the names of these parts, and the botanical name of the family to which the plant belongs. The bodies designated by *a* are bright crimson in color; those at *b* and *d* are dull purplish-brown; while the fringe-like structure at *c* is pale flesh-color. The left hand figure represents the same flower in longitudinal section.

We will publish in our next issue the names of all those who send correct answers to the questions specified above.

The red squirrel is not at all particular in his taste for nuts. A hoard examined under a tree near Alexandria, Va., was found to consist of the nuts of three species, *Juglans nigra*, *Juglans cinerea*, and *Hicoria glabra*, the butternut, black walnut, and bitternut, mixed in about equal proportions.

THOMAS A. WILLIAMS.

WE have already made brief announcement in these pages of the death of our late associate, Thomas A. Williams, and we had expected to present a biographical sketch, with portrait, in this issue. But it has been determined by the former stockholders of the *Asa Gray Bulletin*, now united with this journal, that the concluding issue of Volume VIII, delayed in publication by the editor's death, should fittingly take the form of a memorial to Mr. Williams, and we therefore merely publish at this time the various resolutions adopted by the scientific and other organizations with which he was connected.

[Ed.]

BY THE WASHINGTON BOTANICAL CLUB.

The members of the Botanical Club tender their heartfelt sympathy to the family of our late friend and fellow-member, Mr. Thomas A. Williams, in whose untimely death botanical science has suffered an irreparable loss.

We have each felt his death to be a personal loss. As a friend we found him steadfast, with a kindly indulgence to the faults of others, and a constant endeavor to do the best he could under all circumstances.

His work as a botanist has been fruitful in results, and promised to be still more so in the future. As a worker in Economic Agriculture in the Department, he opened up new lines, and laid a foundation upon which others will build.

As a Club we shall feel the loss of his suggestions and his criticisms, always given in a kindly way, and always helpful, because of his broad knowledge of botany.

Mr. Williams was one of the charter members of the Botanical Club, and to his counsel the Club owes much of its success.

C. L. SHEAR,
J. G. SMITH,
A. J. PIETERS,
Committee.

BY THE WASHINGTON BIOLOGISTS' FIELD CLUB.

WHEREAS, We have learned with sorrow and a sense of deep personal loss of the sudden death of our fellow-member, Thomas A. Williams,

Resolved, That the Standing Committee of the Washington Biologists' Field Club voices the feeling of every member in paying tribute to the memory of Mr. Williams, whose gentle and kindly disposition, charming good-fellowship and sterling qualities, endeared him to every

one of us. We recall with pleasant remembrances his interest in the work of the Club and its social relationships, as well as the many delightful hours spent with him in the field. We extend our heartfelt sympathy to Mrs. Williams in this the hour of her great bereavement, which we hope may be lightened by the thought that he passed away in the same peaceful and tranquil spirit in which he had lived.

Resolved, That a copy of this tribute be sent to the family of the deceased, and that it be published in "The Plant World," of which he was an editor, and in "Science."

By direction Standing Committee, Washington Biologists' Field Club.

CHARLES LOUIS POLLARD,
Chairman.

BY THE EMPLOYES OF THE U. S. DEPARTMENT OF AGRICULTURE.

It is with feelings of profound sorrow and regret that we, the employes of the Department of Agriculture, learn that death has removed from among us our beloved companion and co-worker, Thomas A. Williams, a classmate and intimate associate of many of our number. His broad knowledge of scientific matters, his keen appreciation of nature, his kind and forbearing disposition, has endeared him to all. He was known to his associates as an indefatigable worker and investigator.

Resolved, That in the death of Professor Thomas A. Williams, science and agriculture have suffered a great loss, and we, his associates, a dear friend, whose self-forgetfulness in his kindly consideration for the feelings of others, and uniform cheerfulness, often under conditions of severe physical suffering, revealed a lovable character of the highest Christian type. The loss to the Division of Agrostology is irreparable. In the performance of his official duties he has proved himself an excellent executive, and an organizer of unusual merit, and his relations with his associates in office were always such as to command the highest esteem and respect. He never shirked a duty, and however difficult the undertaking, the work performed by him was done most creditably. His loss will be felt most keenly by his associates in the Division, and his memory will remain with them as one whose exemplary life and steadfastness of purpose they should strive to emulate.

Resolved, further, that we tender to his bereaved family our heartfelt sympathy in their great loss, and invoke for them the blessing of the Heavenly Father, who alone can heal the broken heart, and give lasting comfort.

Committee on Resolutions for the Department of Agriculture.

EDITORIAL.

At the beginning of a new year and a new century, it is perhaps appropriate that we should discuss the outlook for that particular branch of natural science to which THE PLANT WORLD is devoted. At no time in the world's history has botanical activity been so great as now, and a very large proportion of this activity has been developed during the last quarter of a century. Within this period we have seen botany take its place in our educational institutions, side by side with sister sciences, and we have noted the increase in facilities from a few hours perfunctorily spent on "analyzing" plants, to elaborate courses maintained with the aid of perfectly equipped laboratories. But we are also witnessing, it would seem, the passing of the old-time naturalist, and are becoming simply a race of pronounced specialists. Many students of the present generation are apparently content to spend their lives in the orientation of the "spindles" in a single cell, and have, or profess to have, a profound contempt for the plant as a whole. While not for a moment underestimating the value of a knowledge of all vital phenomena, and the importance of even minute investigation, we question whether it is wise to pursue this narrow line of research to the exclusion of more general study. Equally unwise is the course of the systematist who carves out new species to order from any collection submitted to him, and who ignores all the problems of plant growth and plant physiology. Yet it should not be forgotten that the study of taxonomy is, or theoretically should be, the highest type of botanical research, for it is the systematist who seizes upon the isolated facts of cytology, morphology, ecology, ontology and a dozen other "ologies," building them into a more and more complete and compact presentation of scientific knowledge. Each of these branches is, of course, of great importance, but let us not confuse the individual wheels of a machine with the connected whole. It has come to pass that in the majority of cases, botanists having a speaking acquaintance with the plants of their respective regions are almost entirely amateurs, so-called. This should not be. The latter-day scientist of the twen-

tieth century should not lay pleasing unction to his soul that he has satisfied the requirements of the age, unless, in the words of the old maxim, he knows "everything of something, and something of everything."

THE PLANT WORLD dons new robes in honor of its entry into the twentieth century and the fourth year of its existence. Our recent acquisition of the property and good-will of the *Asa Gray Bulletin* together with a substantial increase in our subscription list during the past year, has made it possible for us to enlarge the journal by four pages, and to print it upon a superior quality of book paper manufactured especially for us. The attractive new cover, designed by Mr. John H. Pellen, an artist of the U. S. Geological Survey, will be appreciated by all our readers. Mr. Cornelius L. Shear, who has joined our editorial board, will take active charge of the cryptogamic department, which he hopes to develop materially during the present volume.

THE PLANT WORLD has never been a money-making enterprise, and it is intended by the management that profits shall be at once invested in a betterment of the magazine until it reaches our ideal of usefulness and effectiveness. At the same time, business judgment and sound common sense both require that any commercial undertaking should at least be self-paying, and we must secure additional subscribers before that condition can be accomplished. The continued success of THE PLANT WORLD therefore depends upon two things: first, an increase in the subscription list, and second, a copious supply of literary contributions, so that the editors may not be hampered in making judicious selections. On another page we make some very tempting offers to new subscribers, and we ask those who receive this issue of THE PLANT WORLD to circulate it freely among their friends, calling attention to our advertisement, and to the fact that a sample copy will be sent to anyone upon receipt of a one-cent stamp.

NOTES ON CURRENT LITERATURE

Mr. Geo. B. Sudworth, of the Division of Forestry, U. S. Department of Agriculture, has just issued under the title of *The Forest Nursery*, a very valuable pamphlet containing full directions for collecting and growing tree seeds of all kinds. Just at present, when forestry is assuming such importance, this little book comes as a welcome addition.

The December number of the *Bulletin of the Torrey Botanical Club* contains, among other things, a list of the species in a small collection of Alaskan pteridophytes by Mr. Wm. R. Maxon. The collection comes mainly from the vicinity of Cape Nome, and embraces 24 species, one of which, *Dryopteris aquilonaris*, is new to science. This new species is nearest to *D. fragrans*, but is less rigid, the lower pinnae not reduced gradually, and there are fewer, much more dissected pinnules.

The Tenth Annual Report of the Wyoming Experiment Station contains a list of the cryptogams of Wyoming. This is the first list of any importance from this State. The list is necessarily far from complete, as it will require many years of careful and thorough collecting to exhaust the resources of the State in this direction. The mosses, lichens, and rusts are best represented. Much of our great West is *terra incognita* so far as its cryptogamic flora is concerned, and any effort to increase our knowledge of it is to be commended.—C. L. S.

In the December number of the *Bulletin of the Torrey Botanical Club*, Professor Chas. H. Peck describes a number of new species of fleshy fungi, among which are two Amanitas. One, *Amanita radicata* Peck, is evidently a plant which is not rare about Washington, but has heretofore been referred to *A. strobiliformis* and *A. solitaria*. The other species, *A. submaculata*, we fear is not sufficiently described to be determined with certainty, though whitish stripes or spots on the dark brown pileus are said to make it easily recognizable.—C. L. S.

GENERAL ITEMS.

One of the botanical features of the Pan-American Exposition at Buffalo next year will be the exhibit of vegetable food-products in all stages, from the plant itself to the prepared article of commerce. In the conservatories there will be an interesting exhibit of growing spice-yielding plants from North and South America.

A new technical journal of botany, to be issued at irregular intervals like Professor Greene's *Pittonia*, has been started by Mr. A. A. Heller, of Lancaster, Pa. It is called *Muhlenbergia*, in commemoration of the Pennsylvania botanist of that name, who was a contemporary of Pursh, Nuttall and Torrey. The first issue, which appeared some weeks ago, is devoted entirely to a list of new combinations which Mr. Heller had found it necessary to make for his Catalogue of North American plants.

There is usually less systematic activity in dealing with the ferns and fernworts than with any other group of plants, the generic and specific lines in this group being in general rather closely drawn, and the limitations and variations well understood. Within the past few months, however, there has been more activity among our friends the pteridologists, and we note that within a very short period new North American species or subspecies have been proposed in the genera *Dryopteris*, *Polypodium* and *Asplenium*, not to mention the elaborate studies of *Isoetes* carried on by Mr. A. A. Eaton, the preliminary results of which appear in one of the "Fernwort Papers," recently published.

An interesting series of experiments on the effect produced upon germinating plants by various alkaline solutions, is being prosecuted by the Department of Agriculture. It is found that up to a certain point, the salts act as a tonic; with solutions of greater strength they have a toxic effect, and ultimately cause the death of the seedling. This line of study becomes interesting when considered in connection with the vegetation of the alkali plains in the West, where there is often a very high percentage of salt in the soil.

BOOK REVIEWS.

CATALOGUE OF NORTH AMERICAN PLANTS. By A. A. Heller. Second Edition, Revised and Enlarged. Lancaster, Pa., 1900; published by the author.

Two years or more ago Mr. Heller undertook the somewhat thankless task of preparing a check list of the North American flora north of Mexico, embodying the nomenclature of the Rochester code, which had practically supplanted the old individual system. Though hastily prepared and rather carelessly revised, the first catalogue served a useful purpose as an exchange list and convenient reference book, and now with riper experience, more extended general studies, and the assistance of specialists in certain groups, Mr. Heller has published a catalogue that is creditable to him in many ways.

The new book contains 252 pages, and the typography is most attractive in its clearness and proper contrast of fonts. The printing is on one side of the page only, thus affording abundant opportunity for the marginal notes and corrections that everyone finds essential in using a list of this kind. We have observed a few errors, but they are not sufficiently numerous to be a source of discomfort to the reader. The author explains in his preface an unfortunate mistake which he made in numbering the genera according to the sequence of families in Engler and Prantl. We scarcely believe, however, that this generic enumeration is of much value. It would have been wiser to omit all generic numbers and insert author-citations instead.

Realizing the great deficiency in the first edition of his catalogue, Mr. Heller has added synonyms with much greater freedom, and no one accustomed to the nomenclature of Gray's Manual need have difficulty in ascertaining the equivalent of any unfamiliar name. A large number of new combinations are published in the preface, and the list is extended into the pages of *Muhlenbergia* a periodical elsewhere discussed. Mr. Heller's systematic treatment is drawn on liberal lines, and he has wisely followed, in large and difficult genera, the course of the latest monographers of each particular group. We believe that the work will find a ready sale, and that it will prove an indispensable reference check-list for amateur and professional botanists alike.—C. L. P.

A view on the Pinar Plateau, a few miles east of Consolacion del Sur. This is a common scene on the south side of the mountains of western Cuba. The area was originally covered with a dense pine forest having tall densely matted grass beneath, and a luxuriant tropical vegetation along the water-courses. A few small scattered pines remain. The swelling of the palmetto trunk shown in the view is a common condition among the palms and palmettoes of this region, and is evidently the result of starving.

A view in the Pinales or pine hills in the mountains of western Cuba, near El Guama. Formerly these trees were of dense growth and large size, but constant burning has destroyed many of them and stunted others. In the ravines occur quite different plant types, of which the tree fern is perhaps the most striking.

THE PLANT WORLD

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DEFORESTED CUBA.

By William Palmer.

THE visitor to western Cuba who has an opportunity to visit the country in the neighborhood of Havana and other large cities, must be greatly impressed with the absence of large trees, and especially of well wooded districts. The general openness of the region is rather disappointing, and this feeling is intensified by long rides upon the railways leading out of Havana.

Cuba was originally a somewhat densely wooded island, with probably little if any barren, desert-like areas. In this land of no frost, the cooking is performed entirely with the aid of charcoal. Thus the tracts adjacent to the earliest settlements were the first to be drawn upon for this most useful fuel. The growing importance of the island in the production of tobacco and sugar also hastened the deforesting. Yet another factor is the custom of the Cubans, during the winter months or the dry season, to burn off the grass in order to compel a tender young growth for the cattle and horses. Vast areas are thus irregularly burned yearly and always wantonly. The summer growth on the uplands is usually dense and composed largely of grasses which are worthless for grazing purposes. Cubans are always well supplied with matches for the indispensable cigar or cigarette, and it is an easy matter while they are passing from one point to another, to start several fires. As no care whatever is given to forest growth, and the fires have been repeated annually for generations, the result has been that seedlings and young trees have no chance to develop to a large size.

Another result, appreciated by the few thinking Cubans, is that these repeated fires have burned out the soil, so that in the pine moun-

tains especially, and where the underlying rock is near the surface, as in the Isle of Pines and the Pinar Plateau, it has been entirely removed, either by fire or by the heavy rains. The demand for charcoal is now so great that the trade is highly important, especially through the port of Batabano, where it is brought in schooners from the Isle of Pines, and from the swamp lands and mountains of the south coast. The wooded areas are constantly dwindling on account of this demand, and in a long dry season are unable to re-establish themselves. Practically all the northern portion of the pine lands in the Isle of Pines is annually burned over to furnish a little grass for a few cattle, while the immense lumber interests, so valuable now in regenerating Cuba, are thoughtlessly ignored, and the capital stock of the island, the original forest, is being wantonly destroyed. In western Cuba, on the Pinar Plateau, the view shown in the first figure is a common one. On these almost level stretches of low uplands, the coral rock is very close to the surface, and stores up the heat of the winter sun, thus preventing the retention of moisture in the thin soil. Similar conditions prevail in the pine mountains, shown in the second illustration; here the sandy shale that almost entirely makes up the hills, retains little moisture. One may walk for miles and never be out of sight of the steep slopes covered with small angular pieces of quartz, and with an almost total absence of soil. Such conditions are, of course, deplorable anywhere, but particularly so in a country like Cuba, where fuel and lumber are both necessary and valuable, and where a large proportion of the arable land is given over to such crops as sugar and tobacco.

Aside from these utilitarian features of the Cuban flora, there is another of considerable importance. The change in the topography has been so great, that the original type of vegetation exists now only in isolated places, and usually in comparatively small patches, along water courses and among rocks of the hard limestone mountains; and it is not often a conspicuous feature of the landscape. For large areas the primitive flora has been mainly replaced by dry-ground, or xerophytic plants, which have greatly extended their original ranges. Thus views like those shown in the illustrations are common, but by no means represent the former wealth of plant life occurring throughout the same areas.

If Cuba is to become prosperous, some remedy is necessary, but it is doubtful whether the people, with their habits of rarely thinking of or making preparations for the future, can be expected to apply one. Thousands of acres now utterly worthless, might, if saved from the annual burning over, be allowed to grow as they will, and would eventually produce fuel in abundance for the whole population.

Washington, D. C.

ORCHIDS IN CENTRAL PARK.

By Pauline Kaufman.

ON entering the greenhouse in Central Park where the orchids luxuriate, those wonderful tropical enigmas appearing not merely like flowers, but like creatures endowed with a higher life, a wonderful sight meets the eye. The illusion that the flowers are birds, bees or butterflies, is here fostered with care. Over the green arches, between the leaves, they peep out at us, and almost compel the belief that they will emerge from their hiding-places and flutter away.

A gleam of gold and purple reveals the well-known *Cattleya Trianae*, but even lovelier is the *Cattleya citrina*, in which a soft, pale yellow coloring predominates. More modest in plumage, and less aerial in habit are the Cypripedieae, particularly *C. insigne*, with its brownish-green mottled flowers, *C. Harrisiana*, with dull maroon flowers, and the less familiar native of Malacca, *C. barbatum*, whose oblong leaves are light green with irregular markings of a darker shade, varying greatly in different plants. The dorsal sepal of the solitary flower is large and broad, the upper part pure white, the lower flecked with purple. The petals, similar in color, are ornamented with several tufts of black hairs, while the lip is large and purplish-black. In *C. Spicerianum*, a near neighbor, the pure white upper sepal is divided by a purple line, the greenish lateral sepals being similarly marked. The shining, greenish lip is much inflated, the top of the white column spotted with violet.

The species of *Oncidium* (from the Greek word for a tumor, referring to the warty crest on the base of the labellum) show remarkable variation as regards size, form and color of the flowers, in which yellow usually predominates. From an altitude of from 12,000 to 14,000 feet in tropical latitudes, where at all times the atmosphere is cool and moist, and frost is frequent, many of our Oncidiums are obtained. The most beautiful representative of the genus is *O. Papilio*, the butterfly plant from Trinidad. The lip, with its yellow centre and red-brown border, resembles the body of the insect, the horizontal and similarly colored petals are the wings, and the long, narrow, erect reddish sepals form the antennae and palpi. The likeness is truly startling. In removing this orchid from a vase, I was surprised to find that the sepals cling to and encircle every object with which they come in contact. *O. ornithorhynchum*, in spite of the overpowering name (which means having the wings of a bird), is the very embodiment of grace. Its branching scapes are produced in great abundance, and are laden with drooping panicles of small but lovely rose-pink blossoms having the perfume of heliotrope. *O. varicosum*, with its flat, lobed, bright yellow lip, and its sepals and petals of pale dull green bearded with brown, seems to

raise a question in the mind of the uninitiated, for the preconceived idea of an orchid is a flower invariably with an inflated pouch or a full tubular lip. In its Brazilian home, this *Oncidium* has a flower scape three feet long, bearing from eighty to ninety blooms, while in Central Park the scape is about eighteen inches in length, with from thirty to forty quite large flowers.

Less interesting is a *Lycaste* of a uniform greenish-white coloration, quite unlike its useful and beautiful relative, *L. Skinneri.* The five-inch flower scape bears a single waxy flower, from five to six inches in diameter; its oblong-ovate sepals are white, tinged with rose, the petals three inches long, broadly ovate, directed forward with acutely reflexed tips, streaked and tinged with dark rose. The lateral lobes of the leaf are truncate, the middle one oblong, recurved, with a fleshy, tongue-shaped rose-purple appendage on the disc.

Close by we find a native of Nepaul, *Coelogyne cristata.* It boasts sepals and petals of virgin purity; a large patch of yellow ornaments the lip, the veins of which are fringed with gold. The numerous fragrant flowers are borne in drooping racemes. The pseudo-bulbs are oblong, shining and apple-green in color; the leaves are thin, dark green, and about nine inches long. It is strange that this inhabitant of tropical climes should have a close relative in the beautiful little *Calypso* of our own northern country.

Only one blooming plant of *Zygopetalum Mackayi* has been exhibited. It bears among the numerous leaves five erect flower scapes, each over a foot long, with five or six large flowers, strikingly colored. The sepals and petals are yellowish-green, blotched with chocolate, the white lip streaked and mottled with purplish-blue.

Many other beautiful orchids might be described, if space were only unlimited.

New York City.

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 degrees when the outside temperature was 32 degrees; the earth at 666 feet from the boiler was found to be 36 degrees, and the vapor arising from the warm earth protected the plants.—*Meehans' Monthly.*

THE MASKED TRICHOLOMA.

(*Tricholoma personata* Fr.)*

By E. M. Williams.

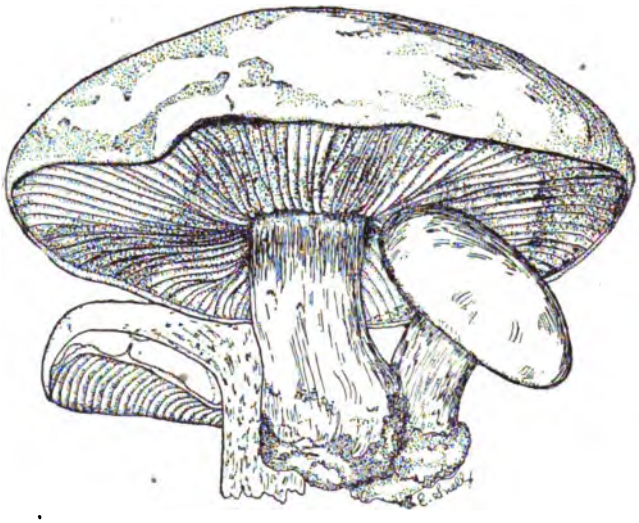
ONE of the most peculiar species of the genus *Tricholoma* is the Masked Tricholoma. It is so characteristic, that once its haunts are invaded, it is hardly likely to escape the eye of the collector. The chances are that he will class it as a *Cortinarius*, if he is at all familiar with that genus, and he may consider it very well placed as *Cortinarius violaceus*. He would not so place it, however, if, as we are told all good botanists should do, he first ascertained the color of the spores. All good botanists, however, do not like to wait for sometimes three or four hours to try to identify such an interesting plant as the one in question, and if our good botanist had named his plant provisionally and laid it away to collect the spores, he would be surprised to find that instead of their being a rusty brown, as the color of the gills had lead him to expect, they were of a very light salmon tint. Considerable doubt might now be felt as to whether the class *Leucosporii* or *Hyphorodii* should claim this wayward child. The gills are rounded behind and sometimes free, but the structure is in most respects very unlike *Lepiota* and *Pluteus*, and the plant is fleshy and compact, and bears many family traits common to *Entoloma* and *Tricholoma*. A microscopic examination of the spores shows them to be regular and smooth, and the color inclines to white rather than to a decided red, hence he concludes that it must belong to the former genus. Once located in the genus, the species is not hard to place, since it has only one relative (*Tricholoma nudum*) which closely resembles it, and these two species are easily separated by the characters of the margin of the pileus.

Of course our hypothetical botanist may have been more fortunate than to have made all the blunders indicated, but others have done worse, and these lines are written for the edification of those who do sometimes make mistakes in their determinations.

The plant under discussion will not fail to delight as well as attract the collector, for it is a dainty plant. It has a delicate pearl-gray-

*Tricholoma personatum Fr.—Pileus compact, becoming soft, thick, convex or plane, obtuse, regular, moist, glabrous, variable in color, generally pallid or cinereous tinged with violet or lilac, the margin at first *involute and villose-pruinose*, flesh whitish; lamellae broad, crowded, rounded behind, free, *violaceous becoming sordid-whitish or fuscous;* stem generally thick, subbulbous, solid, fibrillose or villose-pruinose, whitish or colored like the pileus; spores *sordid-white*, subelliptical, .0003 to .00035 in. long, .00016 to .0002 broad. Pileus 2 to 5 in. broad; stem 1 to 2 in. long, 6 to 12 lines thick.

lavender color, with a curious, half-transparent appearance, which suggests that the plant might have been manufactured of dew and cool shadows, with a glint of sunshine stirred into the mixture. The contrast between this chaste, gracefully-outlined plant, and the sombre grays and rich browns of the decaying leaves which usually surround it, makes a never to be forgotten picture.



The Masked Tricholoma (*Tricholoma personatum* Fr.)

The reason this plant bears so peculiar a name, is not always at once apparent. Several explanations have been offered by different writers on fungi. One maintains that it is so called because of its variable color; another says that because the plant appears so like *Cortinarius violaceus*, it may be said to be masquerading as a species of that genus. While each of these might be good reasons for the plant having such a name, Stevenson,* who is probably right, says that Fries gave the plant this name in contrast to that of its nearest relative, *Tricholoma nudum*, which it very closely resembles, in order to emphasize the most marked difference between the two species, viz. that *personatum* has a tomentose or masked margin, while in *nudum* the margin is naked.

In addition to the interesting relationships and fair exterior of this plant, it possesses also the added charm of being one of the most toothsome morsels to be found in the whole fungus tribe. It has long been known and eaten in the Old World. Early writers on British fungi

*Stevenson, 1: 61-2.

mention it as being on sale in the markets of that country under the name of Blewitz or Blewits. The name, it is supposed, being a corruption of "blue hats," having reference to the blue color of the caps, and indicating as well the long use of the plant for food.

The fungus is a late fall species, generally occurring from the middle of September till freezing weather. It grows in woods among decayed leaves, or in earth in which there is considerable old manure or well rotted straw. In rich soil the caps often attain a large size, sometimes reaching fully five inches in breadth of pileus. Under such conditions the plant also shows a tendency to grow in clusters, while in the woods it is most apt to be solitary. This variation would lead one to think that the fungus might be successfully cultivated artificially. In his recent work on fungi, Capt. McIlvaine * recommends covering patches of this fungus with straw or old manure to prolong their usefulness. Should one ever be fortunate enough to grow this fungus, it would have many advantages over the common field mushroom, for beside the fact that it is far superior in flavor, it may be kept more than twice as long after picking. It also dries easily, and though no record is to be found of any one eating the dried plants, the pleasant odor of the herbarium specimens indicates that they are not likely to prove inferior in flavor to other dried mushrooms.

The specific characters of this plant are so strongly marked, that it could hardly be mistaken for any harmful species. As before stated, it is much like both *Cortinarius violaceus* and *Tricholoma nudum*, but as these species are also edible, no danger would result if the species are confused. There exists no reason for carelessness, however, since among the many undescribed species of fungi there may be harmful ones closely resembling it. Unceasing vigilence is alone the price of safety for a mushroom eater.

Cooked in any of the common ways this mushroom is good, but perhaps the finest flavor is given by cooking them in a little butter in a very hot skillet. They should be covered till tender to retain the flavor, then allowed to brown for a few minutes and served either alone on a hot dish, or on slices of hot buttered toast.

Washington, D. C.

* McIlvaine, One Thousand American Mushrooms, 79-80.

A FEBRUARY OUTING IN CALIFORNIA.

By Stewart H. Burnham.

MANY Saturdays came and went, and still the dreary rain continued. At last the long looked-for bright morning came, and with many thoughts of obtaining the much coveted *Garrya* in flower, my friend and I left the campus of Stanford University early on the morning of February 9, 1895. We crossed the wheat fields and struck the Page Mill Road, which for a few miles winds in and out around the bases of the green foot-hills. Sometimes the ascent was gradual; again we were obliged to climb a steep hill, for our faces were turned toward the mountains, Black Mountain in particular.

Along Madeira Creek in the valley, *Salix lasiolepis* was in full bloom. *Meadia Hendersoni*, the shooting-star, *Cardamine Californica* and *Sanicula Menziesii* were blossoming along the roadside, mostly in the shade of shrubs. The genus *Ribes* was well represented. *R. subvestitum* is a thorny shrub with rather inconspicuous flowers. The herald of the awakening winter flora is *R. glutinosum*. I have seen it beginning to flower on Thanksgiving day, immediately after the first little showers. To-day we found its glory on the wane, as the beautiful pink and rose-colored petals had been falling for some time; still, most of the tall shrubs retained enough beauty to perceptibly enliven the landscape. *R. malvaceum* grows with *glutinosum* here, and is very much like it in many ways, but has thicker leaves, which are tomentose beneath.

Lathyrus Bŏlanderi climbs over the bushes by the aid of its tendrils; such a bower is a congenial home for the delicate maiden-hair fern, *Adiantum Capillus-Veneris*. *Castilleja foliolosa* is a shrubby Painted Cup having scarlet or yellow flowers, but it is not so abundant as its near relative, *Pedicularis densiflora*. The latter has pinnatifid leaves similar to those of our common eastern lousewort, but the flower-spike is far showier, being bright scarlet. This herb occurs everywhere on the mountains and in the chaparral, and in flower is so conspicuous that it can be seen for a great distance.

A few months previous I had seen the clustered bushes of *Garrya elliptica* along the road, part way up the mountain. As I neared the spot I hastened my steps, and at last succeeded in obtaining all that my heart could desire. The flowers are inconspicuous, but they are in graceful axillary aments, solitary or in threes, and dioecious. The leaves are opposite, coriaceous, entire and tomentose beneath. Formerly this low, branching shrub was classed as one of the Cornaceae, with which it has little in common, but it is now placed in the small family Garryaceae.

The upper portion of the road was shaded by trees of *Quercus Wislizeni* and *Q. chrysolepis*, which had evidently borne a fine crop of acorns the previous season. Just before we reached a deserted, typical, old California house, we left the wagon-road, and in a few moments stood on the summit of Black Mountain, 2787 feet above the Pacific, which is visible on a clear day. During the ascent a heavy fog had rolled in from the ocean, and hid from view the picturesque Santa Clara valley. Indeed, Santa Clara was in the cloud-land, a new sight to both of us. At times the fog would raise a bit, revealing a little of the busy world below, but such views were of short duration. Our lunch eaten, we rolled large stones down the mountain side into the dense chaparral or studied the centipedes which we found under them. The descent was made more quickly, and we reached our rooms at dusk, tired but well repaid for the trip.

Vaughns, New York.

THE DISCOVERY OF A PLUMOSE VARIETY OF THE EBONY SPLEENWORT.

By Frances B. Horton.

WHILE gathering ferns one day in September, 1900, we strolled from the cool shade and the gray twilight of the deeper woods to the rocky eastern slope beyond, the hillside home of several of our New England ferns. Nestled close to the limestone cliffs were luxuriant growths of *Asplenium ebeneum* and *A. Trichomanes* in close proximity to dense patches of *Dicksonia* and verdant knolls of maidenhair, while nearer still were the strong hardy fronds of *Aspidium marginale* clinging to the sides of rocks, or imbedded among them, and some were even in the open fields. Being in search of *Asplenium ebeneum* and *A. Trichomanes* for my fern garden and jars, my purpose was soon satisfied, and very soon I found my small basket completely filled with the desired plants, but just as I was about to leave the place, another beautiful specimen of *ebeneum* invited me to take it home. I stooped to dig up the plant, when my attention was attracted by a dainty little stranger clothed with bright green fringe from head to foot, and showing handsome erect fronds with shining dark rachises. Looking about, I discovered several more plants. Their general appearance was much like that of *ebeneum*, except for the deeply incised pinnae. The length of the longer fronds was from eight to ten inches, and of the shorter ones from three to four inches. The taller fronds

were noticeably brittle, and many of the plants had the stipes of several broken fronds standing up an inch or two above the roots.

For a while I stood and looked at the plants, and marveled at their strange appearance, realizing that they were wholly new to me; but I did not think then that they would prove to be strangers to those more wise in fern lore than myself. However, after reaching my home with the two plants, and consulting my fern books and Gray's botany without finding a name for them, I mailed a specimen to Dr. B. L Robinson, curator of the Harvard herbarium, who forwarded it to Mr. George E. Davenport, the well known fern specialist, for further investigation. Later, by request, I sent to Mr. Davenport a fresh plant with the soil attached. As the result of the study the little fern has received, it is now regarded as a plumose variety of *Asplenium ebeneum*, and Mr. Davenport has very courteously named it in honor of its discoverer, so that it is now called *Asplenium ebeneum* var. *Hortanae* Davenport.*

Several times I have visited the station, on each occasion searching in vain for fertile fronds, and leaving with the thought that perhaps the broken ends of the stipes were the remnants of fruiting fronds, broken so close to the rootstock that they told no story. Very late in the season I made a final trip, accompanied by Mr. Horton, and together we carefully covered the dainty plants with fallen leaves, both as a protection from cold and a security against danger, lest they should be observed by others and ruthlessly exterminated. We have carefully guarded the secret of the station, believing that a knowledge of it would mean the complete extermination of the variety.

Brattleboro, Vermont.

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* ASPLENIUM EBENEUM Ait., var. HORTONAE Davenp.—Habit and rootstock as in the specific form. Fronds in two series as in normal forms; lower series smallest, rosette-like in arrangement, reclining in position, normally sterile, with closely set, more or less imbricated, alternate pinnae; larger series taller, erect, abnormally sterile, with more distinct, alternate, sessile, sub-sessile or short-stalked, obliquely incised or deeply pinnatifid obtuse pinnae, the oblique lobes cuneate and coarsely serrated, the basal lobes often distinct, the upper one the largest and somewhat auriculate; laminae ½ to 2 inches broad, pinnate nearly to the pinnatifid acute apex, lower portion abruptly diminished, the reduced pinnae lobed, or divided, and wholly different from the reduced simpler lobes of the normal forms. Stipe short, and as well as the rachis, vivid chestnut, or reddish brown, glossy, terete, or obscurely furrowed along the face in the living plant, shrivelling in drying and then appearing as if striated; clothed at the base with a few delicate, linear-acuminate, ciliated, transparent scales with a central framework of brown, and containing two small vascular bundles that shortly coalesce into one; veins flabellately forked in the basal lobes, the whole system forming what Luerssen terms "Nervatio Sphenopteridis," in which some of the pinnae resemble sections of *Asplenium Adiantum-nigrum*.—*Rhodora*, 3: 1. 1901.

BRIEFER ARTICLES.

Derivation of Columbine.

At page 107 of the preceding volume of this journal are presented some curious attempts on the part of lexicographers to get at the origin of the name Columbine. In the opinion of the author, Mr. Saunders, no acceptable explanation of its derivation has ever been given; and to my mind, his own suggestion about a dovecote, as being hinted at by the columbine flower "when regarded full in the face," fails to commend itself as meritorious above those which the lexicographers had offered.

A little simple and easy grammatical analysis of such a term may be worth making. Columbine is, first of all, simply the English form of a Latin adjective *columbinus*. There was, originally, a substantive of which this adjective was the modifier, and if this long-suppressed noun could be discovered, we may say we should have an absolutely certain clew to the derivation of columbine.

In default of time for a thorough investigation of the early history of the Aquilegias, I am unable to say whether or not that suppressed substantive was ever printed. But I am sure it must have existed, if only colloquially, and at some time, perhaps very remote. I also infer that the said substantive was, in Latin, *pes*, in English *foot;* and that thus the real full name once used for the columbine was "dovefoot." This I say is an inference, not a mere guess. The inference is drawn from the fact that in another instance where the adjective columbinus formed the part of a plant name, just this noun pes formed the other part of that name. The species I have in mind is that for which Linnaeus perpetuated the old binary name of *Geranium columbinum*. Not only this particular species, but a whole group of them, found mention and description under the name, as much generic as specific, of Pes columbinus, or Dovefoot. It is manifest to me that the elastically curving mature carpels of the true geraniums reminded ancient observers of these plants of the claws of a bird; and as the dove was the most familiar of birds, the common wild geraniums obtained the name of dovefoot. Doubtless also the curved and claw-like hollow petals of *Aquilegia* caused this plant also to be designated dovefoot; and I should almost expect to find in some old books of pre-Linnaean botany, had I time to look, the name Pes columbinus assigned to this plant also.

What seems to render it quite certain that the bird's foot idea gave the origin to columbine as here applied, is the circumstance, evidently

not known to botanists of the present, that an older generic name than *Aquilegia* for this genus is *Aquilina*, evidently at first *Planta aquilina;* and this Aquilina name was, for a certain length of time, long past, the prevalent generic name. The bird's foot suggestion is here again in evidence.

Is there, in view of these few historic facts, any further room for doubt that Columbine is an alteration of Pes columbinus, dovefoot?—Edw. L. Greene, Washington, D. C.

Range of the Mistletoe in Oklahoma.

It is a curious fact that the Mistletoe, *Phoradendron flavescens* (Pursh) Nutt., which is the State flower of Oklahoma, is confined in its habitat to a comparatively small area of the territory. In this regard it is in marked contrast to the sunflower, the State flower of Kansas, which is not only rampant in all parts of that State, but also overflows into all neighboring regions.

The Mistletoe is classed among the half-parasitic plants, or those which take a portion of their food from the host and manufacture the rest themselves. It roots on the branches of deciduous trees, notably the tupelo, maple, elm, oak, and cottonwood. Its habitat, according to Britton & Brown, is "central New Jersey to Ohio, Indiana and Missouri, and south to Florida and Texas."

In Oklahoma the Mistletoe is most abundant in the southeastern part of the territory. It grows chiefly on the elm, *Ulmus Americanus*, where it sometimes forms clusters as large as a bushel basket, but is also occasionally found on the cottonwood. Being a semi-tropical plant, it can not thrive in the northern and western parts of the Territory, which are subject to occasional blizzards during the winter months. In the Indian Territory it is abundant as far north as the Cherokee Nation, but in Oklahoma comparatively little Mistletoe is found north of the North Canadian river. It is most abundant in the valley of the South Canadian, which forms the southern boundary of the Territory. In this region it is not unusual to find dozens of the large dark green clusters encircling the branches of a single elm tree. It is reported along the lower course of the Cimarron as far north as Guthrie and Stillwater, but in these localities is not at all abundant.

The severe winter of 1898-99 killed much of the Mistletoe in Oklahoma, and last year there were very few berries to be found. Even during the present season they are not nearly so abundant as formerly. Farmers and others in southern Oklahoma derive considerable income from shipping Mistletoe to the northern States to supply the Christmas trade.—Charles Newton Gould, University of Oklahoma.

Fertilization of the Closed Gentian by Bumblebees.

One of the most interesting and convenient subjects for botanical investigation is that of pollination. The innumerable shapes, colors, arrangements and devices of flowers in their relation to insects, and the agency of wind and water in pollen distribution, furnish an inexhaustible field for study.

An instance occurred last fall while a friend and myself were collecting closed gentians in low woods near Toledo, Ohio. It had been a question in my mind for several years whether or not this flower with closely plaited and folded corolla would be entered by insects as pollen carriers to insure the production of the abundant seed. Our good fortune on this occasion proved beyond a doubt that the flowers of *G. Andrewsii*, at least, are visited by insects.

A bumblebee alighted on the corolla of a fresh flower, and pried and twisted the folds apart until he succeeded in forcing his body through the aperture, when the tube closed over him without any apparent injury. A few seconds later came a disturbance in the flower, the corolla was again forced open and our insect backed out, no doubt covered with pollen to be transferred to another flower.

Several clusters of old flowers were examined by the same insect, but he passed them by without even alighting. Experience had no doubt taught him to distinguish between the old flowers and the new ones containing the cherished honey.

Besides this observation, two similar instances have come to notice, and thus still further emphasize the fact that closed gentians are entomophilous.—F. H. Burglehaus, Toledo, Ohio.

The Kudzu Vine, which has become so valuable in rapidly covering trellises, pillars, and buildings, has been esteemed mainly on this account. Its growth of over a hundred feet in a single season is truly amazing. It was distributed as *Dolichos Japonica*, though it is now said its proper baptismal name is *Pachyrhizus Thunbergianus*, derived from the enormous roots. It appears that where the plant has become strongly established, all the branches of the past year do not die back to the ground. From these enduring stems, spikes of bright purple, bean-like flowers issue. They are so hidden by the foliage as to be unobserved, but soon make themselves known by a delightful odor that is wafted to long distances around.—*Meehans' Monthly.*

GENERAL ITEMS.

The illustrations of "An Unusual Flower" which appeared in our last issue, have aroused much interest among our readers, and we shall continue to publish preblems of this character from time to time. The flower is that of a tropical species of *Pavonia*, a genus belonging to the Malvaceae; the involucral bracts are shown at *a*, the calyx at *d*, corolla at *b*, and monadelphous or united stamens at *c*.

Correct answers to all the questions were received from Mr. Fred. B. Maxwell and Professor John M. Holzinger. The family Malvaceae, to which the plant belongs, was identified by. Mr. Wm. R. Maxon, Mr. G. N. Collins, and Professor Byron D. Halsted.

President McKinley recently transmitted to Congress, with a recommendation to favorable consideration, a report of the Secretary of Agriculture on the establishment of a forest reserve or National Park in the southern Appalachian mountain region. Secretary Wilson has thoroughly investigated the hydrography and forest covering of this region, and states that land can be purchased at an average cost of only about $3.00 per acre. The region "contains the highest and largest mountain masses and perhaps the wildest and most picturesque scenery east of the Mississippi river."

A few days later Senator Pritchard introduced in the Senate a bill known as the Appalachian Park Bill, appropriating the sum of five million dollars to be expended on or before the close of the fiscal year 1910-1911, authorizing the purchase of an area not exceeding two million acres. This, if accomplished, will be the only forest reserve in the eastern States, and we earnestly hope it may be brought about.

The following resolutions, adopted by the Washington Mycological Club after the death of Thomas A. Williams, were received too late for insertion in our last issue.

WHEREAS, Death has taken from the Club our beloved fellow member and Ex-President, who from its first organization took such an active interest in the work of the Club, and spent so much of his time and energy in promoting its growth and welfare, therefore, be it

Resolved, That the Club express its deep sense of loss, and that it convey to the bereaved family its profound sympathy.

Some years ago a friend returning from Cuba brought me a souvenir in the shape of a paper-weight. It was a large, dried fruit of *Hura crepitans*, the well-known sand-box tree, which had had the interior completely filled with molten lead. It was a valued object on my desk for several months, but one morning I was surprised to find pieces of the shell scattered over the desk and about the room. The explosive property of this fruit is, of course, well known, but it was presumed that the lead would hold it together. It did not, however, and nothing now remains but this cast of the interior.—F. H. K.

The late winter is the most appropriate season for studying buds and their development. A bud, being a rudimentary branch, has all the appendages of a branch—leaves, scales, stipules, and often flowers—packed into the smallest possible compass. The mild days of February frequently cause the buds to swell, and it is then easy to dissect them and study their structure. The shoots of many plants, particularly of willows and fruit trees like the apple and peach, will develop their flower-buds in the house if cut in early spring and placed in vases of water. So also many herbaceous perennials like the hepatica, in which the buds are fully formed the preceding fall, will produce their flowers in the house ahead of the season for outdoor bloom.

The sixth annual meeting of the Vermont Botanical Club was held at the University of Vermont on January 25th and 26th. Among the more important papers presented, was that of Mrs. Frances B. Horton, which described the finding of a plumose variety of *Asplenium ebeneum* Ait. This new variety was described in the January *Rhodora*. In a paper entitled "Notes on *Tremella mycetophila* Pk." Dr. E. A. Burt gave his reasons for transferring this species of parasitic mushrooms to the genus *Exobasidium*. T. E. Hazen described some common Confervae which might be found in Vermont streams. Miss E. M. Brownell gave some interesting results of cultivating wild violets in the garden. "Are Equisetums or Ferns Poisonous?" was the subject discussed by Professor L. R. Jones. Numerous cases of horses being poisoned by Equisetums were cited. No evidence was found against the ferns. The annual address was delivered by President Ezra Brainerd. He reviewed the flora as represented in the new catalogue of Vermont plants, and suggested paths for future activities of the Vermont botanists.—C. D. Howe, University of Vermont.

NOTES ON CURRENT LITERATURE

Under the title "Fernwort Papers," the Linnaean Fern Chapter has recently issued an interesting booklet of forty-eight pages, containing five papers "presented at a meeting of fern students held in New York City, June 27, 1900, under the auspices of the Linnaean Fern Chapter." The titles and authors are as follows: "The Genus Isoetes in New England," by A. A. Eaton; "The System of Ferns proposed in Die Natuerlichen Pflanzenfamilien," by Professor L. M. Underwood; "Experiments in Hybridizing Ferns," by Miss Margaret Slosson; "Athyrium as a Genus," by B. D. Gilbert; and "On the Occurrence of the Hart's-tongue in America," by William R. Maxon. In the first-mentioned are contained descriptions of all the New England forms, of which four species and one variety are regarded as new.

The first number of the second series of the *Bulletin de L'Herbier Boissier* has recently appeared. It contains two articles of interest to cryptogamic botanists; one by H. Christ on a collection of ferns from the upper Amazon, collected by Dr. J. Huber, and containing a list of 32 species with notes and descriptions of one new species of *Polybotrya* and four of *Selaginella*, and the other by H. and P. Sydow on new Brazilian fungi collected by Ule, in which two new genera and thirty new species are proposed. The new genera are *Lycopolia* Sacc. & Syd., belonging to the Pyrenomycetes, and *Pazschkeella* Syd., among the Fungi Imperfecti.—C. L. S.

In the January *Botanical Gazette* Professor C. S. Sargent presents the second of his valuable papers on new or little known North American trees, in which he describes a new *Gleditsia* (*G. Texana*), and some seven new arborescent species of *Crataegus*. The *Gleditsia* is a tree 100 to 120 feet in height, with a trunk rarely more than 2½ feet in diameter. It grows in the high, rather dry bottom-lands of the Brazos river, Texas, and may be readily distinguished from the common honey-locust (*G. triacanthos*) by having spineless branches and smoother pale bark.

Dr. John W. Harshberger has just published in the *Proceedings of the Academy of Natural Sciences of Philadelphia*, a valuable "Ecological Study of the New Jersey Strand Flora."

EDITORIAL.

The widespread development of popular interest in the study of plants and plant life during the past few years, is evidenced by the mushroom-like growth of numerous periodicals devoted more or less to the subject of botany. Many of the universities, academies and scientific societies now have their own organs, while the Torrey Botanical Club, one of the oldest and strongest organizations of its kind in the country, has recently started the publication of *Torreya*, a twelve-page monthly devoted to notes and short articles of a less technical nature than the papers appearing in the *Bulletin* or the *Memoirs*. The prosperous journal of the New England Botanical Club, *Rhodora*, has just completed its second year; and the past summer has witnessed the revival of that entertaining product of the Pacific coast known as *Zoe*. A Pennslyvania botanist has commemorated the name of Muhlenberg in *Muhlenbergia*, which is to appear at irregular intervals, whenever suitable matter shall be at hand. We believe, however, that New Jersey has carried off the palm for journalistic nomenclature in the shape of a monthly published at Plainfield, devoted exclusively to popular botany, and rejoicing in the title "*The Gamophyllous*." This singular appellation led to a curious error in the final issue of the *Asa Gray Bulletin*, where the name is printed "The Gamophyllons."

We consider competition an excellent thing, and doubtless many of these publications, particularly those of the amateur type, perform a distinct service in keeping alive the flame of interest in nature study. Yet it must be admitted that through consolidation of several small journals into one large one, it becomes possible to serve the reading public with better articles, more reading matter, and superior illustrations for the same price, and greatly simplifies the work of the student who is compelled to examine the bulk of current scientific literature. There should always be a well-grounded reason and a manifest need for the establishment of a new periodical before it is launched on the stormy seas of journalistic enterprise.

We have received many words of commendation from our subscribers on the fine appearance of our January issue, and we have been particularly gratified with the cordial support extended to the journal by former readers of the *Asa Gray Bulletin*. In this connection we would call the attention of our readers to the demand for back volumes of the *Bulletin*, which will shortly result in exhausting the stock. We can still supply a limited number of complete sets at a price which is quite low in view of the fact that the *Bulletin* is now extinct, and will increase in value and interest for that very reason.

The two beautiful half-tones accompanying this issue of the Supplement were made from photographs taken by Mr. Carl Krebs, of Cleveland, Ohio. They are the first of a large series of similar photographs of plant subjects recently purchased by THE PLANT WORLD from Mr. Krebs, which will appear from time to time in our pages. We have acquired the exclusive rights of publication for these photographs, although prints may be secured from Mr. Krebs.

BOOK REVIEWS.

CONTRIBUTIONS FROM THE U. S. NATIONAL HERBARIUM, VOL. VII. No. 1. A Monograph of the North American Umbelliferae, by John M. Coulter and J. N. Rose. Issued December 31, 1900. Government Printing Office.

A copy of this valuable contribution reached us on the last day of the year, in time to signalize by its production the closing quarter of a memorable century of botanical activity along taxonomic lines. Not the least remarkable feature of this period has been the development of the modern theory of a monograph. In the earlier years of the century, notably in the works of LeConte and Torrey, we are accustomed to find a bare conspectus of the known species of a genus, with brief descriptions, and possibly a short key. This rather unsatisfactory style of treatment has been succeeded by more and more elaborate works, until at the present time a monograph frequently contains, in addition to a full exposition of synonomy, an enumeration of all the herbarium specimens consulted, and a discussion of the systematic

relationships of the genus in question, to say nothing of figures of the species, extended keys and diagnoses, and the most detailed measurements of the individual parts of a plant. Such a work is the logical outcome of the modern doctrine of "expansion" as applied to botanical taxonomy, and without this very complete literature of the subject, it would be impossible for all but actual specialists to identify the species of difficult genera.

The new monograph of Professor Coulter and Dr. Rose is typical of this progressive spirit. The work begins with a complete bibliography of the subject, arranged in three distinct periods; then follows a list of the new species described since the publication of the "Revision of North American Umbelliferae" by the same authors in 1888; a conspectus of the native and introduced genera; and a list of post-Linnaean genera based on a single species. Passing to the text of the book, the reader will be quick to notice and appreciate the illustrations of enlarged fruits and fruit-sections, placed in each case in juxtaposition with the generic descriptions to which they pertain. The specific diagnoses, in addition to a full statement of synonomy and geographic range, include a citation of the type locality and a large share of the specimens examined by the authors.

We fear that our more conservative friends will experience a slight shock when they observe the lavish liberality with which generic lines are drawn by Messrs. Coulter and Rose. The most notable illustration of this may be seen in the expansive tendency of the original *Cymopterus*, which has now developed into *Cymopterus*, *Glehnia*, *Phellopterus*, *Pteryxia*, *Aulospermum*, *Rhysopterus* and *Pseudocymopterus*. Yet even a casual examination of fruit characters in these different genera, as displayed in the text figures, must convince the reader that they rest on a substantial natural foundation.

With the exception of the few inevitable typographical errors, the reviewer will find this work almost without defects, and in the writer's opinion it is the most complete and satisfactory presentment of a family that has come to the attention of latter-day botanists.—C. L. P.

A MONOGRAPH OF THE ERYSIPHACEAE. By E. D. Salmon, F. R. S. Memoirs of the Torrey Botanical Club, Vol. IX.

This is one of the most important of recent contributions to systematic mycology. The author, who did most of his work at Kew, has had unusual facilities in the way of exsiccata and literature, and has treated his subject in a thorough and comprehensive manner. Following the introduction is a chapter on "Morphology and Life-History," in which is brought together the latest results of investigations along these lines. Next a short history of previous systematic studies of

these plant is given, beginning with Linnaeus, who included them in his genus *Mucor*. The connection and relation between host and parasite are discussed, and some interesting data regarding distribution given. Some curious instances are given of species described as occurring on plants upon which the fungus did not originate, its presence being apparently accidental. The author thinks these instances may be accounted for in some cases by the rubbing together of dried specimens, or the repeated use of the same driers to which the perithecia might adhere. It seems to us hardly probable that either of these suggestions would account for the presence of the perithecia which have been reported as occurring on *Fomes fomentarius*. It appears more probable that the perithecia become accidentally detached from plants growing in close proximity to the one on which they are reported. However, the fact of such accidental occurrence should impress upon collectors and authors the necessity of carefully guarding against such errors.

In his treatment of species, the author is very conservative. Saccardo in his "Sylloge Fungorum" recognizes 111 species and 1 variety, with 20 other "dubiae vel inquirendae." In the present monograph, but 49 species and 11 varieties are recognized. Of these, 3 species and 2 varieties are described as new. This is in rather striking contrast to the present tendency to multiply species. This broad conception of species we are inclined to attribute in large part to the close comparative study of a great abundance of material from various parts of the world. One can scarcely examine in an unprejudiced manner a large series of specimens of any group of plants without recognizing their great variability, and the indefiniteness of the dividing lines which necessitates a more or less arbitrary separation if any is to be made. A careful study of types or authentic specimens of many of the species of the older authors has cleared up numerous cases of doubtful identity and synonomy, and quotations of original descriptions from publications which are inaccessible to many students, give opportunity for judging the correctness of the author's interpretations. Citations of literature, exsiccatae and synonyms are unusually complete. The work is illustrated with nine plates, which add greatly to the value of the book. More careful and exact citations of the types of species in the cases in which such exist, would have increased the value of the work. This omission is particularly noticeable in the case of the new species described. The question of generic types is one which must also be met in the near future, if any great degree of stability or uniformity in nomenclature is to be secured. The work as a whole is most commendable, and must remain for a long time the authority on this group of fungi.—C. L. S.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

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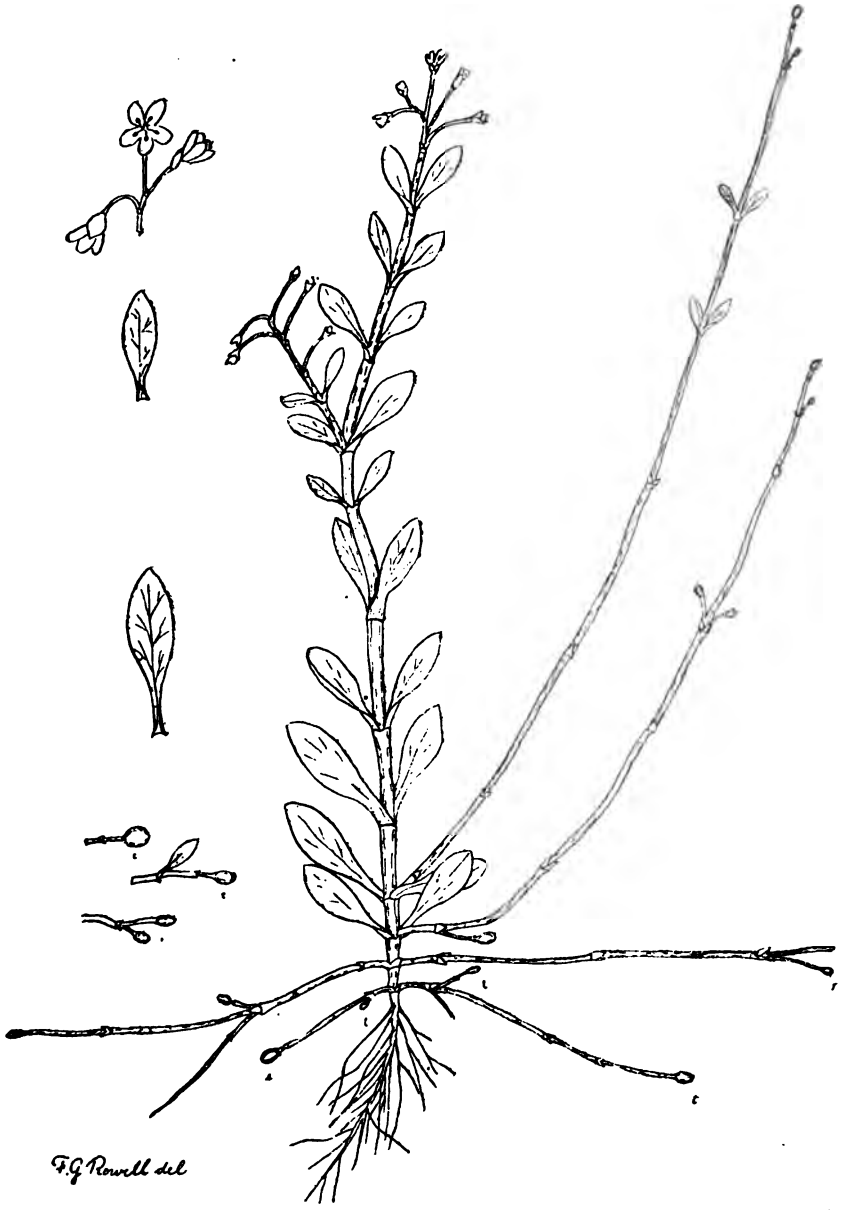
THE DURATION OF CLAYTONIA CHAMISSOI Ledeb.

By John M. Holzinger.

IN June, 1889 (June 18 and 19), the writer, in company with Messrs. Grant Van Sant and Glen Morgan, two young student friends, made a botanical trip by rowboat from Winona down the Mississippi as far as La Crosse. The main purpose was to re-discover a small colony of Kentucky coffee trees seen near Dresbach in 1882. These were not found again. Instead, an herbaceous plant was included in the collection which proved to be a curious intruder into the flora of the Mississippi valley—*Claytonia Chamissoi*. In a letter to Dr. J. M. Coulter during that season, it was pointed out that this plant seemed to be a *perennial*, but agreed in every other respect with the descriptlon of Chammisso's Claytonia. That distinguished botanist kindly verified the determination. More recently, when Britton & Brown's Flora appeared, the plant was still characterized as an annual. Under these circumstances, it seems proper to put on record a correction, insignificant though it be, and to establish beyond doubt the perennial character of this plant.

The accompanying figure, representing a luxuriant plant a little past bloom, drawn by my friend, Mr. Frank Rowell, shows from the lowest nodes of the annual stem, the stolons mentioned in Britton & Brown's Flora. It also shows, at the ends of these stolons, as well as on some of their lateral branches, little tubers, *t*, *t*, to the number of over a dozen on this one plant. These are firm little organs, of the size of small peas and smaller, yellowish-green or yellowish-red in color, according to the degree of exposure to the sun. After the year's growth has withered, including the stolons, these tubers sink into the sub-



Claytonia Chamissoi Ledeb. Slightly reduced.

stratum, here principally leaf mould kept in the condition of slush by the water from a seepage spring. In this carbonaceous mud I have several times since 1893 found them late in October, on the occasions of visits to this station for blooming witch hazel.

In the fall of 1894 I gathered a handful of these tubers, and made an attempt at transplanting this plant to several favorable situations nearer Winona than Queen's Bluff, which is eighteen miles below Winona, and is, so far as I have ascertained after more than eleven years of waiting, its only station east of the Rocky Mountains. The failure of this attempt is to be regretted the more, since the freshets produced in the upper Mississippi basin by the torrential rains of June 12th and 13th, 1899, have left deposits of sand and earth more than a foot deep over this little isolated patch of *Claytonia*, as I learned on my last visit in the late fall of 1899. Whether any fraction of this colony has successfully escaped destruction by that flood, remains to be determined by future search.

It seems superfluous to point out the close similarity of the vegetative system of this plant and that of the common potato, *Solanum tuberosum*. That it has so long been considered an annual herb, seems largely due to the fact that the stolons, the presence of which is noted in some of the descriptions, are quite slender and delicate, and after drying become so brittle that most herbarium specimens show neither them nor the tubers. From my extended observations, it is very probable that the principal means of propagation of this plant is by just these tubers. Indeed, so far as this little colony is concerned, they seem to have been the only means, certainly since I have found the patch. For, of the hundreds of plants collected on the several trips, not a single ripe or even partly developed seed could be found, despite the fact that the plants at the times of collecting were always largely past bloom, and every plant was expressly searched and examined with care. In not a single case was there evidence that fertilization had taken place. Whether this sterility was due to the unfavorable climate or to absence of the right insect visitors, remains an unanswered question.

Winona, Minnesota, February, 1901.

THE CARE OF TREES IN CITY PARKS.*

IN nature, trees grow in one of two ways—either in a crowded forest, or in places more or less open, where they get plenty of light. Although light is free to all, yet among the trees it is the only necessary for which they enter a great competitive struggle, upon which their very lives depend. When once started, a tree cannot help getting a certain quantity of food and moisture, but unless it receives light also, it dies.

In the forest, trees grow as closely together as they can live, and there is a constant struggle to reach the top; those that succeed in doing so will spread out, and by shading the lower ones, kill them just as surely as though one cut them off with an ax. This method of growth shades the ground closely, keeping it damp and cool, and each year's crop of leaves buries beneath it as it falls, the dead limbs and bark and chips which fell during the summer and preceding winter, and these, kept always damp by this mulch of leaves, soon decay, and with the leaves themselves, form what we know as leaf-mould, the whole process being nature's method of making fertile soil. This is the normal forest condition, and the product of its development is timber, straight-grained, strong, and nearly knot-free wood, the joy of the carpenter's heart, and one of the best gifts of the Creator to man.

But once in a while, in natural conditions, and more often when the agency of man is involved, a tree gets a chance to grow in a place where there is an abundance of light on all sides, and what result do we find? This tree, instead of growing tall as rapidly as possible, for fear that some competitor will cut off its supply of light, grows broad nearly as fast as it grows tall and sometimes faster; all sides are covered with leaves, and all the branches beneath are draped with leaves in nature's own unequaled manner. Between these two styles of tree there is little resemblance; the shape is different, the leaves are all over, instead of merely at the top, while the wood, though equally good for burning, is so full of knots from the well-developed limbs, that it is nearly useless for lumber, but for beauty there is no comparison. The one shows nature in a creative mood, making soil and timber for the use of generations yet unborn, and the other shows her in an artistic mood, and the product is something whose beauty is rarely, if ever, equalled by the artifice of man.

In our parks and city streets, trees are grown mainly for purposes of shade and beauty, and as the coolest and most dense shade is given by the most beautiful trees, namely, those that are covered with leaves

*Condensed from a paper by Mr. W. E. Saunders, read before the Horticultural Society of London, Ontario, and published in "The London News."

above, below, and on all sides, it naturally follows that most of our city trees should be grown in this form. And there is but one way to grow them after this manner, and that is by giving them plenty of light, and keeping the trimming-fiend at a distance.

The love of trees is implanted deep in the nature of nearly every person. Many people do not realize this until they come into possession of a plot of ground where a few trees are growing, when their natural affection comes quickly to the surface. But few, however, have this feeling so chastened with wisdom, as to enable them to treat their trees well; nearly all want to grow two, three, or even a dozen trees in the space that should be given to one, not realizing how much better it would be to have one fine, large, well-shaped, handsome tree, than to have half-a-dozen stunted, misshapen, lopsided ones, whose only real utility is for consumption as fuel. No better proof of this deeply implanted love can be offered than the fact that it is almost impossible to persuade the average man to part with a single one of his trees, even when the destruction of one means the betterment of the others.

When trees are too many, cut some of them down. A tree which is too large for its environment can never be made handsome by any system of pruning, and not only that, but it will spoil others which might be ornamental if its space were vacant.

Now, a word as to the planting of shade trees. In London we suffer from a superfluity of silver maple (*Acer saccharinum*). This is a quick-growing tree of handsome form, but there are others that are as quick-growing, and many that, though slow growers, are more desirable and very handsome. Our streets should not all be planted with one kind of tree. Monotony should be avoided. Besides, when a blighting disease or a devastating insect, affecting possibly only one species of tree, reaches a city planted with that tree only, that place is liable to have very few good trees left. Some twenty-five years ago the streets of London had a great many locust trees, whose foliage and flowers are each beautiful, but the locust borer came among them, and now they are gone. The maple is a grand tree, hardy and nobly beautiful, but the Creator has given us many other fine trees also, and doubtless it was never his intention that we should confine ourselves to the use of one species only. The birches, three or four species of beautiful trees immortalized in poetry and characteristic of the north, the lofty elm, whose fame as a street tree in New England has spread over the entire continent, the fragrant basswood, the evergreen spruces and cedar, the hemlock, which I sometimes think is the handsomest of all our trees, and the nut trees, chestnut, butternut, walnut, beech, and the hickories, all these and many more have beauties of their own, and should be largely used.

At irregular intervals a man called by courtesy a "tree-pruner," more or less authorized by those who rule over us to butcher every inanimate object, travels through our streets and makes a bad matter still worse. A gentleman living near my house had last summer a very handsome cut-leaved birch and a good many maples growing on his front lawn. Noticing that the birch was beginning to suffer from being crowded, I one day complimented him on the beauty of his tree, and suggested that it needed more room in order to retain its beauty. He replied that it was a very nice tree, but it needed pruning, and he was getting a man who understood such things, to come and see to it. The beauty of this species of birch lies in the long, slender, drooping branchlets, and in the handsome pyramidal shape of the tree; but this "pruner" sawed off the trunk of this tree at about eight feet from the top, sawed one-third off all the larger limbs, and left the tree shorn of all its beauty and with the work of years destroyed. All the tree needed was to receive plenty of light, and to be left alone. Such examples are abundant.

It was only a few weeks ago that an eminent horticulturalist wrote in the pages of *Gardening*, a leading American magazine, of the folly of planting trees in rows along the drives in parks, a method which is the worst possible, for besides spoiling the artistic appearance of the place, it prevents the people on the drives from the realization and enjoyment of the beauties of either the nearby or the distant view, and yet, despite the fact that this principle is freely stated and admitted by the best authorities, it is the very method which is being adopted in our river park, now in process of formation; and not only that, but the chief part of the trees planted have been soft maples and Norway spruces, the very ones of which Londoners have already far too many. It is to be hoped that ere long different methods may prevail, and that while there is yet time, the best may be made of the material now planted, and that the future may be properly provided for by the planting of such trees as will lend variety and beauty to the landscape. How this is to be accomplished, is not difficult to tell, for it can only be done by placing the control of such matters in the hands of men who have given thought and study to the subject.

I have not touched upon the matter of shrubs and flowering plants, but it would be easy to make a great improvement over present conditions were the plan above mentioned to come into action, and no plan would be complete that did not aim at the best results in these points, as well as others. A shrub may be at its best in five or ten years, whereas a tree is the growth of decades, and neglect for ten years may ruin the result of twenty-five years' careful work and thought.

SPRING IN THE ANAQUASSACOOK HILLS.

By Frank Dobbin.

THE foothills of the Green Mountains lying on the border between New York and Vermont are locally known by several names, but here in the southern part of Washington county the old Indian name of Anaquassacook is still applied to them. I have had opportunity for several years to study the flora of this region during the spring months, and a few remarks upon it may be of interest.

Why the well known skunk cabbage should be absent from this locality I do not know, but as yet the bogs and low grounds have been searched for it in vain. However, my March rambles have been rewarded by the discovery of one or two varieties of willow and also of the smooth alder in bloom. It is still a question with me whether the willow is fertilized by insects or by the wind, or is it possible that both play a part in the process? The profusion of pollen, and the bareness of the branches at the flowering season, would seem to indicate the agency of the wind, but on the other hand, the multitude of insects that on a warm day surround the catkins, would lead one to the conclusion that the plant is after all entomophilous.

Before the last March snow-bank has disappeared under the rays of the April sun, the hepatica can be found in rocky woods having a southern exposure, and near by the arbutus shows a few early flowers among its evergreen leaves. It is hard to realize that this plant, with its creeping habit, is actually a shrub. What a beautiful sight it would be when in bloom, if, like others of the Ericaceae, it stood upright! So much has this plant been sought by its admirers, that it is becoming more and more rare with each successive year, and in many woodlands where it was once abundant it is now almost unknown.

In fence corners and beside old walls the bloodroot is abundant, and in shady situations the two species of the dicentra (*Dicentra Cucullaria* and *D. Canadensis*) may be found. In the same places the wild ginger (*Asarum Canadense*) is usually common, its peculiar flowers lying almost on the ground; and not far off the dog's tooth violet is sure to be seen. One of the most widely distributed plants in this region is the little wind-flower (*Anemone nemorosa*). How well the Greek name Anemone fits this plant, with its delicate nodding flower! Usually side by side with the wind-flower is the rue-anemone (*Anemonella thalictroides*) with its curious yam-like roots. The star flower (*Trientalis Americana*) is more rare than the anemone, but may sometimes be found in the same situations.

One of the most beautiful of our spring flowers is the fringed polygala (*Polygala paucifolia*). But we remember that its showy,

orchid-like blossoms are more ornamental than useful, most of the seed being produced by the more humble cleistogamous flowers. Six of the violets are to be found; at least four of them occur in almost any situation (*V. cucullata, V. blanda, V. pubescens, and V. canina*). Two, *V. ovata* and *V. rostrata* are more rare; *V. ovata* is considered by some botanists to be only a variety of *V. cucullata.* The common arrow-leaved violet and also the Canada violet are conspicuous by their absence. It is in May that the violet season is at its height, and a rich profusion of the first four species mentioned make up for any lack of the others.

In dry places the wood rush (*Luzula vernalis*) can usually be found, as also the better known early saxifrage, the latter clinging to some crevice in the rock where there would appear to be little soil for any flowering plant, but the poverty of its surroundings does not seem to affect this sturdy little plant. In more moist places the gold-thread (*Coptis trifolia*) is present, and sometimes, though not always, that prince of the trilliums, the painted trillium (*Trillium erythrocarpum*). Its more common relative the purple species (*T. erectum*) is, however, sure to be found, and sometimes also the white trillium (*T. grandiflorum*) is also present. Tne nodding trillium (*T. cernuum*), having a modest white flower tucked away under its whorl of leaves, is occasionally found.

Out in the open fields the omnipresent dandelion has made its appearance, and along brook sides a flower much resembling it has opened; it is the coltsfoot (*Tussilago Farfara*). The coarse leaves of this plant are not such early risers as the flowers, and it will be some time before they appear in the world. In the meadows the bluets (*Houstonia coerulea*) grow in great patches that rival the sky in color. A little later in the same spots may be found another flower, the robin's plantain (*Erigeron bellidifolius*) somewhat resembling the autumnal asters in form and color.

In some favored localities the spring beauty (*Claytonia Virginica*) can be noticed. Somehow the dull linear leaves of this fine little plant do not seem in keeping with the cluster of delicately beautiful flowers that it puts forth. The ground-nut (*Aralia trifolia*) is plentiful, especially in open woodlands, its white flowers marking the spot where snug and warm, under six inches or more of mould, the nut itself lies.

The sturdy everlasting (*Antennaria plantaginifolia*), the earliest of our Composites, is to be seen almost anywhere, varying from an inch or so in height on barren rocky spots to a foot or more in richer soil. Somewhat later than the antennaria comes the golden ragwort (*Senecio aureus*), and the uvularias. In the open woods and on dry banks the

little vernal sedge (*Carex Pennsylvanica*) is abundant, and along railroads embankments and in old meadows the fertile and sterile plants of the horse-tail (*Equisetum arvense*) are common.

Among the early flowering shrubs and trees, the shad-bush (*Amelanchier Canadensis*) is conspicuous, and more rarely may be seen the pale sulphury twin flowers of the fly honeysuckle (*Lonicera ciliata*). I have located only one bush of the moosewood (*Dirca palustris*), and therefore conclude that like the Indians who made use of its tough bark, it has nearly disappeared from its native haunts. In the depths of the swamps the hobble-bush (*Viburnum lantanoides*) is to be found, and occasionally in the same locality grows the fetid currant (*Ribes prostratum*).

I have found altogether 172 species of plants in bloom in this region before the first of June, of which those mentioned are the most conspicuous.

Shushan, N. Y.

FUNGUS SPORES AS BEE-BREAD.

By W. H. Lang, Jr.

WHILE collecting fungi in the vicinity of Austin, Texas, on February 26th, the writer had occasion to observe a very peculiar and to him hitherto unknown habit of the honey bee (*Apis mellifica*). The bees were hybrids between the blacks and Italian, and were working in considerable numbers on the leaves of the wild dewberry (*Rubus trivialis*). A closer examination showed that they were busy collecting the spores of the orange rust of blackberry (*Caeoma nitens*) for bee-bread. They were observed in the act time and again of collecting the spores and packing them on their legs, exactly as they collect pollen from the flowers. This was again seen on March 2d, in another locality. To avoid any possible mistake, one of the busy little workers was captured and its load brought to the laboratory for microscopic examination. The balls were of a very dark red, and proved to be composed exclusively of the spores of this rust. Some flowers were in bloom at this time, such as *Anemone Virginiana*, *Rhus Canadensis* var. *trilobata*, *Berberis trifoliolata* and *Draba cuneifolia*, but none of these flowers seemed to attract the bees, and no pollen grains of any kind were found mixed with the spores. Extended examination of the pollen masses of the bees in various localities may show that fungi other than this particular species may be used by them for a similar purpose, especially during seasons of the year when pollen from flow-

ers is scarce or wanting. It opens to the mycologist a new and unique method of collecting when he has any bees in his vicinity. By examining the first pollen masses they bring in, he may find several kinds of spores and might even be able to recognize the species to which they belong, or failing to determine the rust, he can at least watch for the bees on his collecting trips, and thereby discover on what fungus they are feeding. At any rate, they would serve as an index for future work and closer observation.

To the horticulturist it is interesting as a probable means of distributing the fungus over wide areas in a short time; this is a serious factor, and may help to explain the wide-spread prevalence of the disease. In this State the rust is becoming quite a serious menace to blackberry and dewberry culture.* It is also widely distributed throughout the southern States, and indeed wherever the host is found the rust is common. To what extent the bee is a factor in disseminating the spores is purely problematic at this juncture. Close and continued observation in the field will be necessary to decide this important point. But the fact that the infected leaves usually appear before many plants bloom, and the further fact that the bees from a single hive will range over a territory of three miles radius, makes it extremely probable that they are a means of spore distribution.

The apiarist is especially affected by this spore gathering habit of the bees, for the life and future honey-storing capacity of the hives depends upon the available food for rearing the young bees. As is well known to all bee men, the pollen necessary to make "bee-bread" is a vital factor, so much so that often artificial means have to be resorted to in order to furnish the needed pollen supply. The earlier in spring as a rule that the bees can find a good and sufficient supply of pollen or a substitute for it, the stronger will the colony be, and consequently the more honey will they store up later in the season. This rust, appearing early and at a time in the year when pollen is scarce, furnishes an easy and abundant source of supply. The apiarist is therefore immeasurably benefited by this peculiar habit of the bees.

The chemical composition of these spores which makes it possible for the bees to use them in the place of pollen, is as yet an undetermined quantity. That the spores do possess some property suiting them to be used as a substitute for the pollen of flowers is indisputable, for the honey bees know their business, and would certainly not gather the spores if they could not use them.

There is still another side to this question, but one of only minor importance; that is, whether the use of these rust spores would make

*See H. S. Jennings on "Some Parasitic Fungi of Texas," in Bull. No. 9, Texas Agricultural Experiment Station, page 23, 1890.

the honey poisonous. The only case in which this could occur, would be when the "bee-bread" is mixed with the honey that is eaten. As very little honey is used or offered for sale that contains any "bee-bread," this point is insignificant even if the spores are poisonous.

The habit is a unique one, the nearest approach to it that is recorded is the gathering of the "honey-dew" from the young heads of rye, etc., that are affected with the ergot disease (*Claviceps purpurea*), thereby disseminating the spores over wide areas.

School of Botany, University of Texas.

FOSSIL HICKORY NUTS.

By F. H. Knowlton.

RECENTLY Mr. J. B. Hatcher of the Carnegie Museum, Pittsburg, sent me for examination over forty specimens of the most perfectly preserved fossil nuts that I have ever seen. They were obtained by him during the past summer from beds in the so-called Bad Lands of Sioux county, Nebraska, where they were found associated with the bones of some of the strange monsters that have been brought to light from that part of the country. It needs but a glance to determine that they represent the replacement, in silica and lime, of the cotyledons or "meats" of a species of hickory. In a few cases the two cotyledons are still joined together, as in a philopena, but a majority of the specimens are single cotyledons. Every ridge and irregularity has been faithfully reproduced in stone, and even the color is so similar to that in fresh specimens of our living species, that it requires a second glance to separate them when placed together. In size, shape and general appearance, they seem to resemble most closely the "meats" of the common shell-bark hickory (*Hicoria ovata* (Mill.) Britton, or *Carya alba* Nutt.). They have the same broad, thick form, but appear to differ slightly in having a smoother surface—that is, with a less number of ridges or convolutions. The smaller examples are 11 mm. broad, and 4 mm. thick, and the larger about 20 mm. broad, and 7 mm. thick, but there is every step between these extremes, and as there are no apparent differences in the markings, it appears more than probable that they all belong to a single species.

These cotyledons are apparently so closely similar to the cotyledons of living hickories that I should not hesitate to place them in the genus *Hicoria*, but for the fact that a different name has already been given them. In 1898 Prof. E. H. Barbour, of the University of Ne-

braska, described* specimens which he had obtained from the same locality, under the name of *Archihicoria siouxensis*, thus creating a new genus for them. They are undoubtedly "ancient hickories," but I doubt if the differences are great enough to exclude them from *Hicoria*. However, they may as well remain for the present under the name given them by Professor Barbour.

The probable manner in which these perfect replacements were formed is of interest. When the nuts were dropped into the water of the ancient lake, the kernel rotted away, but the shell being tough and hard, would probably last for years under favorable circumstances. "Throughout the clays and marls of the Bad Lands there is a large amount of potash. This is dissolved by water, and then acts upon quartz, carrying it away in solution. This would find its way by infiltration into the interior of the nut. At the same time with this process, carrying lime carbonate in solution, was going on, so that doubtless the stone kernels consisting of pretty nearly equal parts of lime and silica, were deposited within the nuts. These kernels, of course, become hard and flinty in time and capable of resisting almost any amount of weathering. Not so the organic shell; this eventually would decay away, and so leave the filling or kernel of chalcedony and lime."

The forestry exhibit at the Pan-American Exposition will be very extensive and comprehensive. It will include a large display from Louisiana. In that State there are fully fifty different varieties of hard wood, and each will be represented in the exhibit, besides specimens of shrubbery, plants and mosses. Some of the specimens measure eight feet in diameter, and others from six feet down. Some palmetto stalks measure sixteen feet. There are several bundles of large reed cane forty feet long and two inches around. The small cane is about ten feet long. There are also specimens of green Spanish moss and Spanish black moss. The unique feature of this exhibit are about 6,000 little blocks of wood which will be distributed at the Exposition as souvenirs. Red cypress, white cypress, red oak, white oak, cow oak, water oak, striped oak, live oak, red gum, black gum, white ash, blue ash, yellow ash, lynnewood, cottonwood, sycamore, elm, slippery elm, mulberry, locust, thorn locust, burdock, persimmon, ironwood, beech, magnolia, long-leaved pine, red pine, red sassafras, water elm, walnut, bitter pecan, pecan, cedar, prickly ash, wild haw, red haw, may haw, wild plum, willow, maple, elder, white hickory, red hickory, wild hickory and cherry represent the principal varieties that will be seen at the Exposition from Louisiana.

* Nebraska Historical Society, II. 2: 272, *pl. V.* 1898.

BRIEFER ARTICLES.

Root Relations of Pogonia verticillata.

The fact of *Pogonia verticillata* growing in extensive colonies in various localities around this city, Philadelphia, made me think that the connected root system described by Mr. Saunders for *P. ophioglossoides* could be also applied to this species as a means of accounting for its gregariousness. One will scarcely recall ever having seen a solitary individual of this whorled-leaf Pogonia, but rather the reverse, the plants always growing in company or colonies of considerable extent. They are not found in such groups as violets or may-apples and some other plants delight to form, but are more or less distant from each other, not to say reserved, the effect indicating a relation which, while not existing above ground, seems necessary beneath it. To test this latter idea, I made a late fall trip to my favorite grounds at Tullytown, in Bucks county, Pa., near the Delaware river, and found a number of plants not yet destroyed by frost. Selecting a mature form, I soon found its roots to be large but not fleshy fibers, several inches beneath the surface and at various depths, extending in horizontal directions everywhere, apparently without end.

Following up the course of one "runner" for from twelve to fourteen inches, I had the satisfaction of finding another mature plant attached; in fact, this was the parent of the "runner," as beneath the connection were several other roots horizontally disposed, but unfortunately broken off during removal from the soil with one exception that I traced to another mature plant. That these plants were all mature, is shown from the fact that some of them still bore fruit, and all had from five to seven stem scars alternately at caudex or base, and the next season's bud well developed.

The thread of relationship was broken by reason of carelessness in operating among roots of surrounding trees, but I believe that all the plants are joined in this manner, and that this is the means of maintenance of the species rather than that of propagation by seed distribution. I can scarcely recall a small or immature form, nearly all the sterile plants being mature in size.

The fibers were all similar in dimensions, there being no thickening anywhere, even at the point of contact with the stem, and there the

attachment was apparently weak, exactly as if a pin had been passed vertically down, holding one below the other almost on a pivot, but firm enough to last for years, as none showed any decay.

It would seem strange indeed if nature had resorted to this method of preserving the species, since the location affords abundant opportunity for seed distribution and plant growth. I hope to be able to continue investigations on the subject during the coming season.—Joseph Crawford, Philadelphia, Pa.

An Abnormal Seedling.

Recently while making some germination tests with gingko (*Gingko biloba* L.) seeds, a peculiar plant appeared. This bears four leaves which are fully developed. The first one is normal. The edges of the second have coalesced along their entire length, giving the leaf a cornucopia-like form. In the third and fourth leaves the edges have coalesced for about half their length. It is some time since the last leaf came out, and there is no terminal bud apparent. If the bud develops and the plant lives, it will be interesting to see if the tree preserves this peculiar form of leaves.—E. Brown, Department of Agriculture, Washington, D. C.

MEMORIAL.

BOTANICAL SECTION, ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

This Section having been informed of the decease of Professor Thomas A. Williams, late of the United States Department of Agriculture, at Washington, D. C., it seems eminently fitting that we should show our appreciation of his botanical attainments and the loss that practical science has sustained by his early death. Although young in years, his indefatigable energy and untiring zeal in behalf of his favorite studies, made him a conspicuous example for the youth of our land to emulate.

Resolved, That in the death of Professor Thomas A. Williams, botany, and especially agrostology, has received an unusual loss, and his many correspondents a friend who was ever desirous of rendering all the assistance in his power.

FRANCIS WINDLE,
JOHN W. HARSHBERGER,
STEWARDSON BROWN,
Committee.

Adopted by the Section, March 11, 1901.

JOHN W. HARSHBERGER,
Recorder.

GENERAL ITEMS.

The Yale Summer School of Forestry will hold its sessions at Gray Towers, the estate of Mr. James W. Pinchot, near the village of Milford, Pike county, Pa., under the instruction of Professors Graves and Toumey. The purpose of this Summer School is to provide instruction in forestry for those who do not wish to take, or who are not ready for, the more advanced technical courses at regular forestry schools, being especially designed for owners of woodland, forest rangers, teachers, and persons who desire to acquire a general knowledge of forestry or any of its branches. Full information may be obtained on application to H. S. Graves, Yale University, New Haven, Conn.

A part of the botanical library of the late Professor T. A. Williams is to be offered for sale. A catalogue has been prepared, which may be obtained upon application to Miss Ethel Snell, Takoma Park, D. C.

NOTES ON CURRENT LITERATURE

In the January number of *Rhodora* Prof. W. J. Beal gives the following list of plants that become tumble-weeds in central Michigan: Old-witch grass (*Panicum capillare*); hair-grass (*Agrostis scabra*); pepper grass (*Lepidium apetalum*); Russian thistle (*Salsola Tragus*); low hop clover (*Trifolium procumbens*); winged pig-weed (*Cycloloma platyphyllum*); evening primrose (*Oenothera biennis*); gypsophyll (*Gypsophila elegans*); tumble-weed (*Amaranthus albus*).

Another addition to our mushroom literature is Dr. Trelease's paper an "Edible and poisonous Mushrooms and Toadstools," reprinted from the forty-third annual report of the Missouri State Horticultural Society. The article contains some very plain and sensible remarks which are worthy of careful perusal by the prospective mycophagist. At the close of the paper is a bibliography which will be found very helpful to those who wish to consult the latest and best literature on the subject.—C. L. S.

Professor F. Lamson-Scribner and Mr. Elmer D. Merrill, of the U. S. Department of Agriculture, have rendered a service to American botanists by making a careful study of the grasses in Stephen Elliott's herbarium at Charleston, S. C., the results of their investigations being published as a special Circular from the Division of Agrostology. It would be an excellent thing for systematic botany if more of this work could be done on the herbaria of earlier authors, and it would tend to prevent much confusion and multiplicity of plant names.

We have just received the attractive catalogue of Thomas Meehan & Sons. It is a carefully selected list of choice hardy stock especially adapted for making improvements in the home surroundings. It tells what stock to use, how and when to plant and prune, and is full of useful suggestions.

Messrs. Ellis & Everhart have lately published a pamphlet entitled "The North American Phyllostictas," containing descriptions of the species published up to August, 1900. This will be helpful to American students who do not have access to Saccardo's Sylloge Fungorum.

The current issue of the *Bulletin de l'Academie Internationale* (*Le Monde des Plantes*) contains an annotated supplementary list of the mosses of Sarthe, France, by M. I. Theriot. It is illustrated with a number of detailed figures. This issue also contains a catalogue of the lichens of the same region, by M. E. Monguillon.

In the February *Forester* there is a very valuable article by the late F. F. Hilder, on Phillipine forest products, in which some fifty of the more valuable trees or shrubs are described. This includes the common or native name, the botanical name, the uses and last the provinces in which each is found. When properly explored, it will be found that the Philiippnes are a most valuable addition to our country.

"Notes on Crataegus in the Champlain Valley," is the subject of a valuable article by C. S. Sargent in the March number of *Rhodora*. According to Professor Sargent, the Champlain Valley is one of the richest regions in the world for forms of this genus. In this paper he enumerates 22 species, 13 of which are described as new to science, which makes more growing in this limited area than botanists recognized a few years ago on the entire continent of North America.

"The Transactions of the Massachusetts Horticultural Society" for 1900 has recently appeared. A lecture which it contains on "The Rusts of Horticultural Plants," by Dr. B. D. Halsted, will be of interest to mycologists. Considerable space is given to the asparagus rust (*Puccinia Asparagi* DC.) which has recently been causing considerable damage in different parts of the country. The paper is illustrated by two plates, showing the fungus and its two natural enemies, *Darluca filum* and *Tuberculina* sp.—C. L. S.

Bulletin No. 46 of the North Dakota Agricultural Experiment Station consists of a preliminary list of the spermaphyta, or seed-bearing plants of the State, compiled by Professors Henry L. Bolley and Lawrence R. Waldron. It is a carefully prepared work, and being the first contribution toward an enumeration of the Dakota flora, will be welcomed by the various local schools and by botanists throughout the country. The list comprises 775 species and varieties. As to nomenclature, the authors have adhered strictly to that of Gray's Manual, disregarding even such corrections as have been made by Dr. Gray's successors at Harvard. The names used in Britton and Brown's Flora are, however, inserted as synonyms.

EDITORIAL.

The methods of obtaining large general collections of plants from new or little known parts of the world appear to have changed greatly within the past few years. Formerly such collections were largely obtained by sending a collector with elaborately organized expeditions, such as the Wilkes Exploring Expedition, the Pacific Railroad Surveys, the voyage of the *Challenger*, etc., and even under these conditions botany was usually subordinated to other interests, and the collections, while abundantly interesting and valuable, were often far from complete. But within the last decades has come a marked improvement in botanical exploration. Governments, institutions of learning, botanical gardens and other centers of botanical activity, have sent out regularly equipped exploring expeditions charged with the sole purpose of obtaining a full representation of the plants of the region visited. Thus the U. S. Department of Agriculture has sent botanical expeditions to almost all parts of this country. The U. S. National Museum has sent two expeditions to Mexico, with the result of greatly increasing our knowledge of the flora of that country. The Field Columbian Museum has had several expeditions in the West Indies; the New York Botanical Garden has had two expeditions in Porto Rico, two in the Rocky Mountains, and another has just started for an exploration of Java. In addition to these, various trained private collectors have visited and collected in interesting and comparatively unknown regions, depending upon the sale of sets of their plants for compensation. Among such may be mentioned Pringle and Palmer in Mexico, Heller in the Rocky Mountains, Hawaii, and Porto Rico, Clute in Jamaica, Curtiss in Florida, etc. These are hopeful signs, and go to show that botanical activity along systematic lines was never more active than at present.

Complaint of the non-receipt of our January issue has been made by a number of subscribers. From inquiries which we have since made at the Washington postoffice, it seems probable that an entire package

of the edition went astray. Of course it is understood that we will replace all such missing numbers without charge.

In this connection it is perhaps due to our readers that some explanation should be given of the excessive delay in the publication of our February and March numbers. The principal causes have been the change of printer, the selection and preparation of a new cover design, the manufacture of a quantity of paper to our special order, and the large amount of extra business that has come to us with the acquisition of the *Asa Gray Bulletin* property. After a delay has once occurred, it is almost impossible to prevent a still further lapse from month to month; but special arrangements have been made whereby the preparations for this and the succeeding issue might progress nearly simultaneously, and we hope to publish THE PLANT WORLD for May promptly on May 15th.

BOOK REVIEWS.

THE MUSHROOM BOOK. A popular guide to the identification and study of our commoner fungi, with special emphasis on the edible varieties, by Nina L. Marshall, with many illustrations in color and black and white, photographed from nature by J. A. and H. C. Anderson. Small 4to, 167 pp. Doubleday, Page and Co., Publishers, New York, 1901. $3.00.

If the number of books on mushrooms which have recently appeared may be taken as an indication of public interest in the subject, such interest must be rapidly increasing, The latest effort at a popular work on these plants is "The Mushroom Book." The book is very prepossessing in appearance, and a perusal of its contents increases one's first favorable impression. The purpose of the author is stated as follows: "It has been the aim of the author to write a book simple enough to serve as a source of knowledge for the many who, though busy with other pursuits, yet take an interest in science and wish to

obtain information about the fungi, either for the sake of using them as food; or for the pleasure which an acquaintance with their habits and home life may give." The first three chapters are of a general nature, treating of "The Homes and Habits of Fungi," "The Relation of Fungi to other Plants," and "From Spore to Mushroom." An illustrated key follows, containing cuts representing the genera which include most of the higher and more conspicuous forms of Ascomycetes and Basidiomycetes. The beginner will probably find these cuts very helpful. Most of them are sufficiently accurate for generic determination. Those intended to represent a "rust" and a "puffball" are very crude, however.

The systematic portion of the book beginning with *Amanita* and ending with *Helvella*, has descriptions of many of the most common eastern species. Where space permits the selection of so few of the numerous species occurring, it could scarcely be expected that any two persons would choose exactly the same list. While there is occasionally a species which does not seem to us sufficiently common to deserve a place, and a few which we had expected to find are not present, yet the majority are well selected, and represent fairly well our more common eastern species. The descriptions are rather brief in some cases but perhaps on the whole as complete as most readers will require or can use advantageously. The illustrations are the most useful and commendable feature of the book. Ten species representing seven genera of Ascomycetes, and seventy-three species representing thirty-five genera of Basidiomycetes, are illustrated by photographs in color and half-tone. Most of the color plates, while lacking considerable of perfection, are nevertheless superior to many others that have appeared.

The most important matter connected with the book, however, is that of edible and poisonous species. The publishers say that "this is a practical and popular book * * enabling the unscientific reader to identify the edible and poisonous varieties." That this is a rather rash and even dangerous statement, we think all who have made a special study of edible and poisonous fungi will admit. Some of our edible and poisonous species, especially of the genus *Amanita*, show so many perplexing forms, that they frequently puzzle the most skilled mycologist. The only safe course for the untrained mycophagist is to avoid entirely the two genera *Amanita* and *Amanitopsis*.

It is but fair to the author, however, to quote a statement in contrast to the one cited above. On page 151 in the chapter on "Fungi for the Table," the following advice is given: "Unless you are experienced in making careful observations and comparisons, eat only those fungi which have been shown to you by some one who has tried them and knows them to be wholesome.—C. L. S.

THE PLANT WORLD

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HINTS ON HERBORIZING.

By A. H. Curtiss.

WHEN I was a beginner in botany, there was no limit to my ambition nor to the confidence I had in my capacity for work. I took in the whole vegetable kingdom, and devoted no little time to the animal and mineral kingdoms. But my self-confidence gradually abated; various branches of study were dropped from year to year, till finally I came to be known as a mere collector of southern United States phaenogams and ferns. I use the adjective "mere" in deference to what I consider popular opinion. If, instead, I had joined in the great and patriotic undertaking which is now being pressed so bravely forward, to swell the flora of the United States to 50,000 species, I might not have found cause to speak of my botanical labors deprecatingly. Perhaps it is unfortunate that I acquired some fixed and ineradicable ideas of division of labor in botany, by twenty years of rather close association by correspondence with Gray, Watson, and Engelmann. In those days it was considered utterly presumptious for any besides those three, Chapman and a very few specialists, to describe new species, revise nomenclature, or rearrange genera and orders.

It is true that my patience was often sorely tried by the refusal of those good authorities to recognize what I considered new species or varieties, but I could not confidently gainsay their opinions without seeing the herbarium material on which their opinions presumably were founded, and to have defied their opinions would have been folly under the circumstances. Thus schooled in botany, I became fully imbued with Muhlenberg's precept that "it is for but few to name." When I contemplate the new order of things in American botany, I feel impressed with the idea that I am almost the only one left of those who

once respected the sentiment quoted, and that therefore I should regard myself as a relic of antiquity.

Before taking up the rather prosaic subject announced in my caption, permit me to present a few facts favorable to the "mere collector." In those days of youthful enthusiasm to which I have alluded, I spared no effort to obtain by exchange specimens of plants from all parts of the Union, and of the world from which specimens were obtainable. Enjoying exceptional advantages, I succeeded in securing good representations of the floras of such remote regions as Greenland, Nova Zembla and Siberia in the north, and Australia, Tasmania, South Africa and Hawaii in the south. And mark this fact, that from each of the countries mentioned, I had from ten to one hundred times as many plants as from all of the recent slave States excepting Virginia, where I then resided. To nearly all herbalists in those days, the South was a botanical *terra incognita*, and they were made to realize this the more fully through the fact that the only exchange list then in use included the names of all the plants of Chapman's Flora.

Now suppose I had devoted my botanical efforts to the writing of monographs instead of supplying, as I have done, from thirty to two hundred herbaria with between two and three thousand species of the Southern flora. Could I thereby have done science better service, even were I possessed of the acumen of an Engelmann and the accuracy of a Watson? I think not. If a few trained workers in the great herbaria were left to do all the naming and describing of plants, it would continue to be possible to learn botany from books; but the hair-splitting that is now being done by scores of zealous botanists, threatens to render descriptive works of the future incomprehensible, and botany more unpopular than now. However, I suppose that most of this work will go to swell the long lists of synonyms found in such works as Watson's *Index*.

At least thirty years ago I contributed to the *American Naturalist* an article with the same caption as the above, and it was afterwards sold as a reprint. When the copy was returned to me with proof, I observed that Professor Gray had written beneath it "Very good." One cannot understand the exact meaning of that phrase without hearing it spoken. In later years I construed it to mean—not bad. I found that my methods varied so much with changing environments and increasing experience, that I never again felt like offering advice on the subject, and I felt the more disinclined to do so through appreciation of the uselesness of prescribing methods to be followed under all conditions of life, and by persons of infinitely varied temperaments and idiosyncrasies.

At the time when I wrote my first "Hints," it was my delight to

carry a hand-press, with a full outfit of driers, boards and straps, over hills and mountains, ten, twenty, and thirty miles a day, wearing heavy cavalry boots as a defense against snakes. Mere physical exertion I counted as nothing, nor the time and care needful for making good specimens. It was all what Professor Gray termed "conscientious work." The method of preparing specimens which I advised in the *American Naturalist* is doubtless productive of best results, but after leaving Virginia I never again carried a press, except in special cases. That method is not adapted to the malarious Gulf States, where there is no shade except in the shadows of pine trunks and in thickets that teem with red-bugs.

Before pursuing the subject further, I will observe that the ideas which I have to offer were suggested by Professor W. W. Bailey's book on "Botanizing." I bought this book on the supposition that it embodied all the knowledge of all the ages on the subject of herborizing, and read it with eager interest, hoping to learn something that might prove of service to me, yet fearing to discover that I had lost much in the past through ignorance of the best methods. Both my hopes and fears were dispelled, and I was left to deplore the author's decision, on reaching page 87, to dispense with further advice in regard to field work, for the reason that it "would cumber our pages." Being thus apprised that the author knows a good deal besides what he has told, I should disclaim any pretention to superior knowledge of his subject, and should further acknowledge that our differences of opinion may be due to mistaken ideas on my part. At any rate, I will not pose as an adviser, saying do so and so, or it should be done so and so, but will merely say that I do so and so, generally giving my reasons, and sometimes referring to Professor Bailey's omissions and different ideas.

My outfit for collecting is wholly different from that described in "Botanizing." I do not even carry a vasculum nor care for "capacious pockets," my two hip-pockets being the only ones commonly used. "Stout leather gloves" would make me smile, but they are well enough for men who wish to keep their hands delicate. It tires me to think of carrying a knapsack, canteen, trowel, pruning shears, cane, and the like. I need no cane, because something better can be found almost anywhere in a sapling or fallen branch; no tags for marking, because I prefer the woodsman's methods of marking localities; no note-book and pencil, because I can remember everything until ready to put my specimens in press; no drinking water, because I have formed the habit, for prudential reasons, of not getting thirsty when in the wilds.

It is evident, therefore, that the articles I do carry can be quickly enumerated; but it is not easy to describe my substitute for a vasculum and explain its merits. It is simply that well-known and everywhere

obtainable receptacle for baggage called a "telescope," with two tin trays or coverless boxes fitted to the inside. One of these boxes slips inside of the other, and has half-inch flanges turned inward from the ends. When filled, this is set below the outer box, to which the flanges afford a firm support. To make these boxes so that they will slip in and out easily, and so as not to waste any space, is a nice job for a tinsmith. When both are in use, the upper part of the "telescope" laps a half-inch over the lower. If the material be canvas, a piece of rubber cloth should be pasted inside the top of the upper part, but "fiber leather" is far better, being strong, waterproof, and not easily soiled. It is well to bear in mind that it shrinks a little. My "telescope" is of this material, and measures 16 inches in length, 9 in width, and either 7 or 12 in depth. I arrange the straps by reversing one so that they buckle together on opposite sides, having the holes marked which should receive the buckles whether one or both of the inner boxes be in use, both straps meeting together snugly in the hand in either case. When through collecting, the straps may be adjusted in the usual way. The only inconvenience is the catching up of the two straps at every fresh start, but this is slight.

The advantages of this device are numerous and important. First of all, either canvas or "fiber leather" is a non-conductor of heat, while a tin receptacle exposed to hot sunshine becomes so heated as sometimes to injure the specimens inside, especially such as incline to disarticulate. In the two open-topped boxes, specimens can be arranged and sorted better than in a vasculum, and taken out more handily. The advantages of the quadrangular form are obvious. Moreover, the "telescope" is such a familiar object, that it does not excite curiosity and inquisitiveness as does the vasculum, which I have heard described as "something like a piece of stovepipe with a door on one side." The adaptability of bulk to material collected is a manifest advantage. Then again, space may be spared in the bottom for stowing a vest or light coat.

As to the other articles of my ordinary collecting outfit, they are, as I have stated, few and simple. I always carry one or two folded sheets of oiled manilla paper in the bottom of my "telescope," some pieces of newspaper tucked in at the sides, or laid inside the tin boxes, in the inner of which is placed on starting a stout pruning or hawk's-bill knife, a four ounce bottle of water, and sometimes a lunch done up in oiled paper. Later the knife is transferred to the right hip-pocket, and the bottle sometimes to the left. The knife is used mainly for digging, and the amount of work that can be done with it is surprising. The lower part of the blade is kept barely sharp enough for cutting.

Oiled paper I find extremely serviceable, and was surprised to see

no mention of it in Professor Bailey's book. Sometimes I carry nothing else, since specimens wrapped in it after being sprinkled keep as fresh as in tin. If both of the boxes become full and more space is needed, I take out a sheet of the oiled paper, empty the contents of one box on it, wrap and tie with twine, and proceed with my collecting. Sometimes the paper is used for wrapping a set of oak, pine, or anything else with firm leaves, or for rolling up full length a set of some coarse grass or sedge. In fact, the uses to which oiled paper may be put are almost too numerous to mention.

The bottle of water is for sprinkling, which I consider of prime importance. I start with one or two thicknesses of wet paper at the bottom of each box, and sometimes put more at top. When specimens are put in, I sprinkle them more or less, according to their nature and condition. This prevents any wilting in the box, and freshens up most plants which may droop in a time of drouth or under a midday sun; but it does not revive plants with milky juice, and specimens with roots are much slower in reviving than cuttings. Sprinkling also softens dead and dry basal leaves which would otherwise be crushed in the press. With woody specimens sprinkling should be avoided, as it tends to the disarticulation of their leaves. I detest wilted specimens, and would not add a single one to the thousands that are sent out yearly.

A portfolio I never use, but for plants with fugacious flowers or sensitive leaves, sometimes use a hand-press with binders boards for covers, binding the whole tightly with stout cord. There are objections to the habitual use of a portfolio or hand-press besides those before mentioned, except quite near home, and there it will not do in a country where there are ticks, and flies and red-bugs. On a long jaunt the pressing of specimens takes up too much time, and they are not likely to be put in as carefully as at home. The objections in windy or showery weather are obvious. After making a collection of plants, one may find much better specimens, and wish to substitute them for the first lot, but one will hardly throw out specimens from the portfolio. I would here observe that my collecting is almost entirely in large sets, dozens or scores of sheets of a kind, and that therefore my methods are somewhat different from what they would be if only single specimens were collected.

When traveling in a wagon or buggy, some additional articles are carried, in particular, a nest of two or three rectangular tin boxes, the largest measuring 19 by 12½ by 9 inches. They are painted outside and inside with maroon carriage paint. A rubber blanket is used mainly, cloth side up, for protecting the boxes from the sun. When traveling by rail, my principal mode of conveyance nowadays, two

presses and a large "telescope" are carried, besides the small one for collecting. In the large one is carried my largest tin box, inside of which are placed articles liable to damage by pressure, especially dried specimens, until there is enough to send off by express. After strapping the presses so tightly as to defy the efforts of the baggage smashers, covers of brown denim are slipped over them, stout cords are passed around them crosswise and straps lengthwise, and they are ready to be checked. A trunk as stout and heavy as I would need is objectionable on various accounts. I get along far better without one.

As to that very important article, the press, Professor Bailey describes only one with weights, which I always regarded as the lady's press. I attribute this preference to his morbid fear of "crushing" specimens, a delusion which is a prolific source of bad specimens, like imperfect drying and the pressing of wilted plants. One objection to such specimens is their special liability to breakage unless packed with exceptional care—and they do not show all the breaks till they come to be poisoned and mounted. My presses consist of driers, sheets of specimens, pads, boards and straps, and they are so compact that they may be tumbled about like blocks of wood. The driers are cut from rolls of felt paper to the size of 12 by 17 inches, the cost not exceeding one cent each. The specimen sheets measure 11 by 16 inches; if larger than this, many specimens would be too large to look well on the mounting sheets. Some collectors use sheets measuring 12 by 18 inches, and send out specimens which need to be broken or cut. The pads consist of folded driers, and are used for keeping the press level and compact, a need often felt in pressing many specimens of a kind. The boards are of the same length and width as the driers, and are made of half-inch poplar with yellow pine cleats, which bear the whole strain. The cleats run lengthwise of the boards, and are smoothed and rounded at the ends, which allows the straps to be pushed off without the exertion of unbuckling. The straps are made of the best harness leather, one inch wide, with rounded edges and with holes for the buckle rather close together, so long, and with the holes so disposed that the press may vary from a few inches to two feet in height—in traveling it never exceeds twenty inches. The straps are passed around the press about three inches from either end, and are tightened alternately. A combination of pressure with the left foot and leverage with both hands is what does the work. To avoid strains, I have learned to use the hands in a certain way, different for each strap, but knacks of this sort cannot well be described. A few hours after putting a fresh lot of specimens in press, the straps need to be tightened again.

(*To be continued.*)

NOTES ON THE FLORA ABOUT NOME CITY.

By J. B. Flett.

BOTANIZING at Nome City, Alaska, is quite different from what it is generally in the States. The first requisite is a pair of hip-rubber boots with which one may "mush" the swales and sluggish streams which are so abundant on the tundra. The latter, which has a width at Nome City of about five miles, is exceedingly rich in mosses and lichens. There were many sedges and several species of willow, some of which were only a few inches high; mixed with these were a small birch and a spiraea. Near the numerous ponds are beautiful patches of cotton-grass (*Eriophorum*). This grows very luxuriantly, and presents a beautiful sight as it waves to and fro in the wind. The heath family has quite a number of representatives, most of the species being different from ours. The genus *Pedicularis* is represented by several species, some of which are distinctly Arctic. The shooting-star (*Dodecatheon*) was seen along the streams in company with two violets, a *Parnassia*, a *Polemonium* and a *Delphinium*. There were two little brambles (*Rubus*), one of which bore a large edible berry, much like our thimble-berry.

The banks of the sluggish streams bore a very rich flora, including a *Caltha*, a *Claytonia*, three members of the genus *Saxifraga*, a small gentian, and many others growing in the midst of the usually tall grass. Among the moss and lichens grew a short rigid form of *Lycopodium Selago* and *Equisetum variegatum*, the latter in very dense tufts.

At the base of the foothills occurred a mixture of the plants belonging to the tundra and those seen chiefly on the hills and along the rapid streams flowing from them. A few plants naturally belonged here and were found nowhere else. This was true of the fern *Filix montana*, a species of gentian, and the large forms of alder and willow. *Equisetum sylvaticum* flourished in the shade of these in the grassy places. Both alders and willows were much bent, forming thickets through which it was very difficult to penetrate. The severe storms and snows of winter had caused them to assume such a position. In these thickets grew a large *Delphinium*, several *Polygonums*, violets, buttercups and forget-me-nots, the latter very numerous. A beautiful *Iris* found a congenial home in the shade. The monocotyledonous plants, with the exception of the sedges and grasses, had few representatives. The only ones which I can recall are the *Iris* above referred to, a *Zygadenus*, an *Allium*, and a minute *Tofieldia*. *Potentilla fruticosa* and several other species of related genera grew in abundance, covering the ground with yellow, thus presenting a beautiful contrast to other flowers white, purple and pink in color.

Passing on upwards from this narrow belt at the base of the hills, we came upon higher and drier ground, hence new forms sprang up different from those of the tundra and shady places. Among these may be mentioned two beautiful poppies, a phlox, two campanulas, a solidago, two senecios, two or three antennarias, an arnica, the common dandelion and yarrow, and other members of the Compositae. The Heath Family was well represented, as was also the Pink Family. In addition to these, there were many leguminous plants. Some of these were very minute and beautiful. Little *Woodsia glabella* presented a dainty appearance among these small plants which decorated the steep slopes of the mountain terraces. On the ledges of solid rock grew *Filix fragilis*. This was also collected under the large rock shaped like an anvil, on the highest point. Anvil Mountain takes its name from this rock.

On the summit of these storm swept hills, or mountains, as they are called in that country, lichens and mosses are the chief forms of vegetation. There is a dark colored lichen, perhaps an *Usnea*, which gives the summits a doleful appearance. Occasionally a few heaths, arenarias, arnicas and blue-bells crop out here and there to break the monotony.

For botanical purposes, the country may be divided into three distinct areas, namely, the tundra, including the ponds and the sluggish streams spreading out over it forming swales; second, the narrow belt connecting the tundra with the mountains; and third, the mountains themselves, having a very rich flora on their lower slopes, while their summits bear only those plants that can endure the severe storms and the scanty soil. In fact, the summits might be considered a fourth area, though no new plants were observed. A few of the hardy plants which grew profusely on the slopes, were stunted and matted here.

Owing to the moist climate and the abundance of moss and lichens, and the power of these plants to retain moisture, they have very little respect for habitat. The twin-flower (*Linnaea borealis*), was observed on the tundra and on the dry moss-covered rocks. This can also be said of many other plants. Very often the rocky peaks are enveloped by the clouds or swept by storms, while the weather is fairly pleasant a few hundred feet below.

Within a short distance of Nome City—about five miles north and eighteen west—the writer collected about 170 spermatophytes and 20 pteridophytes, besides many bryophytes and a few lichens.

Tacoma, Washington.

THE NATIVE OAK GROVES OF IOWA.

By T. J. and M. F. L. Fitzpatrick.

IOWA, whose prairie land rolls from river to river, can neither boast of great forests nor of many species, yet such as she has are by no means worthy of contempt. It is our purpose in this article to give the salient features of Iowa's native oak groves, which are made up of fifteen species, a number we believe quite incomparable considering our location.

The oak has been looked upon as the peer of forest trees, and even taken as the symbol of strength. Its close strong fibers enable the tree to resist a thousand storms, and some of the species live several hundred years before storms, fungi, accidents, and natural old age succeed in consuming the tree's vitality, and causing death.

Let us pass through a native oak grove of eastern Iowa. At first we shall be impressed by the remarkable paucity of large trees, though here and there fine specimens are seen. Further observation, however, reveals many decaying stumps, clearly indicating the cause of the scarcity. In place of the primeval, there are numerous young trees which collectively constitute the so-called second growth. On noticing species, we find they bear a rather general numerical relation to each other. Sometimes one species predominates, and sometimes another, so that the areas receive the distinctive names of white oak, bur oak, or so-called black oak groves. One particular grove on the uplands is composed largely of scarlet oak (*Quercus coccinea* Wang.); the trees are thick-set, well-limbed or not as may be convenient for them, stately, thriving or passive as the seasons of average moisture or drought appears. Here and there may be seen a solitary red oak (*Q. rubra* L.), or at best but few individuals, for they seem not to thrive in numbers where the scarlet oak abounds. The bur oak (*Q. macrocarpa* Michx.) fares better, though not many individuals can be counted in close proximity with the scarlet oak, yet passing in certain directions we find the number increasing until we are in a typical bur oak grove. We said we were on the uplands, but we find on passing to the lowlands that the bur oak is there. The trees are large, but the quality of the timber is poor. The white oak (*Q. alba* L.) has much the same habit as the bur oak. Solitary individuals occur among the scarlet oaks, and in certain places predominate, though as we pass from point to point, we may find white oaks mixed with bur oaks along with scarlet oaks, until differentiated by natural causes into predominant or subordinate numerical positions. Let us pass over to the bluff side next the river, and here we may expect to find a few chestnut oaks (*Q. acuminata* (Michx.) Sargent). As the chestnut oaks we usually find are few and small, we

look upon them as curiosities in the oak line. Rarely do we find a quercitron or black oak (*Q. velutina* Lam.) mixed in our typical oak groves.

Turning to southeastern or southern Iowa, we find the relations of the bur, white, scarlet, and red oak remaining much the same as in the eastern part of the State, except that the shingle oak (*Q. imbricaria* Michx.), or laurel oak, as it is called in Iowa, makes itself numerous in the uplands, replacing in many localities the scarlet oak. On the second bottoms we find the swamp white oak (*Q. platanoides* (Lam.) Sudw.) flourishing, and in the swampy portions of the lower bottom the pin oak (*Q. palustris* Du Roi) occurs abundantly. The swamp white oak and the pin oak sometimes intermingle on neutral ground, but not to mutual benefit. Coming to the uplands, we find groves of black-jack or barren oak (*Q. Marylandica* Muench.) growing frequently on rather sterile soil. The trees are small, rough-formed, apparently stunted, much-branched, so much so that getting wood from these groves is slow and laborious. Infrequently we find a water oak (*Q. nigra* L.) in these black-jack groves. This species occurs along streams and swamps in the eastern portion of the United States, but in Iowa we have seen it only on the upland. Passing out on the prairie we find many colonies of the ground or scrub chestnut oak (*Q. prinoides* Willd.). The species is small, only two or three feet high, of heavy root, and of no economic value save the acorns, which are stored by the prairie squirrels. The roots are a rather formidable obstacle to the breaking of the sod, taxing the patience of the breaker and the draught team. On the prairie, too, we find the bur oak. Instead of the fine large trees, we have scrubs, only a few feet high, but seemingly thriving in small colonies, and each apparently striving to be the prototype of a future forest.

In central and western Iowa we find the red oak frequently displacing the scarlet oak. The white oak is frequent along with the bur oak, which is stately or scrubby, according to location. Occasionally a few chestnut oaks occur along the bluffs in central Iowa. In the same region also occurs the Texan red oak (*Q. Texana* Buckley), an unusual find.

It will be seen that central and western Iowa have few species, as compared with the eastern and southern portions. Forests are more extensive in the eastern area. The larger rivers of the State are all eastern, and the Father of Waters is our eastern border. The forest primeval established itself in a narrow strip along our eastern border, sending out branches of tenuous width up the tributaries. The forests of central and western Iowa are meagre because they had to be established in a fire-swept zone, and had not reached their fulness before the

advent of man. The problem of forest conditions, especially near the rivers, having been solved in the eastern portion, there was opportunity for the increase of species. But the hardy ones were established first and others followed. The forests of central and western Iowa had made their beginning; the sturdy species had stood the test on favorable ground, and others were following, but the advent of man changed conditions. He made the prairie a farm, and converted the young forests into heat and building material.

Passing backward in time for a space of fifty years, we find the State but thinly settled and nearly all its inhabitants on the eastern side. There were many limited oak forests with fine large trees. The settler chose the best of convenient size to build his home. The saw mill on being brought and conveniently located, was energetically used in producing building materials needed in the rising villages or on the farms. Thousands of trees were made into rails to be used in the old-fashioned worm fences. The advent of the railways caused an increase in the demand for oak timber for many years. The timber was rapidly disappearing, and many citizens felt apprehensive. But as time goes on conditions change; the universal application of metals materially checked the strain on the timber resources, so that to-day our oak groves as a rule are suffering only from the demands for fuel and fence-posts, along with the greed for more pasture land. The opening of large coal fields in southern Iowa has materially reduced the fuel demand.

The remaining two species of Iowa oaks are *Q. ellipsoidalis* Hill, found rarely in Scott county, and *Q. minor* (Marsh.) Sargent, the post or iron oak, which occurs sparingly in groves in the southern part of the State.

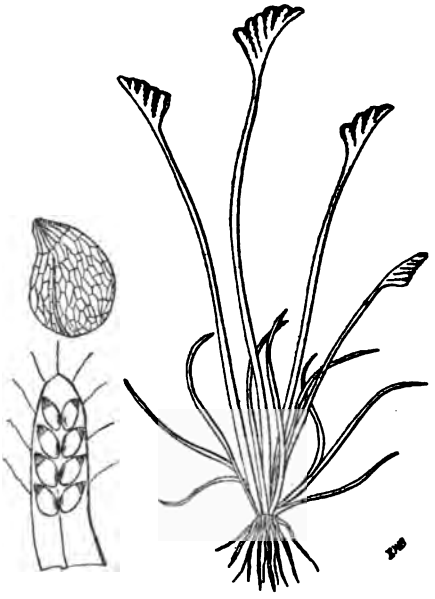
Iowa City, Iowa.

Probably the largest specimen of the 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.*

BRIEFER ARTICLES.

The Curly Grass, Schizaea pusilla.

As is well-known, this fern is abundant at several stations in the pine barrens of New Jersey, where it reaches its maximum development in size and in number of stations. At Forked River it grows on the edge of a patch of woods of the southern white cedar, in an open boggy meadow, which at the time we were there was a brilliant orange-color with the tall spikes of the bog asphodel. Around the base of hummocks of peat-moss, mixed with sedges, sundews, and lycopods, it grew, and in little sandy hollows, shaded by bushes we found the young plants. They could be recognized by the rolled tips of the leaves, and when pulled or dug up, it could be seen with an ordinary pocket-lens that between the root and the leaf there were numerous branching green filaments, looking like a fresh-water alga or the protonema of a moss. These filaments proved to be the prothallium, but quite unlike that of ordinary ferns, in fact nothing quite so simple or so like those of the mosses has been heretofore described. It comes nearest to fulfilling Goebel's idea of what the ancestral parent might have been, as it bears the antheridia and archegonia directly on the filaments. The antheridia are quite abundant near the extremities of the branches; the archegonia are fewer, 2-12 having been found on a single plant. They are large and quite conspicuous with a magnification of fifty diameters, and remain attached near the point from which the filaments radiate, on slightly thickened, fleshy white filaments. On the extremities of the filaments were found a number of globose cells in pairs, usually inhabited by a mycorhiza, that is, by a fungus growing in symbiotic relation to the filaments, and serving as its agent in nutrition. They break up the contents of the cells into granular fungoid masses, and send long hyphae through the cells. The radicles were found to occur only on these cells, and they are apparently formed only on those filaments which turn down toward the ground, the ones which are erect being always green, without radicles or fungoid cells. They must serve a useful purpose, as the filaments remain attached long after the fertilization of the archegonium, even when the young sporophyte has rooted and produced several leaves, often nearly an inch high. Ultimately they all succumb to the attacks of fungi, which discolor the cells, penetrate the walls, surround the extremities of the filaments and stop their growth. The root has a cap of four spreading cells like a four-leaf



The curly-grass (*Schizaea pusilla*). After Berry in Asa Gray Bulletin, V. 5.

clover. Occasionally as many as five of these caps remain one below the other, pushed off in succession from the growing point of the root. The leaves have two rows of stomata and several rows of club-shaped hairs, which are most abundant on the circinnate tips of the young leaves. The spores are bean-shaped, pitted like a thimble, with a ridge on the convex side, through which the first cell of the filament emerges. The antheridia are formed early, one having been found when the filament consisted of only four cells, and was still attached to the spore.

A search through the literature of ferns has shown no record quite as simple as that of *Schizaea*, the nearest being that described by Bower in the *Annals of Botany* in *Trichomanes pyxidiferum*. But even this is more complex, as the archegonia are borne on a specially modified base known as an "archegoniophore."

A full description and illustrations will be found in the *Bulletin of the Torrey Botanical Club* for January, 1901.—Elizabeth G. Britton, New York Botanical Garden.

A Fossil Flower.

It is a well-known fact that outside of the Baltic amber, flowers in a fossil state are extremely rare. Their delicate texture is wholly unsuited to the rough handling incident to fossilization, and consequently few traces of them have been found.

In working up a collection of beautifully preserved material from the valley of the John Day River, Oregon, I have found what seems to be the large sterile flower of a *Hydrangea*. It is composed of four large, broadly obovate or nearly circular calyx-lobes which have a spread of about 4 cm. The nervation of the lobes is perfectly preserved, and is of exactly the type found in *Hydrangea Japonica*. In size and shape it agrees very well with *H. quercifolia* of the eastern United States, but not in nervation.

This fossil was originally described as a species of *Marsilia*, the leaf of which it much resembles, but was later placed under *Porana*, a Convolvulaceous genus having a curious, leathery calyx. It seems, however, to be much more nearly related to *Hydrangea*.

Associated with this flower is a flora of over fifty species, all of which have a very modern aspect. There are elms, maples, alders, hornbeams, sumac, willows, oaks, a sycamore with leaves over a foot broad, and among the conifers *Glyptostrobus*, *Sequoia*, a *Taxodium* hardly to be distinguished from *T. distichum*, and a *Thuja*. Perhaps not the least interesting is what appears to be a species of bread-fruit tree (*Artocarpus*).—F. H. Knowlton.

The Mesquite in Kansas and Oklahoma.

In the summer of 1897, while doing geological work in southwestern Kansas, my attention was called to a thorny shrub unlike anything I had seen in the State. It grew on the hillside just north of the Black Hills, some eight miles southeast of Belvidere. The next summer I pointed out the shrub to Dr. Lester F. Ward, who identified it as the mesquite (*Prosopis glandulosa* Torr.), and published a notice of its occurrence in THE PLANT WORLD I: 48. The species has since been included in Britton & Brown's Illustrated Flora, 3: 516.

During the past summer while working with the Oklahoma Geological Survey, I had opportunity to observe the habitat of this plant in northwestern Oklahoma In this region *Prosopis* was not observed except in patches along the valley of the Cimarron river, where it sometimes becomes quite abundant. It prefers the poorest and driest soils, and apparently those impregnated with salt. Almost without exception it was found in the red soil on or near salt flats. The shrub sometimes grows as much as ten feet high, but is always wide spreading and apparently stunted. It bears a great profusion of pods. The mesquite has also been noticed on the high hills of Clark county, Kansas, fifty miles west of Belvidere, but here it is extremely dwarfed, rarely growing more than three feet high. I have never seen it north of the southern tier of counties in Kansas.—Charles Newton Gould, University of Oklahoma.

GENERAL ITEMS.

Miss Bird in her "Unbeaten Tracks in Japan," has the following interesting note on strawberries: "A day or two ago we had some fully ripe strawberries of a pale pea-green color, with a strong odor and flavor, not of strawberries, but of the Catawba grape."

The announcement for the fourteenth season of the Marine Biological Laboratory at Woods Holl, Mass., is just received. The course of instruction in botany extends from July 3d to August 14th, and facilities are offered for study in cryptogams, phanerogams, plant physiology, plant cytology, etc. Additional information may be obtained of Professor Bradley M. Davis, of the University of Chicago.

"The water-nut (*Hydrodictyon*), is a very common alga throughout Minnesota, Iowa and Illinois. It is to be found in shallow water, along the banks of rivers and small streams, and in pools having a constant supply of water kept warm by the sun, noticeably those in stone quarries. It is quickly recognized by the large, angular meshes reaching half a centimeter or more in diameter, seen best by raising the plant from the water. The old vesicular mother-cells, a centimeter or two long, still containing the young nets, look much like dead and bleached worms, as they lie undisturbed in the water."—*Botanical Gazette.*

During the past year the Department of Agriculture established a date garden in Arizona in conjunction with the Experiment Station of that Territory. Mr. W. T. Swingle made a special trip to Algeria for the purpose of securing suckers of the best varieties of dates known in the Mediterranean region, with the result that they now have about 500 plants growing successfully. It seems not at all improbable that we shall soon be raising dates commercially in this country. In this connection it may be of interest to call attention to the fact that Mr. Swingle also secured, in Asia Minor, numbers of the fig-fertilizing insects, which were successfully introduced into California. This seems likely to revolutionize the fig industry in this country.

The Botanic Garden as an Aid to Agriculture, was the subject of a lecture by Prof. William Trelease before the Society for Promotion of Agricultural Science. He shows very clearly that quite aside from the aesthetic study of plants, the botanical garden has or should have a positive bearing in furthering the science of agriculture.

For many years the Governmont has been engaged in reclaiming land in the Potomac river opposite Washington. Twenty-five acres of this reclaimed land has been granted to the Department of Agriculture for use as a trial ground for seeds and plants obtained in all parts of the world which are likely to prove of value in this country. Tests have also been made of the seed annually distributed by Congress.

Some very beautiful specimens of pressed California wild flowers and sea mosses, together with some striking floral paintings, have been submitted to Secretary Filcher of the California State Board of Trade by Miss Elinor McCord, of Monterey, who desires to send a large and important exhibit along these lines to the Pan-American Exposition at Buffalo. The Secretary has cordially accepted Miss McCord's offer, and this dainty display will be a novel feature of the California exhibit, which will be an important one.

It is of common knowledge that mahogany is very valuable, but the full extent of this value is perhaps realized by but few. According to the *American Lumberman*, two logs of the African mahogany (*Khaya Senegalensis*), sold in Liverpool last summer at the rate of $1,771.58 and $2,501.56 respectively a thousand feet B. M. Shortly previous to this three logs were sold for $5,500. These logs averaged 22 feet long and 32 inches in diameter at the base. This African mahogany, also known as Senegal mahogany, is really inferior to our West Indian mahogany.

According to Dr. B. E. Fernow (*Recreation*, April, 1901), the Singapore cedar (*Cedrela toona*) can undoubtedly be introduced successfully into the West Indies and Florida. It is a native of Asia and Australia, and has light, fragrant, soft, shiny wood, brick red in color, which does not warp or crack in seasoning. It ii easily propagated and grows rapidly, a tree in Australia reaching a diameter of 10 inches and a height of 50 feet in 12 years. The wood is used in making tea boxes, boats, carvings, shingles, furniture, etc. In Australia, where it is known as red cedar, it is being extensively used in replanting reserves.

NOTES ON CURRENT LITERATURE

Recent advance sheets from the Report of the Missouri Botanical Garden, Vol. 12, contain descriptions of a new *Agave* from Arizona (*A. Treleasii*), by Professor J. W. Toumey, and a new cristate variety of the cliff-brake (*Pellaea atropurpurea cristata*), by Dr. William Trelease. Both papers are accompanied by excellent plates made from photographs.

A catalogue of the flowering plants and ferns growing without cultivation in the vicinity of Grand Rapids, Michigan, by Emma J. Cole, has recently been issued. It is carefully prepared, and reflects credit on the compiler for the excellent general arrangement, the full citations of habitat and locality, and the neat typography. The introduction contains chapters on the geology and geography of the region, together with its ecology, a discussion of which always adds interest to a local flora. The Index Kewensis is adopted as the guide for nomenclature, a somewhat remarkable innovation, since the Index departs quite widely from the usage of Gray's Manual, and hence is not closely followed by even conservative American botanists.

Farmers' Bulletin No. 121, of the U. S. Department of Agriculture, on "Beans, Peas, and Other Legumes as Food," is similar in scope to a number of popular bulletins published by the Department, summarizing the available information on different food materials which enter largely into the diet of most families. It was prepared under the direction of the Director of the Office of Experiment Stations by Mrs. Mary Hinman Abel who has made an extensive study of the literature of the subject, and has also embodied the results gained by practical experience and many experiments, some of which were undertaken especially in connection with this bulletin. The geographical distribution of the legume family, representatives of which are found in all climates and countries, is given, and their nutritive value, nitrogeneus constituents, and digestibility are discussed. Vegetable protein is compared with animal protein, the various species of beans and peas are described, the many ways of preparing them for food are noted, and a table is given showing the comparative value of legumes in relation to their cost.

EDITORIAL.

The marvellous advance that practical botany has made in this country within the past two decades is perhaps best attested by the growth and expansion along these lines in the U. S. Department of Agriculture. Some fifteen years ago practically all of the botanical work of the Department was done by three individuals. At the present time there are probably more than one hundred persons engaged in one capacity or another in botanical work, among them being not less than twenty-five trained investigators of the highest order. From the original Division of Botany other divisions have been cut out from time to time, until at the beginning of the present year they were six or seven in number. The last session of Congress wisely combined all botanical work in the Department in one group, to be known as the Bureau of Plant Industry, thus putting it on a footing with the Weather Bureau and the Bureau of Animal Industry. In it is embraced the old Division of Botany, charged with the economic study of the higher plants; the Division of Seeds, charged particularly with the testing of seeds sent out by Congress; the Division of Agrostology, which devotes all its attention to the grasses; the Division of Plant Introduction, which covers the introduction of new and desirable plants from foreign countries; the Division of Vegetable Physiology and Pathology, in which plant diseases are studied; the Division of Pomology, or the study of fruits, and finally the Division of Gardens and Grounds, which attends to the extensive collections of plants grown in the Department grounds. The total appropriation for this work is $204,680, which, compared with the few thousands formerly devoted to the subject, shows the liberality with which these interests are fostered by the Government.

BOOK REVIEWS.

FLORA OF WESTERN MIDDLE CALIFORNIA. By Willis Linn Jepson, Ph. D., Assistant Professor of Botany in the University of California. 12mo, paper, 625 pp. The Encina Publishing Co., Berkely, Cal. Price $2.50 postpaid.

In this compact book Professor Jepson offers to the botanical public an excellent working manual of the region indicated by its title. This portion of the State has not been altogether neglected in the past, for in addition to Dr. Behr's Flora of the vicinity of San Francisco, we have Professor Greene's Manual of the Bay Region, and his Flora Franciscana, both of which are very exhaustive in their treatment. But the volume at hand is somewhat more extensive in its scope, and on account of the extra-limital species frequently included, will be, according to the author's statement, "almost if not quite as useful as far north as Red Bluff and as far south as Bakersfield."

The best feature of Dr. Jepson's flora is to be found in the descriptions, which are very accurately drawn, in most cases from living material. Probably no State has yielded more noveltius since the publication of the botany of the State Survey many years ago; and it is gratifying to note that Dr. Jepson is not altogether hampered by conservative tenets in his recognition of species and genera. The nomenclature seems to be impartially divided between both the old school and the new; we note, for instance, that *Tumion* has been taken up for *Torreya*, while on a closely succeeding page *Hierochloe* is retained instead of *Savastana*, which antedates it. The double author-citation is used throughout. The typography and general arrangement of the book is excellent, although printed on rather inferior paper. It may be commended unreservedly, we think, to students desiring a good working mannal of the region covered.—C. L. P.

ROYAL GARDENS, KEW; Bulletin of Miscellaneous Iuformation; Additional Series IV; List of Published Names of Plants Introduced to Cultivation, 1876 to 1896.

Some of the most useful books are often hidden from investigators because of the elaborate and official character of their titles. Such titles do not stick in the memory, and the books are hard to find in a library catalogue. A recent work of this kind labors under the above title. This is a book of 410 pages, containing the names of 7,600 plants introduced into cultivation during the 21 years ending 1896. Brief descriptions are given, including the nativity. It is especially valuable for its reference to pictures and to the descriptions, which are usually the original ones. In compiling this index, 63 publications have been consulted, including the standard horticultural publications and a num-

ber of important nursery catalogues, as those of Bull, Sander, Veith, Williams, Lemoine, Vilmorin, Spaeth, and Dammann. Some of these firms have for many years sent collectors to the uttermost parts of the earth in search of new plants, and many species that are prominent in cultivation to-day were first described in these catalogues.

In the preparation of the Cyclopedia of American Horticulture, this "List" has been of great value, since it gives a clue to perhaps 4,000 plants of horticultural interest that have come into cultivation since the period covered by the Index Kewensis, *i. e.* since 1885. It accounts for a great many names of American plants which baffle those monographers of American genera who do not have access to just such a work as this. Nor will the publication of the fifth volume of the Index Kewensis destroy the value of the present work, as it gives much valuable information that will not be included in the Index Moreover, many systematic botanists who are now engaged on important American works, cannot afford to wait for the next volume of the latter. The "List of Published Names" will also be found useful to workers engaged on the floras of other lands than America.

The work under review does not guarantee the names found within its covers. It pretends to be nothing more than a compilation. It does not even claim to be a complete list of all the new names found in the 63 publications that have been abstracted. Nevertheless, it would be hard to overpraise the Kew management for this work. Ten years from now the "List" might be a more nearly perfect work, but in the interim there would be an enormous waste in time and energy and a useless multiplication of synonymous names. How such a book can be published for a dollar, is a mystery.

In his modest preface to the "List," Sir W. T. Thiselton-Dyer takes occasion to give some interesting facts and figures about the 7600 plants introduced to cultivation from 1876 to 1896. The families most largely represented are orchids, lilies and aroids, the last-named including many foliage plants which are particularly in favor on the continent. Of the 7600 species, 1600 are orchids belonging to seven genera. The seven genera most largely represented are all orchids. These statistics throw an important light on the horticultural taste of the last century, and indicate in a measure what plants the collectors risk their lives for, and what novelties the great commercial houses mentioned above are desirous of obtaining for their rich patrons.

The preface also cites one case of a tri-generic hybrid which has originated during the period mentioned, as also 15 different groups of bi-genic hybrids.

The new species for 1897 are found in the Kew Bulletin of Miscellaneous Information for 1898, Appendix II.—Wilhelm Miller.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

Vol. IV. MAY, 1901. No. 5.

HINTS ON HERBORIZING.

By A. H. Curtiss.

(*Concluded from page 66.*)

HAVING described my implements and materials for work, I will now turn my attention to methods, describing as briefly as possible such as are not alluded to in "Botanizing," or that are mentioned as of little or doubtful value.

In selecting specimens of any plant, I aim to avoid abnormal and deformed growths—for which latter insects and browsing animals are chiefly responsible—and to represent all normal forms or developments obtainable. Of small herbs I collect various sizes, slender and much-branched plants, etc. And when I come to make up plants for distribution, I aim that a like variety shall be represented in each specimen. This requires a careful arrangement which may not be understood by those who receive my specimens. It seems to be generally considered that quantity is the only point to be regarded.

Of many plants, especially Compositae, I aim to collect an equal number of perfect small plants, and branches of large ones with sections of the main stems and the supporting leaves attached. I aim that the under side of at least one leaf shall be turned upward, and I often add separate leaves when they are large and of varied forms. Good additions to specimens of biennials and some perennials are the well developed seedlings which may be found in the fall.

Of tall and slender grasses and sedges I usually provide several tops of flowers or fruit for each specimen. Grasses whose leaves incline to roll, I dampen thoroughly before putting in press, and I give

them so many driers that the leaves at least will be quite dry when the press is next opened. In bending tall and rigid stems to sharp angles, I first mash them at the proper points with the back of my knife in order to prevent their breaking. Before pressing a bunchy specimen, like *Rhus copallina*, I thin the leaves and the panicle or thyrsus, leaving enough of the petioles to show the positions of the leaves removed. The specimens then dry better, look better, mount better, and can be more effectually poisoned.

I cannot account for Professor Bailey's statement that presentable specimens of most ferns can be obtained only by using the portfolio. I have always regarded ferns as requiring no more care than lycopods, provided the thin ones are kept damp. I know of no fern that may not be gathered and pressed at leisure unless there are young and tender fronds, which, as a rule, should not appear in specimens. Those ferns which, like *Cheilanthes*, become dry and crisp in dry weather, unless collected in damp weather, should be plunged in water or heavily sprinkled and left in a box over night to straighten out.

The hand-press or portfolio is particularly adapted to Malvaceae, Leguminosae, Onagraceae, and Acanthaceae. The latter, like the rhexias and ludwigias, shed their flowers as soon as put in the vasculum, and there are many families allied to Acanthaceae which do not hold their flowers long, and need to be hurried into the press. The eccentricities of some Leguminosae and Malvaceae are hard to understand. It seems as though they try to baffle the collector. Once at Key West I went out with a press for a *Gossypium* very early in the morning. I had to wait till sunrise for the flowers to open, and before I secured all I wanted, the flowers had fully closed again.

Convolvulaceae, which abound in Florida, I used to consider troublesome, but do not now. Late in the afternoon I select specimens with buds just ready to open, arrange them loosely in tin receptacles, sprinkle freely and cover. The next morning I find them in full and perfect flower, and deliberately put them in press. The nocturnal species, however, I have to press before going to bed. I usually close the flowers of the large flowered species of this family, because the inner surface will adhere even to oiled paper.

A good way to secure perfect flower specimens of the splendid but tissue-like *Canna flaccida*, of *Iris* and various other Monocotyledonae with delicate flowers, as also of some troublesome Polypetalae, is to collect specimens after the manner described for Convolvulaceae—not root specimens—and let them bloom in water. Such flowers should be pressed between folded pieces of waxed or paraffine paper. And I believe there is no other way of preserving the flowers of Commelinaceae and of such genera as *Sisyrinchium*, *Nemastylis* and *Xyris*. The same

method may be employed in dealing with *Helianthemum*, with some genera of Malvaceae and Cucurbitaceae, and with several small families allied to the latter. Waxed paper should be used with fruit specimens of *Desmodium*.

Another troublesome class of plants comprises the Ficoideae, most of the Crassulaceae, many Portulacaceae, *Batis*, etc. An *Allium* will bloom and seed in press, and its root be ready to grow the following spring. All such plants may be killed and disarticulation prevented by immersion in hot water, as is stated in "Botanizing," but there is danger of overdoing the thing by too long immersion, which causes the leaves to drop off at once. When I have a set of a plant of this nature, I lay the specimens in a pan and pour boiling water over them. Just as soon as all green has disappeared, I turn the pan over on the ground and spread the dead and limp plants on grass or a wire screen. As soon as the water has dried off I place the specimens in press, and, by frequent changes, soon have them nicely dried. With Monocotyledonae I have not used hot water with satisfaction except on leathery leaves like those of *Yucca* and *Epidendrum*. A bunch of the latter I have placed in a tea kettle of boiling water, the flowers outside protected from the steam, and they have not been affected in the least. Pressing specimens with a hot flat iron is barbarous.

Thick leaved maritime plants like *Scaevola* and *Iva imbricaria* I allow to air-dry on a floor for two or three days before pressing. The flowers of *Citrus* fall to pieces if pressed fresh, but not if first wilted a little. Disarticulation is checked by any wilting process, and most promoted by confinement in a fresh state in a close box. This trouble increases in approaching the tropics, as also the discoloration of specimens. Most specimens that I have had from the tropics, including ferns, are almost black. Even my north Florida collections of spring and summer plants lose most of their green before winter. This might perhaps be prevented by serving them as our merchants do kid gloves, by sending them north for storage till the middle of fall. The color of dried specimens, however, is a matter of no practical importance.

Other plants which are injured for specimens by keeping over night in a box are many slender ones, especially of the *Euphorbia* genus, which twist about as if in search of light. On returning from a collecting trip I at once transfer my specimens to roomy boxes, placing plenty of wet paper at bottom and top, but avoiding sprinkling. Then I decide which kinds should be put in press without delay, and which may be kept over night, if needful, and put them in press in that order.

When I need to wash roots, which I avoid as much as possible, I usually air-dry them before pressing. If, for example, I have a set of *Eleocharis* or *Sagittaria* taken from miry ground, I wash the roots, trim

the fibers short, leaving rhizomes, pile the plants in a circular heap with the roots outward, cover with wet paper or cloth all but the roots, and wait till the latter have dried before pressing the specimens. Some collectors save large masses of fibrous roots in making specimens. Such roots make an herbarium dirty, and they have little or no instructive value. Except as to annual herbs, which usually have mat roots, my practice is to clip fibers short. For this and general trimmings, I prefer shears to a knife. To secure the brittle tubers of orchids I cut out a chunk of earth with a plant in the center, and then pull the earth away from the root. Strings and slitted papers for confining grasses and sedges, like cotton rings for sunflowers, I discarded long ago. There is no need of bunching and crumpling grass specimens. They can be as easily pressed in good shape as other plants.

In preparing specimens of plants which have fleshy fruits with large or curious seeds, such as Menispermaceae and some Sapotaceae, *Prunus* and *Chrysobalanus*, *Nyssa uniflora* and *N. capitata*, it is desirable to prepare some cleaned seeds. The quickest way to do this is by boiling, but this will not do for Menispermaceae, as their thin shells would warp out of shape. Of fleshy fruits like crab apples and persimmons, *Anona* and *Zamia*, I preserve a central slice with the stem attached and partially air-dry before pressing. Some collectors think it a nice way to send the fruit of *Carya* and *Quercus* separate from the leaf specimens. Excepting the pines with fruit larger than *P. mitis*, I do not believe in any fruit specimens without attached leaves, which testify to the correctness or incorrectness of the name. In preparing fruit specimens of oaks, I spread out the specimen sheets and fold them in from both ends and sides, making them the same size as before, but so shaped as to prevent the nuts from rolling out, and I send the specimens away in the same shape. If the acorns are quite large, I wrap some thin paper around them and the stem to which they are attached. I have received lots of kindling wood in the shape of flower specimens of *Quercus*, *Betula*, *Ulmus*, and the like, without a vestige of leaves. Why such stuff is frequently sent out, I never could understand.

Failure to thoroughly dry specimens is a bad fault. I used so often to have to put sets back in press, that I now take none out unless the driers are left dry enough for use with fresh specimens. Many fleshy flowers, and especially heads of Compositae, contain eggs of insects. From theso are born very destructive larvae which often ruin specimens if not promptly destroyed. Therefore I search closely for them on first changing a set of any thick flowered plant. Last year I had a set of *Sagittaria Mohrii* almost ruined in this way throagh neglect to look at the specimens till after the worms had reduced most of the fruit heads to powder. As Professor Bailey does not allude to worming the

press, it may indicate that this trouble is not experienced in the north, but I know it to be worse in Virginia than in Florida. The mite, however, which seems to be harmless in northern herbaria, gives me a great deal of trouble. Where mites find much fresh pollen they multiply rapidly and soon destroy the flowers. They also eat fleshy fruit specimens, especially of Rosaceae and Ericaceae. I never fully protected my fresh collections from them till last year, when I kept my bundles of fresh specimens in a tight closet with plenty of naphthaline. I strewed "moth balls" over the floor, and scattered others, after being crushed, among the specimens. Packing in chests or tight boxes with naphthaline is still better.

I will now describe my method of poisoning specimens, as it differs materially from that described by Professor Bailey. He says that if specimens be effectually poisoned, "discoloration always results;" also that a brush with metal fastenings "discolors the specimens;" that there is need of wearing gloves to protect the fingers; that after applying the sublimate the specimens need to be dried between papers under a light weight. Now I have poisoned tens of thousands of specimens, and none of them was ever touched by insects afterward, though always exposed to them. And they all looked just the same after poisoning as before, except for occasional slight traces of the sublimate. I never pressed any after poisoning, and never injured my fingers, for the good reason that I do not touch the specimens. My outfit for poisoning is even simpler than that for collecting, consisting simply of a flat, tin-bound brush an inch wide, a long bone knitting needle and an alcoholic solution of corrosive sublimate. An aqueous solution will not answer, and even if waste of so expensive a liquid as alcohol be not considered, such methods as dipping, flowing and spraying are objectionable.

With a pile of specimens before me, the long and limber needle for holding down specimens in my left hand and a wet brush in the right, I commence by poisoning the upper side of the thick parts—roots, stems, flowers and fruit, mostly by light and quick touches, but taking pains to soak heads of flowers, and when the brush is nearly empty I draw it lightly over the leaves. Keeping on in this way all the sheets are presently in a pile at my right, in reverse order. Then, with strawboards at top and bottom of the pile, I turn the whole over and go to work on the other side of the specimens. When all the sheets are in a pile at my right again, I turn it over and all the specimens are right side up and in their original order. Sometimes, especially with Compositae, I use a weak and strong solution, with a brush for each. I do not poison grasses and sedges, though aware that in badly infested plants a bug or worm may sometimes be found in a thick culm. The only cryptogams I poison are fungi and Isoetes.

It seems to me strange that but five lines in "Botanizing" are devoted to the bisulphide of carbon treatment, since it has attained such importance in the estimation of herbalists that some now depend on it entirely, to the exclusion of the laborious washing process, which with many proves ineffectual. I have a zinc lined chest that holds about 3000 specimens, and pass my unpoisoned plants through it twice a year, letting them remain for a few days or for months, according to circumstances. A plastered closet in a vacant house will answer the purpose, using plenty of the bisulphide and caulking the door. In the chest I set a plate on top of the plants, and pour into it about two ounces of the bisulphide, then weight down the lid and run putty around the edge, also puttying the top of the bottle or can. Fire should be kept away from the gas.

Some time ago a writer in THE PLANT WORLD announced his discovery of a new method of drying press papers, by punching a hole in one corner of each, and stringing them on a wire, I believe. Twenty years ago I discovered the same method, and probably others have discovered it. I employed it while botanizing in eastern Tennessee one summer, but never again. My apparatus consisted of some slender iron rods three or four feet long, sandpapered, and with the ends filed, crotched stakes set in a row east and west, and a pole laid across these with hooks screwed into the under side to catch the rods. After passing a rod through a lot of the driers, I suspended it on three of the hooks, and by drawing the driers apart in a certain way, spread them very uniformly and quickly. I could take them down and into the house in a tenth of the time required for spread papers, a great advantage in showery weather. Driers might be hung in this way over a stove or over a lamp with some simple arrangement for spreading the heat. The rods and hooks might be carried with one's baggage. I aim to spread driers before noon, for in the afternoon the absorbent power of the air rapidly diminishes.

An important detail of botanical work is the packing of plants for sending away. In making up packages for exchange, most botanists throw the specimens on the sheets in any handy position, put a strawboard or tar board at top and one at bottom, and draw them together with cord till they nearly meet. This insures much breakage unless the specimens were very nicely pressed. The method which I have adopted, and which prevents damage in transportation, I will attempt to briefly describe. I arrange the specimens with the thick parts at the corners and edges as much as possible, and so that whenever I lay my hands on the pile it feels of uniform thickness. With all in good shape and between stout strawboards, I pass two lengths of manilla twine under the package lengthwise and three crosswise, each length having

a loop at one end through which the other end is passed. I tighten the five cords in succession, each several times, till they seem almost ready to break. I cannot fully describe how I tighten up the bundle, or how I strain and temporarily fasten the cords, but it is all done easily and quickly, and the result is a perfectly compact package. I often place strips of light strawboard at the ends or corners before wrapping.

Some of my "hints" may be regarded as of too little importance for publication. That consideration may have deterred the author of "Botanizing" from touching on the same points. His book nearly covers the subject, but for which fact I should not have attempted a subject requiring so much space for comprehensive treatment. The comparatively simple treatment of the cellular cryptogams is well covered by the specialists who contributed chapters on those orders. The book should be in the hands of all collectors.

I am more painstaking than most collectors, yet I would be still more so if I had the financial resources which the Biltmore botanists enjoy. I do not try to equal their work in some respects, because it wonld increase my expenses too much. I try to recover my cash outlay from the subscribers to my distributions, but have not done more than that except in the years when I had commissions for forestry work, when I had at least my expenses paid and valuable sets of woods to sell. For the great amount of time consumed I get no return except the satisfaction of feeling that I am doing useful and long-enduring work. It is a healthful pursuit, full of incident and adventure, one more to my liking than any other, and I expect to follow it as long as my physical ability holds out.

Jacksonville, Florida.

The cork tree is an evergreen oak (*Quercus suber*), about the size of our apple tree, and grown largely in Spain for commercial uses. The bark is stripped in order to obtain the cork, which is soaked and then dried. The moment the cork is peeled off, the tree begins to grow another cork skin, and each new one is better than the last, so the older the tree the better the cork. The trees are stripped about every eight years, and so strong does it make them that they often live to the age of 200 years. After the bark is stripped off it is trimmed and dried and flattened. Then it is packed and shipped to all parts of the world.

THE ASPARAGUS RUST.*

By Byron D. Halsted.

THE rust of the asparagus is caused by a fungus that was described by DeCandolle as *Puccinia asparagi* in the year 1805. From this it is seen that the rust upon the asparagus has been known to science for nearly a hundred years. No search of the early writings upon gardening has been made for a mention of the trouble, but it is reasonable to suppose that more or less of this fungus has existed beyond the history of man.

The only mention of its being found in the United States previous to 1896 is by Dr. Harkness, and correspondents in California inform us that the rust is not found there at the present time. It is impossible to account for the unusual outbreak of the rust in the eastern United States in 1896, which, after a full correspondence with botanists, horticulturalists and asparagus growers, seemed to be limited in that year to New England, Long Island, New Jersey and Delaware. In 1897 it was gathered, by wide correspondence, that the rust had spread only alang the Atlantic Coast, and as far south as South Carolina, where it became a genuine source of alarm in the large asparagus fields around Charleston; but as yet the vast interior and western United States were free from the rust. In 1898 the disease had spread westward as far as Michigan, and southward to Georgia, with a full measure of it in Pennsylvania. During the year 1899, with careful observers in each State and Territory, one is able to add Ohio, Indiana, Illinois, Kansas, and North Dakota to the infested area. For the year just closed, it is reported as being in evidence in Nebraska, South Dakota, and last of all, the gap between Illinois and the west is filled by its being found in Iowa.

It is not likely that the spread of this disease has been phenominally rapid, but on account of its first coming into the country at this late date when the Experiment Stations are established, and spies, so to say, may be set upon its movements, it becomes possible to note its progress both in direction of the invasion and the rate of its advance. In order to offer some clue as to the method of the dispersion of this rust, it may be interesting to mention in passing some personal observations in the field. For example, there were two asparagus beds standing at right angles to each other; and separated by a small place containing a house and barn. In position it was like the letter T, but with the horizontal top piece somewhat removed from the upright. One

* This paper has been prepared at the request of the Editors. In substance it has appeared before in another journal, but its exceptional interest makes its repetition desirable.

bed had its cutting continued late for market, and a young vigorous growth of brush stood about hip high. Looked at from one side, all the main stems and branches were showing the rust just breaking through the skin. On the opposite side the same stems had very little of the rust in sight. The rusted side was toward the old bed, and it was further observed that the sides of greatest rustiness made an arc the radii of which centered in the old bed. The observation told much, for it demonstrated that the infection was aerial and not through the roots. It showed that the old bed was the source of the contagion, and that the wind was the vehicle of transfer. The asparagus plants of the later bed that stood in the line of the house were protected by it and showed much less rust, and the same was true of the barn. There was a narrow belt between the two buildings where the disease was abundant, and here the spores had uninterrupted access to the young asparagus plants.

This complete demonstration of the method of inoculation leaves it easy to see how the disease may be carried for long distances by the same agency. It has been frequently observed that beds of asparagus standing alone, and surrounded by forests, are much less likely to be badly rusted than those in the full open. If the barberry-covered rocky hillsides of New England can furnish the spores to inoculate with rust all wheat fields within the sweep of New England winds, it goes without further argument that the rust of the asparagus may have its spores carried as far as the breezes go that blow across an infected area.

When an asparagus field is badly infested with the rust, the general appearance is that of an unusually early maturing of the plants. Instead of the healthy green color, there is a brown hue, as if insects had sapped the plants, or frost destroyed their vitality. Rusted plants, when viewed closely, are found to have the skin of the stems lifted, as if blistered, as shown in figure 1, *a* and *b*.

The brown color is due to multitudes of spores borne upon the tips of fine threads of the fungus, which center at certain points and cause the spots. A view of a section through one of the spore-bearing spots is shown at figure 2, *f*. The threads from which the spores are produced are exceedingly small, and grow through the substance of the asparagus stem, taking up nourishment and causing an enfeebled condition of the victim, which results in loss of the green color and the final rustiness of the plant, due to the multitudes of spores formed upon the surface, shown by figures *f*, and *g*. These spores are carried by the wind to other plants, where new diseased spots are produced; but as the autumn advances, a final form of spore appears in the ruptures, figure *j*, that is quite different in shape and color from the first ones produced through the summer. At *i*, is shown a section of a rust rift,

with the spores of late autumn, which, from their dark color, give an almost black appearance to the spots as seen in *h*.

There is another form which the rust fungus assumes, not usually seen in the asparagus field, but it may be found in early spring upon plants that are not subjected to cutting. This is the cluster-cup stage, so named because the fungus produces minute cups from the asparagus stem and in small groups of a dozen to fifty, making usually an oval spot easily seen with the naked eye. At *c*, figure 1, is shown a portion of one of these cups, with the spores that are formed in them enlarged, at *d*. This stage of the fungus comes first in the order of time in the series, and is met with upon volunteer plants that may grow along the roadside or fence row or in a field where all the old asparagus plants have not been destroyed. This form of the rust was quite common upon plants in vineyards and orchards set upon old asparagus fields and the plants near the trees or trellises, out of reach of the cultivator, were left to grow. The importance of a knowledge of the relation of these cluster cups to the asparagus rust proper, will be dwelt upon under the head of remedies.

It is a pleasure to record that a parasite has been frequently seen upon the uredo form of the asparagus rust. This is a fungus bearing the name of *Darluca filum* Cast., that is well understood as preying upon the rusts generally. To the naked eye, the fungus, as seen in the field, gives the rusted plant a mouldy appearance. This light-gray color is due to multitudes of fine, curved threads that ooze out of the more deeply-seated portion of the fungus. When these minute spirals, made up of spores that, with the accompanying jelly, are pushed out of the spore cavities, are washed away by rains, the asparagus stems appear covered with minute dark pimples, which are the spore cavities of the fungus. The intimate association of the *Darluca* with the rust fungus is shown at figure 3, where, at *a*, is given an enlarged view of a spore rift of the *Puccinia*, within which there is a large number of the dark spore cavities of the *Darluca*. The fine threads of the latter fungus fasten themselves upon those of the rust and there finally results the structures for spore production as shown at *b*, in a sectional view of a rift.

The two fungi, namely, the rust that feeds upon the sap of the asparagus, and the *Darluca* that gets its nourishment from the filament of the rust, are quite unlike in many things. The spores of the *Darluca*, shown much enlarged at *c*, are colorless and boat-shaped, with a cross-wall dividing each into two nearly equal parts, and therefore very different from the large, oval, thick-walled, orange-brown spores of the rust. Again, the method of their production is within a pear-shaped cavity, while the rust spores are formed upon the free tips of the

threads. Both are fungi; both are found in the same diseased spots of the asparagus; but under the microscope the differences are as great as between asparagus and onions, for both of the latter belong to the same family of flowering plants (Liliaceae), while the *Darluca* and the rust are members of widely-separated families of fungi.

In some localities this parasite upon the asparagus rust has been so abundant as to make it difficult to find a fully-developed rust spot free from the *Darluca*. Microscopic study of this fungus has not extended far enough to warrant any opinion as to the amount of influence it has in checking the growth and spread of the rust, and as 1897 was the first season that the *Darluca* has been met with, it is impossible to make any statement as to the favorable effect its presence may have upon the following crop. But upon general principles, the *Darluca* may be looked upon as a friend by the asparagus-growers, and its presence in the rusted field is to be encouraged.

This view of the *Darluca* opens up a further consideration of the subject of spraying, for it is to be expected that the spores of the *Darluca*, from their smaller size and thinner coat, would be more quickly killed by the fungicide than the larger, thicker-walled spores of the rust. It is possible, therefore, that it might be a disadvantage to spray asparagus plants that are already covered like a mould with the spores of the *Darluca*. In short, the grower is in a dilemma, and it is not safe with the present limited knowledge at hand to decide satisfactorily for him. It is true that the rust comes before the *Darluca*, and if the rust fails to appear, there is no use for the *Darluca*. If early spraying has only a small retarding effect upon the rust, but kills off effectively the *Darluca* that might otherwise make a vigorous attack upon the rust, it is possible that spraying to check the rust might defeat its own end. It is clear, therefore, that the whole question must be left open until further experience is had, and experiments made with the case.

Another natural enemy of the asparagus was found in the early part of the season upon the cluster-cup form of the asparagus rust. This is the fungus *Tubercularia persicina* Ditt. Figure 4, *d*, shows a piece of asparagus stem with a cluster of the cups in the center, and around this are five spore-bearing patches of the parasite, which are large, irregular and black where the skin of the asparagus stem has been broken.

A portion of one of the spore-patches is shown in sectional view at *e*, where the spores in great numbers are to be seen produced upon the ends of threads. The spores are oval and purplish, and are shown highly magnified at *f*.

If the cluster-cup stage is essential to the development of the asparagus rust and must precede it, this *Tubercularia*, preying upon the

cup fungus, may be a particularly valuable auxiliary in checking the later and more destructive forms.

Thus far this parasite has been met with only upon asparagus plants that grow wild and produce the cluster-cups in early spring. Spraying in the field may not therefore interfere with the good work of this fungus. It remains to be determined how much this parasite and the *Darluca* may be depended upon to hold the rust in check, and it is encouraging to have these friends of the asparagus grower come to his rescue so early in the history of the asparagus rust in this country.

This is not the place, perhaps, to consider the subject of remedies at any length, although it is of vital importance to the growers of asparagus. So soon as the "brush" has lost its green it is no longer of use, and the cutting aud burning of it in autumn will secure the destruction of vast multitudes of spores. The plants, consisting as they do of numerous fine and very smooth rapidly growing branches, are not well adapted for holding fungicides. Also, experiments show that the tender, slender tip may be injured by the ordinary Bordeaux mixture. Perhaps the most successful treatment of the disease is that recently described by Mr. Sirrine,* who finds that the ravages of the rust can be stayed to a considerable degree by using a resin-Bordeaux mixture, which is applied by means of a horse-power sprayer.

Mr. J. A. Kelsey, field assistant of the New Jersey College Experiment Station, has shown close attention to details in making the drawings for the accompanying engravings.

DESCRIPTION OF FIGURES.

Fig. 1. (*a.*) An asparagus stem showing uredo form of the rust, natural size. (*b.*) An asparagus stem showing teleutospore form of the rust, natural size. (*c.*) A portion of a section of an aecidium cup showing the rows of spores and the mycelium of the fungus and cells of the asparagus stem, magnified 175 times. (*d.*) Aecidial spores, magnified 300 times.

Fig. 2. (*e.*) Portion of uredo sorus, magnified 25 times. (*f.*) Portion of a section of a uredo sorus, magnified 175 times. (*g.*) Uredo spores, magnified 300 times. (*h.*) Portion of teleutospore sorus, magnified 25 times. (*i.*) Portion of a section of teleutospore sorus, magnified 175 times. (*j.*) Two teleutospores, magnified 300 times.

Fig. 3. (*a.*) A uredo sorus infested by the *Darluca*, magnified 25 times. (*b.*) A section of uredo sorus infested by the *Darluca*, magnified 70 times. (*c.*) Spores of the *Darluca*, three of them germinated, magnified 590 times.

Fig. 4. (*d.*) A cluster of aecidium cups infested by the *Tuberculina*—the cups are in the center and the *Tuberculina* marginal near the spermagonia—magnified 15 times. (*e.*) Portion of a section of the *Tuberculina*, magnified 175 times, (*f.*) Spores of the *Tuberculina*, magnified 590 times.

New Brunswick, N. J.

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* Bull. N. Y. Agric. Exper. Station, No. 188, December, 1900.

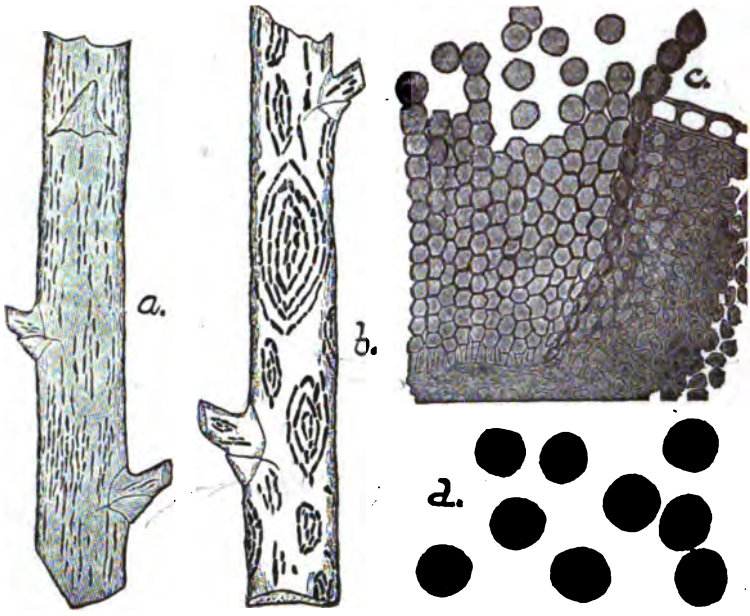

Fig. 1.

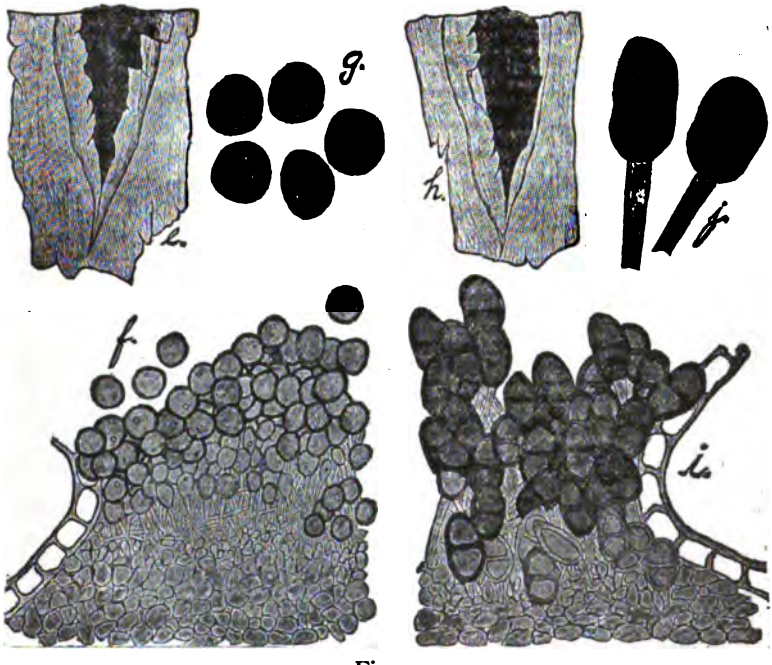

Fig. 2.

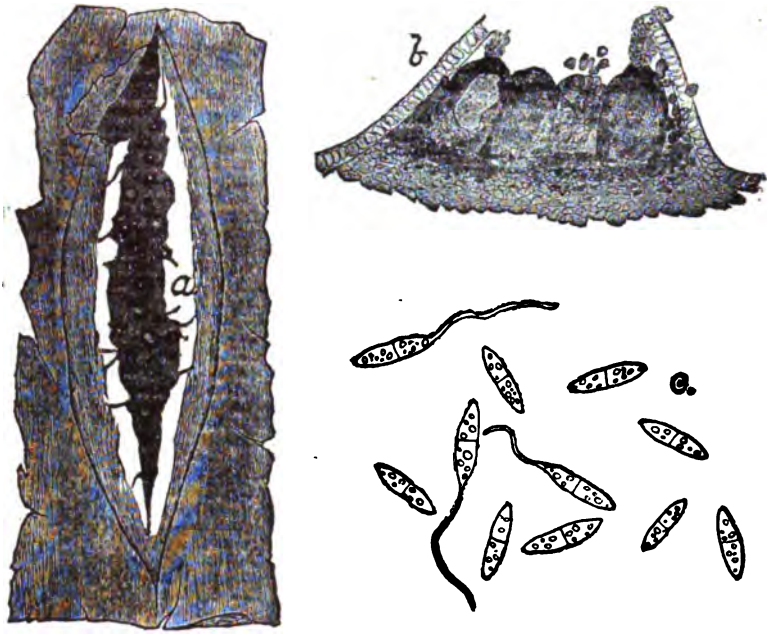

Fig. 3.

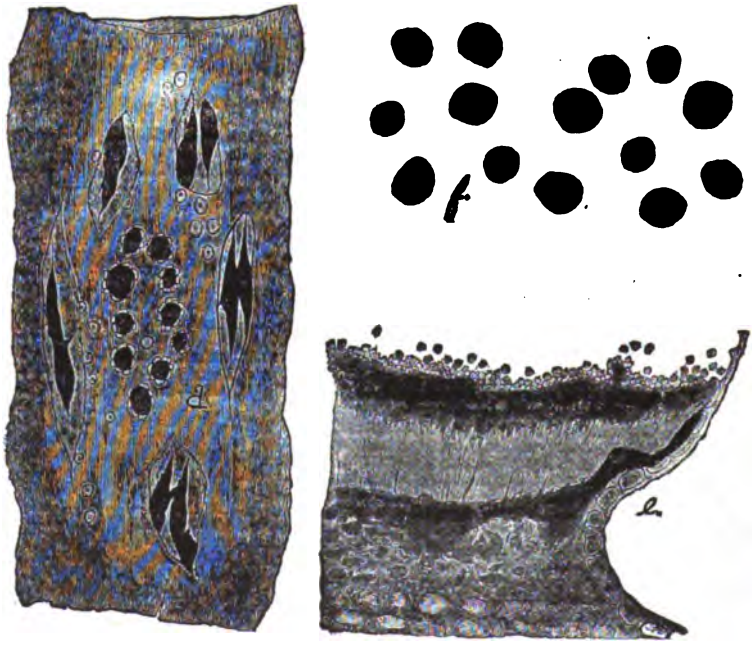

Fig. 4.

BRIEFER ARTICLES.

Derivation of Mimosa.

In Volume XXIII of the Prooeedings of the American Academy, at page 307, there is record of an attempt made by Professors Robinson and Greenough, of Harvard University, to reach the derivation of the genus-name *Mimosa.* As apparently exhaustive of the resources of Latin and Greek roots as bearing on the origin of such a name, the effort was learnedly made; but the result, as Professor Robinson conceded, was far enough from what could be called successful.

The failure of these two scholars, botanist and etymologist, to solve the problem undertaken, was inevitable; and that because of their erroneous assumption that *Mimosa* is a substantive. Almost all genus names for plants are substantive, it is true. Linnaeus promulgated a rule which requires that all adjective names for genera be rejected; and, while most botanical authors have since kept the rule when forming new names, the rule-maker himself repeatedly violated it; and no one in editing his works has ever yet very thoroughly corrected his violations of his own rules; and so we have in use names as *Gentiana, Valeriana, Nicotiana, Impatiens, Bidens, Fissidens, Mirabilis, Primula, Mimosa,* and many more, all adjective names.

Tournefort, the earliest authority appealed to by our authors, had guessed that the name *Mimosa* was substantive, and that it had been derived from the Latin *mimus,* a mimic actor; but that is seen to be both naturally improbable, and etymologically impossible. But the difficulties all vanish, as many difficulties onomantic and phytologic are apt to vanish in the light of history. The type of the genus *Mimosa* appears to have been first mentioned in print by the old Spanish writer upon drugs, C. Acosta. His work, a most important one in its day, upon the subject of the vegetable materia medica, was soon translated into Latin, as well as into several modern languages. In the Latin edition the new plant remarkable for the apparent sensibility or touchiness of its foliage, was called the *Herba viva,* in Italian the *Herba delicata,* in French the *Sensitiva,* while in the original Spanish it was the *Yerba mimosa,* mimosa, being, in that language, the adjective expression of delicateness, sensitiveness, peevishness, etc.; and the word is so Latin in its form and sounding, that it gradually slipped into the place

of a generic name, and Linnaeus' *Mimosa sensitiva* is a binary name of which the significancy of the two terms is exactly the same; it is equivalent to saying *Sensitiva sensitiva*. That is about the sum of the etymology of the generic name *Mimosa*.—Edward L. Greene, Washington, D. C.

More about Fungus Spores as Bee-bread.

The article by W. H. Lang, Jr., on "Fungus Spores as Bee-bread" in the March number of THE PLANT WORLD (page 49), reminds me of a similar case to which my attention was called many years ago. I was at that time a student in the Lawrence Scientific School of Harvard University (1875-76), and was working in the Botanical Department. Dr. Gray came in one day, and called my attention to a letter from some one in California who said that his bees were using a yellow dust which they found on cottonwood leaves for bee-bread. The correspondent sent samples of the leaves, and at Dr. Grya's suggestion I made a careful examination, finding that the "yellow dust" was the mass of uredospores of the well-known "cottonwood rust," one of the Uredineae (*Melampsora populina* (Jacq.) Lev.) Considerable interest was aroused at the time over this matter, and I am under the impression that a notice of the fact was made in some of the journals, but am not certain in regard to this point. If publication was made, it was probably in either the *American Journal of Science* or the *American Naturalist*.—Charles E. Bessey, University of Nebraska.

Sabbatia campestris in Oklahoma.

In riding over the prairies during the month of July, a very interesting feature of the landscape is this species of *Sabbatia*. They form a pleasing contrast with the green prairie grass, as their pink blossoms are quite prominent. The range of the plant seems to be somewhat restricted in Oklahoma. I have found it as far north as the southern border of Kansas, as far west as western Garfield county, and east to Payne county. The southern and southwestern limits I have been unable to determine. The preference of the species is for open prairies, although it is occasionally found in low places. As to number of plants, they seem to be inexhaustible. They thrive very well in the thickest grass, and it is here that they reach their greatest height, about ten inches. But as to number of individuals, the best growth is made about the margins of buffalo wallows, where the grass is thinner. Here the plants are also more hardy. They form a fringe about the wallows which is very pleasing in appearance. The flowering season in this latitude is from the last of June to the first of August, with a maximum number of blossoms about July 20th.—Paul J. White, University of Oklahoma.

GENERAL ITEMS.

The cultivation of tea, which has been for some years carried on experimentally at Summerville, S. C., now bids fair to develop into a commercial success. Thousands of acres of land are now being bought near Charleston, and it is contemplated to produce something like 300,000 pounds of tea annually for the American market.—*American Gardening.*

A most beautiful, interesting, and decidedly unique exhibit has just been set up in the Mines Building of the Pan-American Exposition. It is that of the agatized wood specimens from Chalcedony Park, Apache county, Arizona, in charge of Mr. E. F. Batten, who represents the Drake Company, of St. Paul, Minn. These specimens consist of cross sections of trees polished to a high degree of brilliancy, and showing most beautiful colors. In some of the specimens the fossilized bark still surrounds the section of the tree. This petrified forest, of which Mr. Batten has numerous pictures, looks more like a stone quarry than a forest, as the trees are mostly strewn around in broken sections. One picture, however, shows an almost perfect tree. Microscopical examination reveals a part of this wood to belong to the genus *Araucarioxylon*, a genus closely allied to *Araucaria*, or the Norfolk Island pine of the southern Pacific ocean. All the specimens examined show that the wood was undergoing decay before being filled with the various media which afterwards solidified. On some of the specimens traces of fungi (mycelium) causing decay, may be plainly seen. The process of petrification possibly resulted from the tree being submerged by hot geysers bearing silicon in solution, the rich oxides of Arizona intermixed with silicon and the cell tissues of the wood were substituted by the silicious solution and then solidified.

NOTES ON CURRENT LITERATURE

In an advance separate from the Annual Report of the Missouri Botanical Garden, Dr. Trelease describes an interesting new palmetto from the Mexican State of Sonora, under the name *Sabal Uresana.* A beautiful photograph shows the plant to be a handsome tree of more graceful habit than our eastern palmettoes. In foliage it somewhat resembles the Washington palm, but the leaf-stalks are not spiny.

We have just received a copy of "Notes on the Flora of Connecticut," by A. W. Driggs, which forms No. 16 of the Connecticut School Documents. We are at a loss to understand the reasons for this publication. It does not appear to supplement any former list of Connecticut plants, and moreover embraces only a few of what would seem to be ordinarily common species. The families are arranged alphabetically, the ferns, for instance, coming between the evening primroses and the figworts, the grasses between the goosefoot and heath families.

Frederick D. Chester, Bacteriologist of the Delaware Agricultural Experiment Station, and Director of the State Bacteriological Laboratory, has just completed "A Manual of Determinative Bacteriology." The work aims to arrange all sufficiently described bacteria in such a way that they can be determined by the laboratory worker. The system of classification of Migula has been adopted. The genera are then divided into classes in accordance with their most prominent characters. Under each class is a synoptical table, after the plan of a botanical key, which enables the student to trace out the species. Then follow brief and concise descriptions of the species. No known facts regarding the latter have been omitted, but the system of terminology adopted by the writer makes it possible to make these descriptions short and to the point, thus avoiding verbosity. The work is prefaced by a number of chapters on morphology, cultural characters and methods, which will enable a student to take up any culture placed in his hands, and to study it and determine it systematically. Teachers of bacteriology have long felt the want of a work which will enable a student to accurately describe the cultural character of an organism, and then to determine the species in question. Both of these demands have been met in the present work.

EDITORIAL.

The following note, received a few days ago from the veteran botanist and collector, Mr. A. H. Curtiss, whose interesting paper entitled "Hints on Herborizing" is concluded in this issue, will be read with sincere regret by all who are familiar with Mr. Curtiss' beautiful specimens, and who realize their great scientific value:

DEAR SIRS:—

It will interest many of your readers if you mention in your next issue that my herbarium was destroyed in the recent conflagration at Jacksonville. But my early collections for this year's distribution were in another safe place. All else—about 16,000 sheets—are gone.

Yours respectfully,

A. H. CURTISS.

The majority of amateur students and plant-lovers fail to realize the immense importance of a large collection of plants like the above. Even though pressed and dried, the species retain what are technically known as "characters" which make them far more valuable for reference and study than any amount of printed descriptions. Often rare plants are collected from a locality afterward destroyed by building or other causes, and these specimens can never be replaced.

While we sympathize most deeply with Mr. Curtiss in his great loss, we feel that such accidents render more imperative the deposition of valuable specimens in public museums where they will receive proper care and attention, or that they shall be at least secured from fire in a fire-proof building. Private herbaria are frequently necessary adjuncts to private libraries, but when they become large and valuable, containing a number of types, the botanical public has certain rights toward them which should be respected. Mr. Curtiss had already pursued a wise course in presenting his fine collection of algae to the National Herbarium; and it is doubly unfortunate that disaster overtook him before he could dispose of the remainder.

BOOK REVIEWS.

A LIST OF THE FERNS AND FERN ALLIES OF NORTH AMERICA NORTH OF MEXICO, WITH PRINCIPAL SYNONYMS AND DISTRIBUTION. By William R. Maxon. Proc. U. S. Nat. Mus., Vol. XXIII, pp. 619-651. Issued May 4, 1901.

Among the extensive publications devoted to our ferns and their allies, only two systematic treatises have hitherto appeared which include all of the species north of Mexico and Mr. Maxon is to be congratulated upon having presented to botanists this very complete and carefully compiled list. The total number of species and subspecies enumerated is 211, of which number 187 are true ferns. The accepted name of each form is printed in conspicuous black-faced type, which makes the list easy of use. No attempt has been made to make the synonomy absolutely complete, but enough has been included to clearly present the present status. Great pains have evidently been taken to verify all references, and in this respect alone the list will be found invaluable. Recent changes in generic limitations will be found responsible for the adoption of certain somewhat unfamiliar names for well-known species, but this is clearly in line with advanced study. Thus we have the genera *Phlebodium*, *Campyloneuron*, and *Phymatodes* for species formerly included in *Polypodium; Pteridium* for *Pteris aquilina* and its allies; *Cryptogramma* for a part of *Pellaea; Athyrium* for three species formerly placed in *Asplenium; Polystichum*, *Phanerophlebia* and *Tectaria* for portions of *Dryopteris*, etc. The geographical distribution of each species is also given, and in the case of rare or little known species, the name of the collector is added.

Without going into the merits of each individual case, we can but think that Mr. Maxon has erred in quoting Robert Browu, Prodr. Fl. Nov. Holl. I: 158. 1810, as the initial point for the genus "*Woodsia.*" A reference to this publication reveals the fact that the genus was there called *Woodia*, and it was not changed to *Woodsia* until several years later. This is not, however, a matter of vital moment, and this list must remain for many years indispensible to all working fern fern students.—F. H. K.

A Road in Bermuda. After photograph by Marshall A. Howe.

THE PLANT WORLD

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BOTANIZING IN BERMUDA.*

By Marshall A. Howe.

ALTHOUGH the flora of Bermuda has very little in common with that of Vermont, I have thought that a brief sketch of it by a member of the Club might be of sufficient general interest to justify making this response to our secretary's request to contribute something to the program of this meeting.

The trip to Bermuda was undertaken chiefly for the collection and study of the marine algae. It was suggested in part by Professor C. L. Bristol, of New York University, who very generously placed at my service the facilities of the New York University Biological Station, and did much to make the undertaking a success. Nearly six weeks, including the month of June and the first half of July, were spent on the islands.

The Bermudas, as is generally known, are of the so-called coral formation, though I am told that a microscopical examination of the rock shows that other organisms have contributed much to its composition. The islands lie in just about the latitude of Charleston, S. C., and the nearest land is said to be Cape Hatteras, which is nearly 600 miles away. They are but a speck on the map of the world, having an area of less than twenty square miles. From their small size and isolated position, one would perhaps expect to find the flora little diversified in character, and would expect to find a considerable proportion of endemic species. As a matter of fact, the number of species which have been looked upon by systematists as peculiar to the islands is

*Read at the winter meeting of the Vermont Botanical Club, held at Burlington, January 25 and 26, 1901.

remarkably small. The most complete account of the flora of Bermuda is that contributed by W. Botting Hemsley to the Report of the Challenger expedition. Of the 326 species of flowering plants and ferns recognized in this work, only 8 are considered to be endemic. Of these 326 species, 144 are regarded as indigenous. It is somewhat interesting to note that the 144 indigenous species represent 109 genera and 50 families, an average of about 1⅓ species to a genus, and a little less than 3 species to a family. Of the 144 indigenous species, 109 occur also in the southeastern United States, including southern Florida, and 108 are found also in the West Indies. It will thus be apparent that the Bermudian flora is essentially West Indian in character. Among the very few probably indigenous species which grow also in Vermont may be mentioned *Osmunda regalis*, *Osmunda cinnamomea*, *Woodwardia Virginica*, *Asplenium Trichomanes*, *Dryopteris Thelypteris*, *Typha angustifolia*, *Juncus tenuis*, *Juncus marginatus*, *Celtis occidentalis*, *Parietaria Pennsylvanica*, *Ceratophyllum demersum*, *Rhus radicans*, and *Phryma leptostachya*. *Pteridium aquilinum* is represented by the closely related *Pteridium caudatum*, which by some is considered but a variety of the former.

The number of the higher plants growing upon the islands at the time of discovery by the Europeans was, as we have seen, evidently small as regards genera and species, but so many kinds from Europe, the West Indies, Mexico, and the United States have become naturalized or are grown under cultivation, that the higher vegetation is no longer open to the charge of poverty. The only really native plants that attain to the dignity of trees are the Bermudian cedar (*Juniperus Bermudiana*), a palmetto which was long considered the same as the common species of the southern United States but is now separated from it, and, by courtesy, perhaps, the weird mangrove, which, standing on stilts in the salt water, makes extensive thickets along the marshy borders of sheltered bays in various parts of the islands. The cedar, it would seem, is not confined to the Bermudas, as possibly might be inferred from its name, but is said to be found also in some of the West Indian islands. Mr. Hemsley, who wrote the botanical part of the Challenger Expedition Report, entertains the possibility that the palmetto also extends into the West Indies. The cedar attains considerable size, and has been used to quite an extent in boat-building and in the interior finishings of the houses, which are chiefly built of the white limestone rock, or sandstone, as they call the softer forms of it. The cedars of to-day are mostly from 20 to 40 feet high, and from 1 to 2 feet in diameter, but there are remains of trunks still standing which are nearly five feet in diameter. Besides the cedar, the palmetto, and the mangrove, there are three or four large native shrubs which might

occasionally be designated as trees. In fact, the native-born Bermudian calls every plant a "tree" even down to a small membranous seaweed. The oleander, which was introduced into the islands about a century ago, has become extensively naturalized and in some quarters has taken possession of the landscape, attaining a height, sometimes, of 20 feet, I should say. It was in full bloom during our visit, and formed a very showy and beautiful feature of the flora.

There are said to be only two or three recorded cases of a freezing temperature in the Bermudas, and by reason of the practical absence of frost, the India-rubber tree, the mahogany, the logwood, etc., have been acclimated with surprising success. In the open caves or sink-holes of the Walsingham tract, the coffee tree or shrub has run wild and seems to be perfectly naturalized. Oranges and lemons were once raised to some extent for home consumption, but about fifty years ago the trees were nearly all killed by the attacks of insects, and the culture of citrus fruits has never been successfully resumed. Mr. Bishop, the superintendent of the recently established Botanical Station, or Agricultural Experiment Station, as we would call it, is now trying to convince the farmers that with the modern methods of fighting plant diseases, the raising of oranges and lemons may be made a source of profit. The farmers now depend for their income almost entirely upon onions, Easter lilies, potatoes, and American winter boarders. When we consider that the 13,000 acres, or less, comprising the area of the islands, is distributed among about 16,000 inhabitants, most of whom till the soil, it becomes evident that but little remains, on the average, to each individual. Four acres of tillable land makes an unusually large farm. Much of the land is of a kind not readily cultivated.

Strawberries do not flourish very well, peaches get along after a fashion, but apples, pears, plums, and cherries, are almost a complete failure. Bananas, however, of excellent quality are raised in considerable abundance, but none as yet for export.

There are in the islands about 25 species of ferns, nearly all of which I collected. In the line of bryophytes, 8 mosses and 6 hepatics had been reported from the Bermudas. The entire absence of any brooks, streams, or springs, is a little disconcerting to one who would hunt for bryophytes. Only one moss and one hepatic are at all common. In order to get the others, one must go to the Devonshire Marsh, where the water is scarcely brackish, and to the caves and sink-holes of the Walsingham tract. It required little special effort, however, to gather nearly thrice the recorded number of Hepaticae and to make a few additions also to the moss-list.

The marine flora—to study which was the main object of my visit—

has very little in common with that of our more northern Atlantic seaboard. It is largely that of southern Florida and the West Indies. The entire absence of the genera *Fucus* and *Ascophyllum*, which constitute the conspicuous rockweeds of our own coast, is a noteworthy feature. This is apt to give one the impression at first that seaweeds are scarce, but such is far from being the case, for the marine flora is a fairly rich one, considering the size of the islands. The Report of the Challenger Expedition enumerates 132 species, including those reported by previous collectors. My own collections have been so little studied as yet that any estimate as to the number of species represented therein would be premature.

It would be unfair to bring these remarks to a close without enthusing a little over the delightful clearness of the Bermudian waters, the exquisite coloring and beautiful forms of the living corals, sea-fans, sponges, and other inhabitants of the subtropical seas. It was, to be sure, my first experience with the coral-reef formation, but it was an experience which any one with a trace of love for the beautiful in nature would hope to be able some time to repeat.

New York City.

SUGGESTIONS FOR THE STUDY OF THE HAWTHORNS.

By W. W. Ashe.

FOR many years the hawthorns have been a trying puzzle to the American botanist, especially that wonderfully variable species, *Crataegus coccinea*. Under the name of scarlet thorn were placed forms with fruits of all sizes and shapes, from the brightest yellow to the deepest crimson, ripening early or very late, with various flowers and inflorescence, and all degrees of pubescence—in fact, every form which could not be "squeezed" into the descriptions of the ten other species of eastern America, so that *Crataegus coccinea* was a most elastic and convenient species. Not only the scarlet thorn, but the other species as well, were regarded as variable, and the descriptions in systematic works were generalized to include a variety of forms.

For many years several American species not recognized by American botanists, have been well known in Europe, among them *Crataegus rotundifolia, C. intricata, C. lucida, C. succulenta*, and *C. pruinosa*. Some of these, like *C. rotundifolia* and *C. macracantha*, were gradually being recognized on this side of the Atlantic as species of fixed character and general distribution. The other species cultivated in Europe, were

Palms in Bermuda. After photograph by Marshall A. Howe.

there also regarded as having good specific characters. The additional fact that many American forms seemed to reoccur in their wild state without change or variation, led several years ago to a careful field study of various forms by several persons in different States. The results have been surprising. In place of the ten species, it is now certain that we have at least 120 species, merely on the Atlantic coast. More than eighty species have already been described from this region, while imperfect material at hand indicates that there are probably half as many species yet undescribed.

While the number of species is undoubtedly so large, the number in any local flora, of an area of about 100 square miles, will in few cases exceed sixteen or seventeen. This is due to the great number of local species, or species with limited distribution. In each of the eastern States there will probably be found species which do not extend beyond its borders.

Instead of the species being variable and intergrading, as has been so long thought, there is probably no large genus in which the specific characters are more firmly fixed, less variable, and so easily described as in the thorns. What has retarded the study of the genus more than all else, is the habit of collecting flowering and fruiting specimens from different plants, which would often be different species, and distributing under the same label, so that the species in most large herbaria are presented in an almost inextricable confusion. As most of the fruit is collected green, all distinctive shape, color, and the characteristic disposition of the calyx lobes is lacking.

In studying the forms of a locality, the first essential is to mark the plants from which specimens are collected, so that flowers, mature foliage and ripe fruit will all be from the same plant. It is necessary to have complete material, flowers, foliage and fruit, since some species are with difficulty separated while in flower, the characters which distinguish them being most evident in the mature foliage or fruit. In many species the foliage is very similar, and the distinctive characters lie in the flowers or fruit. This adds to the difficulty of identifying specimens in immature fruit.

In the inflorescence it shonld be noted whether it is cymose or corymbose; simple or compound; the usual number of flowers; the amount of pubescence; whether the flowers are erect or nodding and their size when expanded; the size and number of bractlets, and if they are glandular; whether the calyx is obconic or cup-shaped, and its pubescence.

The calyx-lobes furnish some excellent characters: their size and shape, whether serrate or entire, and if stalked glands are present; the persistence of the lobes on the mature fruit, and when persistent, if

reflexed, spreading, or ascending; whether sessile, stalked on the projecting calyx-tube, or somewhat imbedded in the flesh; remaining green or coloring with the fruit.

The number of the stamens, 5, 5 to 8, 10 or 20; the size of the filaments; the color of the anthers (cream, yellow, pink or purple), are of the greatest importance, as well as the number of styles. The relative time of flowering will often be of value in separating closely related species in the field while in flower.

The immature fruit presents few distinctive characters. It should be noted of the mature fruit the date when it ripens and when it falls; its size; the shape (oblong, pear-shaped, globular, flattened, etc.); whether either end is concave; if glabrous or pubescent; its color (green, yellow, orange, scarlet, or mottled wifh several colors); waxlike; dull or shining; glaucous; punctate.

Of the calyx-cavity, whether it is obconic or cylindrous, its size and pubescence.

Of the seed, the number; whether their sides are smooth or hollowed; the backs smooth or grooved; whether placed centrally or apically in the fruit.

The color and firmness of the flesh are good field characters, as well as the disposition, length, and pubescence of the fruiting pedicels.

The pubescence, color, and texture of the foliage, as well as its shape and size should be noted; the color of the twigs, and the abundance of thorns and their size. In a few species the thorns are 2-ranked; in most, however, they are found on all sides of the twig.

Many of these characters must be noted in the field, as they are lost in the most carefully prepared herbarium specimens. When once the floral and fruit characters of the thorns are carefully observed, the separation of the forms becomes a simpler task than distinguishing the willows, or even the oaks and hickories.

Besides the characters given above, the size, habitat, bark, and habit (ascending, spreading), or drooping branches, upturned twigs, drooping or erect leaves, and the coloring of the foliage in autumn, will be of great help to the careful observer.

Raleigh, N. C.

CUBAN USES OF THE ROYAL PALM.

By William Palmer.

THE royal palm (*Oreodoxa regia*) is a widely distributed tree throughout Cuba, and is truly the tropical feature of the landscape. In the former more highly cultivated areas they largely occupy the hedgerows, thus being arranged in double rows along the roadways, and in single rows along the dividing lines. This arrangement is largely accidental, cultivation compelling the absence of the young plants from the fields, and the hedge-rows offering a secluded habitat until they are strong enough to need no shelter. In other places the frequent fires have destroyed the trees on the higher areas, so that one sees them oftenest along the banks of the watercourses. The tree is a noble one, and occurs everywhere except among the pines of the mountains. To the simple Cubans living remote from modern civilization, it furnishes many of his necessities, most of which perhaps are contained in the following list.

Posts.—Trees are felled and allowed to lie for a considerable time before they are cut into lengths and split.

Fences.—These are made of strips of the wood tied upright to cross-pieces and close together, so that chickens cannot get through.

Columns.—They are used as the main supports of a house, the upper portion of the trunk being used.

Boards.—When the interior of a felled tree is rotted, it can readily be split and the pieces trimmed to the required length and width, which is necessarily narrow.

Coffee mortars.—Most palms are somewhat swollen at about one-third of their length from the ground; this is cut out for about the height of a table, the wider end is hollowed out, and with a pestle of similar or different wood, forms a mortar and pestle which is used to crush the roasted coffee beans. When not in use, the hollow may hold the family supply of beans, and it is always handy to support the family wash-tub, a shallow broad article made often of the same wood.

House walls.—The basal part of the leaf stalk is a broad, long woody portion which clasps the trunk for its whole length, and whose lower end leaves a narrow horizontal scar where it was attached to the trunk. These fall with the leaf, and are dampened and flattened by weights. Bun lles of these leaf bases are an article of sale in places where the palms are scarce, and they may be seen piled up in stores for sale. They are trimmed and tied to the framework of the house. They are placed in two rows, the side of one overlapping another, and the lower ends of the upper row overlapping the lower row. They also serve to cover anything, and not unfrequently are used as tables.

Rain Coats.—One rainy afternoon several Cubans came to our camp dressed in coats made of the green (freshly fallen) stalk. A hole had been cut out of the center through which the head was thrust, and the two halves bent so as to cover the front and back. A string torn off the edge of the same piece was used to tie it around the waist, the whole making a peculiar but efficient coat of mail.

Boxes and Baskets.—With a sharp knife which all Cubans carry, a few minutes suffices to make one of these leaf bases into a receptacle capable of holding water, vegetables, or similar things. Cuban tobacco is always bound up and shipped from the plantations in a large bundle wrapped in the bases of the leaf stalks.

Thatch.—All Cuban houses outside of the towns have their roofs covered thickly with thatch made from the long leaves of the palm. It is usually cut into two or three parts, and tied to the pole rafters with palm leaf string.

String and Rope.—Either the split parts of the leaf base or the division of the leaf are used, either twisted or not. No nails are used in the construction of the houses, the poles, thatch and siding being tied on.

Canes.—A strip of the wood worked round and polished, makes a presentable cane.

Brooms.—The flower stalk and its divisions is a large affair. With the berries off, it is bound about its center, and the numerous small twigs are ready for work. It is a common article of every Cuban house, and the dirt floors and surroundings are kept well swept.

Chicken and Pig Feed.—The bunches of berries are carefully cut off and lowered by a palm leaf rope to the ground, and then laid across the chicken or pig pen to be eaten as desired.

Paper.—The inside layer of the base of the leaf stalk is very fine and white, and is used for writing purposes.

Wine.—This is made from the berries when in a green state. A gun-shot fired into a bunch of fruit is sure to result in a shower of juice. Woodpeckers are fond of this, and will tap the berries or the base of the fresh leaf stalk and sip the juice.

Nest of Woodpeckers.—The large Cuban woodpecker always excavates a large hole about two-thirds up the trunk of a live tree, and rears its young in the cavity.

Food.—When a tree is felled, the mass of embryo leaves are cut out, forming a lump about 18 inches long by 6-8 inches in diameter, of beautiful creamy whiteness.

Without the royal palm the people of Cuba would be poor indeed. With the cocoanut, banana, sweet potato, and palm, they are able to exist comfortably with a mild climate.

Washington, D. C.

BOTANIZING IN AND AROUND A LAKE.

By E. L. Morris.

MOST people who collect plants either for pleasure or for study, have had opportunities to gather numerous species about bodies of water varying from mere puddles or pools to the Great Lakes. If we may judge from the representation of aquatics in various herbaria or their mention in lists of "plants collected," etc., it is very easy to picture ninety or more per cent. of the people out collecting faithfully skirting any body of water which comes in their path, but never examining or saving the different kinds which can not be reached without getting upon or into the water. But they miss their opportunity, and the acquaintance of some of the most beautiful and delicate plants that grow. It is true that one must get partly or wholly wet to gather these out-of-the-way citizens, but on a fine summer day that only increases the enjoyment of the outing, for it is so easy to prepare properly for such thorough search. In all probability there is no boat at hand, as it is at the other end of the lake, or the pond is too small or remote for a boat for other than our momentary need. As likely, also, the bottom may be covered with several inches, sometimes feet, of the ooziest possible mud. But these are the water and bottom homes of some plants known in their variation only to the professional collectors. Many times have I been asked how these plants have been gotten, when people have been looking over a collection. Surely by no other way than to go in and get them.

Most of the so-called ponds in the older parts of the country were originally formed by the damming of some stream, or at least increased in size and depth by raising the outlet. This appropriation of more territory by the water has often modified the flora of these ponds very markedly, retaining certain influential soil and topographical characters for very many years, which have entirely disappeared, if ever present, in the wholly natural lakes. But that is a question too far-reaching for our subject, yet one of that very kind of pond was the collecting ground for the following marsh and aquatic species secured during one forenoon at about the middle of the State line between Massachusetts and Connecticut. Knowing nothing of the flowerless plants below the fernworts, we made no attempt to collect or record them. Starting beyond the upper end of the lake, along the pools ond stream in a short valley which rises in the very water-shed between the two States, we collected carefully down the valley and lake to its outlet, then up an arm of the lake to a larger stream from another part of the divide, and last in a bog below the lake. In these pools and brook there was scarcely a plant other than Nuttall's pondweed (*Potamogeton Nuttallii*), whose

leaves are so beautifully banded along the center with very coarse reticulations. Along the margins of these pools, and nowhere else in this locality, was an abundance of yellow-eyed grass. At the head of the pond were large clumps of *Scirpus Americanus* and wool-grass (*S. cyperinus*), occupying a half-acre or more. From these clumps and both shores, the water of a bay was uniformly about three feet deep, and entirely occupied in patches by water-milfoil (*Myriophyllum humile*) and the perfoliate pondweed. The first has no emersed stems, and in the clear water showed its feathery plumes to the utmost advantage as the unusually long branches lazily floated this way or that according to the current, or remained motionless as if patiently hiding the mud below. The contrast between its dull green bases and brown-purple tips was intensified by the sunlight through the slightly humus-dyed water. At one side of this bay there was a patch of water-pepper (*Polygonum hydropiperoides*) wholly in the water except the upper leaves and flower clusters. This more than usually aquatic home has produced a tremendous root system, shining pure white in contrast to the meager purple-stemmed part of the plant above the mud. These roots were the finest example of primary and secondary root systems I have ever seen. Out in the pond proper four species held full sway, the white and the yellow water-lilies, water shield, and eel-grass. Most people are content to pull the water-lilies with what they call long stems, knowing nothing of the true stem or rootstock buried in the mud below. At this place we hauled up one nearly five inches in thickness, and we could not get its full length. Would not a housekeeper delight to serve a jelly so crystally clear as the gelatinous coating of the water-shield! Little would one suspect such a coating from looking at the plant in the water. So far as I can ascertain, the eel-grass never blossoms at this place. Near the shores three pondweeds (*Potamogeton nutans, Oakesianus* and *perfoliatus*) occupy the shallower places. At one place where the bottom is a coarse gravel, occurred a large patch of *Nitella.* At the outlet of the lake there was a large bed of pickerel-weed, just buzzing with the visiting humble and honey bees. In a swamp about the mouth of the larger brook, water-cress, mermaid-weed, various-leaved water-starwort, marsh purslane (*Isnardia palustris*), various sedges too young to blossom, bur-reeds, and arrow-leaves, were abundant. Below the outlet of the lake was a small sphagnum bog, just dotted with blossoms so much in contrast with the more sombre plants of the water. There were pitcher-plants, round-leaved sundew, *Arethusa,* Calopogon (*Limodorum*), bitter buttercup, and peat-moss (*Sphagnum cymbifolium*) in fruit. We heartily wished for another day to retrace our steps and find the other species which surely must have been there.

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BRIEFER ARTICLES.

Fossil Sequoias in North America.

In a recent number of THE PLANT WORLD we published an article showing how perilously near absolute extermination is the big tree (*Sequoia Washingtoniana*) of California. It is hardly necessary to say that this and the redwood (*S. sempervirens*), are the only living representatives of what was once a powerful and world-wide race of trees. The genus *Sequoia*, represented by foliage, cones and wood, is very widely distributed in a fossil state, many nominal species having been described. Geologically it is found from the Jurassic to the Pleistocene, and geographically from Japan, Asia, Europe, the Arctic regions, including Greenland, and North and South America.

In North America some 44 fossil forms have been described, of which number about 35 are based on foliage and cones, and the remainder on wood showing internal structure of the *Sequoia* type. These are found from our Lower Cretaceous to the present time, having been very abundant in the Middle and Upper Cretaceous, and represented by a considerable number throughout the Tertiary. It is probable, however, that there has been more or less duplication in these species, for it is often necessary to describe as different species foliage, cones and wood that may have come from the same tree, because they have never been found connected, and association in the same beds may or may not argue identity. Occasionally a fossil is found with cones and foliage attached, but usually they are separated.

Both of the living types of *Sequoia* are abundantly represented among these fossil forms. One of the most abundant and widely distributed is known as *Sequoia Langsdorffii*, and is of the *S. sempervirens* type, while *S. Coultsiae* represents the *S. Washingtoniana* type, and is about equally well distributed. A fine species known as *S. magnifica* is found in the Yellowstone National Park. It had trunks fully ten feet in diameter, and beautifully preserved wood of the *S. sempervirens* type.—F. H. Knowlton.

A Singular Tree.

The photograph shows the lower part of a slippery elm (*Ulmus fulva*). When five and one-half inches in diameter it was stripped of its bark. On two sides the bark grew and raised the surface seven-

eights of an inch, but the third side was more seriously injured. Here the strip of bark was entirely separated from the wood, breaking the cambium cells, and thus preventing the wound from healing. The strip of bark, however, remained attached at top and bottom. Some of the cells in the separated portion must have been uninjured, as they began to form new wood. The bark curved in around this new growth and formed an independent body nearly round, with the exception of the ridge on the inner side.

This tree is growing near the north end of Cedar Mountain, Hartford Conn.—H. S. Clark, Hartford, Conn.

Cleaning Desmids.

The method to be described is particularly applicable to material obtained from mountain bogs containing submerged plants of *Sphagnum*, among which specimens of the genera *Micrasterias*, *Ereastrum*, *Closterium*, *Penium*, and others abound. To collect desmids from this source a good plan is to squeeze the *Sphagnum* into a wide-mouthed bottle. But the majority of desmid gatherings appear amenable to the same method of cleaning.

The apparatus required consists of one or two shallow porcelain saucers or photographic dishes, an old pomatum pot being useful among the number, and a tapered glass tube with a rubber cap, for which purpose the "filler" of a stylographic or fountain pen answers admirably. A gauze strainer of a coffee pot is useful for straining out any large pieces of dirt, the stuff left behind being examined for filamentous desmids.

The strained material is run into one of the porcelain dishes, and after a short interval—not more than half a minute—the dish is inclined to one side, a gentle rocking motion being given at the same time. If there are any desmids in the gathering, they will be seen to collect in a *bright green line or patch* at the edge of the receding water when they may be readily picked up with the pen-filler in a state of almost purity. On working the water round the edge of the dish, the desmids may be drawn into green patches in almost any desired part of the vessel, and one lot after another picked up till there are none left worth troubling about.

As the desmids are removed I transfer them to the pomatum pot, when a drop of Zenker's fixative suffices to fix them. A repetition of the rocking process enables the desmids to be once more collected and taken up in the pen-filler, while, if any flocculent matter was picked up with the desmids in the first separation, this may often be left behind with a considerable portion of the fixative. The desmids are now trans-

A singular elm.

ferred to another dish containing clear water and deposited in a patch in the water near the edge of the dish. By repeating the rocking process the fixative is washed away, and by a little skill in the rocking, any foreign matter not previously removed can be separated from the desmids. The desmids are transferred to a fresh dish of clean water by again using the pen-filler, and a repetition of the process removes all residual traces of the fixative.—G. H. Bryan in *Journal of Applied Microscopy* for October, 1900.

Aspect of the New Zealand Flora.

Mr. Frank G. Carpenter, in an interesting article descriptive of New Zealand, published in the Washington *Evening Star*, has this to say concerning the flora of that country:

"I have spoken of New Zealand as an evergreen land. It is so. It has the same green you see in England and Ireland. The fences about the houses are often hedges cut in curious shapes and of a varnished green. The leaves are on most of the trees all the year round. There are many varieties of green plants, such as the holly. There are scrub palms, and the New Zealand palm lily is to be seen everywhere. This is a tree which reaches a height of twenty feet. It goes straight up without a branch to the top, where it blossoms out in green tassels like a palm. The people call it the cabbage tree.

"And then the ferns! New Zealand has enough to establish fernеries for all creation. You find places where there are acres of them, miles of them. Some of the deep glens and gorges are walled with them. They are of all kinds, some great trees and others as fine as a maiden's hair. There is one fern which is used by the natives for bedding, and another which is half fern, half vine. It climbs the loftiest tree, coiling its wire-like stems about the branches. The stems are tough enough for ropes. They maintain their coil after being pulled off, and it is said that some of the people have used them for making spring mattresses. Think of sleeping on fern beds, upon fern springs, and you have one of the possibilities of New Zealand!"

GENERAL ITEMS.

Dr. F. H. Knowlton, editor-in-chief of this journal, has gone west on an extended collecting trip. He will study the fossil plants of various geological formations in Colorado, California and Oregon.

In the Louisiana exhibit in the Agricultural Building at the Pan-American Exposition, cotton naturally occupies a prominent position. Forty varieties of seed and sixty of lint cotton are shown, the latter displayed in miniature bales. Several full-sized bales as they are prepared for shipment are also shown. Thirty-five varieties of sweet potatoes form another interesting feature of this exhibit, one monster weighing 122 pounds. The genus *Ipomoea*, to which the sweet potato belongs, and which also includes our common morning-glory, is noteworthy for the enormous development of tubers in some of its species.

Orris-root, the rhizomes of *Iris florentina*, has been singularly overlooked by wide-awake Americans who are ever on the lookout for something on which "a good snap" might be made. As it has long been grown as an ornamental garden plant, there is no question about its successful adaptation to culture here. It is one of the staple bases on which many popular perfumes are constructed, and would always find a ready market. European papers tell us that the demand there for it is so lively that the prices have risen considerably, and, indeed, it is believed that the stock in hand is behind the probable demand—*Meehans' Monthly for May.*

The Philippine exhibit at the Pan-American Exposition contains samples of the famous Manila hemp in huge skeins, like flaxen hair, or made up into ropes and cables. There are sugar baskets and bales, and native sugar of various grades, tobacco, coffee, indigo, dye-stuffs, cocoanut fibre and oil, and the beautiful and wonderfully delicate pina cloth, made from pineapple fibre. Most abundant of all is the bamboo, which the Filipino adapts to every conceivable use. There are bedsteads of bamboo, chairs, tables, brushes, milk jars, rakes, rafts, and strangest of all, musical instruments. Hardly less important is rattan, of which the native constructs baskets, balls, mats and numerous other household articles. The palm leaf is everywhere in evidence, being used for roofs, hats, cloaks, fans, baskets, etc.

NOTES ON CURRENT LITERATURE

The May issue of *The Forester* contains an interesting article on "The Study and Practice of Silviculture," by Henry S. Graves, illustrated with numerous photographs; also an account of the rubber industry of Costa Rica, by H Stuart Hotchkiss.

Tne Report of the State Botanist of New York for 1899 has recently been distributed. A number of new species of fleshy fungi are described. Four quarto colored plates are included, illustrating some of the new species of agarics.

In the supplement of the 26th volume of the Royal Academy of Sciences of Sweden, L. Romell reports on a collection of Hymenomycetes from South America. A number of new species are described and illustrated. The illustrations are excellent.

In the May number of the *Botanical Gazette*, E. W. D. Holway publishes the third of a series of articles on Mexican fungi. As heretofore, the author has had the assistance of Dr. Dietel. Thirty-one new species are described, most of which are rusts (Uredineae).

Mr. Willard N. Clute has recently published the first supplement to his "Flora of the Upper Susquehanna and its Tributaries," noticed in a former volume of this journal. The list enumerates 95 additional species and a number of new stations. The same author, we learn from the announcement of the Frederick A. Stokes Company, is about to publish a new work on ferns entitled "Our Ferns in their Haunts."

The Biltmore Herbarium, Biltmore, N. C., has commenced the publication of "Biltmore Botanical Studies," which will be issued at irregular intervals, and will contain papers by the Curator and his assistants. The first number, which is beautifully printed, contains descriptions of a number of new species, and revisions of certain trilliums and of the Composite genus *Marshallia*.

Mycological Note No. 6, by C. G. Lloyd, contains descriptions of eight new species of fungi by Bresadola and Patouillard. The material was collected by Mr. Lloyd in Samoa. There are also some excellent notes on a number of other fungi, mostly agarics.

The Yearbook of the Department of Agriculture for 1900, recently issued, contains a number of articles of botanical interest, among the more noteworthy being "Smyrna Fig Culture in the United States," by L. O. Howard; "Commercial Plant Introduction," by Jared G. Smith; "Fungous Diseases of Forest Trees," by Hermann von Schrenk; "Our Native Pasture Plants," by F. Lamson-Scribner; and "The Date and its Culture," by Walter T. Swingle.

A recent addition to our exchange list is *School Science*, a journal of science teaching in secondary schools, published in Chicago and edited by C. E. Linebarger, with the assistance of a board of associates from various cities in the country. The articles in the three issues which have thus far been published are very suggestive, and should be of value to teachers. In the May number A. M. Ferguson discusses "The Modern Presentation of Botany," emphasizing the importance of developing the faculties of observation, comparison and deduction in teaching the subject.

The second volume of the *Bulletin of the New York Botanical Garden* starts with an elaborate issue, containing the annual reports of the Director and other officers of the Garden, and a number of scientific papers, as follows: "Propagation of *Lysimachia terrestris*," by D. T. MacDougal; "Mimosaceae of the Southeastern United States," by John K. Small; "The Oaks of the Continental Divide North of Mexico," by P. A. Rydberg; and "Contributions to the Botany of the Yukon Territory," with papers by several authors.

We have just received a copy of Dr. Fernow's third annual report as Director of the New York State College of Forestry, it being devoted to "Progress of Forest Management in the Adirondacks." It is a pamphlet of forty pages, and gives timely information regarding the courses of instruction, the college forest, the first logging operations, experimental cuttings, planting, etc. No matter how valuable forest products may be, they must have a market, and as none existed in the vicinity of the College forest, manufacturing interests have been induced to locate plants contiguous to the supply, and there is every evidence that the forest management will be self supporting from the first. We wish Dr. Fernow every success in this the initial undertaking of its kind in this country.

EDITORIAL.

In the death of Professor Thomas C. Porter, of Lafayette College, Pennsylvania has lost one of her oldest and most noted botanists. For many years Dr. Porter has been known as one of the pioneers in the study of the Rocky Mountain flora, the first results of which are to be found in the "Flora of Colorado," and in later years he has been a close student of Pennsylvania plant life. We hope to publish in an early issue of THE PLANT WORLD a brief biography with portrait.

The article by Mr. W. W. Ashe, State forester of North Carolina, published in this issue of THE PLANT WORLD, will be read with interest not only by professional botanists, but by amateur students as well, for it explains in detail just how the scientist discriminates between species. Many persons have very vague ideas of the natural distinctions to be found in various groups, and quite fail to realize how many important factors are considered before the botanist feels free to name and describe a species new to science.

In the hawthorns, to which Mr. Ashe's paper is devoted, we find an unusually large list of available characters for study. Frequently the only means of distinguishing between excellent natural species lies in the form or structure of a single organ—flower, fruit, or the like. It has been claimed that science should recognize only as many species as are popularly appreciated and understood; but this is too extreme a view to take, for the untrained eye would often fail to observe distinctions of the utmost taxonomic importance. It would, however, be an excellent plan if all workers in botany would confine their descriptions of new species to such as they may have been able to distinguish in the living state. It is certain that the present tendency toward an inordinate multiplication of species will result some day in a violent reaction.

BOOK REVIEWS.

MEMOIR OF THE NEW YORK STATE MUSEUM, No. 4, VOL. 3, NOVEMBER, 1900. Report of the State Botanist on Edible Fungi of New York, 1895-1899. By Charles H. Peck, M. A., State Botanist. Albany. University of the State of New York.

Under this title Professor Peck has brought together descriptions and figures of the 47 edible species of mushrooms known to occur in New York State. Descriptions and illustrations of 53 of them appeared in Reports 49, 51 and 52; the balance (14) represents the number of edible species added during 1899. Aside from these, one unwholesome species, *Clitocybe illudens*, is figured. It is stated by the author in the introduction, that "in consequence of recent discoveries of variations in a few of the edible species described and illustrated in the three reports mentioned, and of the great demand for these reports, it has seemed desirable to revise the illustrations and descriptions where needful, and to incorporate the whole in the present memoir with that part of the state botanists report for 1899 relating to edible fungi. Accordingly an attempt has been made to arrange both descriptions and illustrations as far as possible in harmony with their natural and generic relations to each other." The present work will undoubtedly prove a valuable one, as presenting a convenient synopsis of the edible species of the State, and, of course, of much of the adjoining territory. It is, however, a source of regret that in view of recent advances in illustrative photography, the revised descriptions should not have been accompanied by more recognizable figures to replace the colored illustrations adopted. Several recent works of popular botany might have served as excellent models in this connection.—W. R. M.

FLOWERS AND FERNS IN THEIR HAUNTS. By Mabel Osgood Wright. New York. The Macmillan Co., 1901. pp. i-xix; 1-358. Price $2.50.

We have had, in recent years, many more or less popular works on botany, but among them all not one that possesses the delicacy and charm of treatment of this, Mrs. Wright's latest work. It is not a book to which one may turn for cut-and-dried descriptions of our more conspicuovs flowers and ferns, for the author well says: "The wild flower and fern is only to be truly known where it creeps, clings, or sways un-

troubled in its home. Then the flower in its haunt is a part of the landscape, a tint in nature's palette not to be heedlessly removed." It presupposes a knowledge of the mere names of the plants, and sets them forth on the unrolling calendar from spring to winter in a way that makes them something more than individuals of this or that species—it has imparted to them the charm and fragrance that can only come from an intuitive and delicate appreciation of "nature unadorned." And woven through it all is the pathetic life story of old Time o'Year, the hermit, who knew when blossomed the earliest arbutus, the moccasin flower, and the dainty harebell, and whose wealth of woodland lore is told in his own quaint language.

The illustrations in this book are absolutely unique. They are photographs direct from nature, that have been intensified by the process that makes the modern high grade magazine illustrations so effective. Each plate is surrounded by a dark mat which sets off the charming bits of nature in a manner we have never seen equaled. We predict for this book a wide sale and a delighted audience.—F. H. K.

COURS DE BOTANIQUE. Par MM. Gaston Bonnier & Leclere du Sablon. Tome I, fascicule 1, 8vo, pp. 1-384. Paris, 1901. Paul Dupont, Editeur.

This work, which, as the title indicates, is to be a complete text-book of botany, has been prepared for the use of universities, schools of medicine and pharmacy, and agricultural schools, and if carried out along the lines laid down in this first fascicle, can not fail to be of permanent value. The first pages are appropriately devoted to certain preliminary questions, such as the characters of living things, definitions of plant organs and of the various branches of botanical study. The next portion deals with the general structure of plants, while the final pages of this fascicle are devoted to the morphology of the angiosperms. Each topic is treated with as much fulness as could be expected, being set off by a line or more printed in full-faced type. The illustrations are copious, there being 553 in this fascicle, and we are told in the prospectus that the whole work will contain fully 3000 cuts. A large proportion are new, but many have been taken from approved sources.

We regret to note certain evidences of ultra-conservatism or clinging to old methods, such as the beginning with the study of the higher plants, the retention of the Apetalae as a sub-class of the dicotyledons, etc. It is, of course, well to keep certain unsettled questions out of a text-book designed for beginners, but in an advanced work it would seem better to make a thoroughly modern presentation. When looked upon in this way, the whole plan of the work seems antiquated.

The book is beautifully printed on thin but good paper, and we are wholly at a loss to know how it can be sold for the sum of 25 francs for the complete work, or 5 francs per part.—F. H. K.

THE SEA BEACH AT EBB TIDE. By Augusta Foote Arnold. 12mo, 500 pages, fully illustrated. The Century Co.

Many a traveler has strolled along one of our broad sea beaches fascinated by the marvellous wealth of living organisms which even the most careless observer cannot fail to note. Though the majority of these organisms belong to the animal kingdom, there is a very large group of plants—the algae or seaweeds—which in salt water attain their largest dimensions and showiest of colors.

The author of this interesting book has succeeded admirably in establishing a happy mean between a technical and a popular treatment. The first part, with which we are chiefly concerned, is devoted to a systematic account of the seaweeds inhabiting both the Atlantic and Pacific coasts; the second part describes in detail the various forms of animal life found on the beach, beginning with the sponges and ending with the mollusks.

In a well-written introduction consisting of several chapters, careful directions are given for collecting and preserving seaweeds; also remarks upon their structure and economic uses. The classification which follows is based upon that of Engler & Prantl, and various acknowledgements in the preface show that the author has been careful to consult with specialists in order to secure botanical accuracy. Not the least interesting and valuable feature of the book is the wealth of half-tone engravings, picturing a large number of our familiar algae.—C. L. P.

Dragon-tree at Laguna, Tenerife, about 4000 years old.

THE PLANT WORLD

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THE DRAGON-TREE OF OROTAVA.

By Alice Carter Cook.

ON the Fortunate Islands, in the garden of the Hesperides, at the end of the world, near the borders of eternal darkness, a strange tree had been growing long before the time when, according to accepted chronologies, the Garden of Eden was planted. Adam, Methuselah, Noah and Abraham lived and died; Egyptians, Assyrians and Persians built empires, temples and pyramids. The dazzling star of Greece faded before the dawning light of Rome, which rose and set as the world's great temporal power, to rise and set again as its spiritual head; Europe awoke to intellectual life; England and America were born. And while the whole procession of history was passing, the strange tree grew on, slowly, steadily, in the wonderful valley of Orotava. The spirit of the Peak of Tenerife brooded over it. The genius of the people of the Island breathed through it. With the leisurely assurance of infinite time, expanding at the rate of one foot in circumference each three hundred years, it attained a girth of fifty feet at the base. Its furrowed, conical trunk rose sixty feet into the air before dividing into a circle of twelve giant arms, themselves measuring from nine to eighteen feet in circumference and each bearing terminal branches tipped with dense clusters of sharp, sword-like leaves two to four feet long, and one to three inches broad. The whole crown was two hundred feet in circumference. Aerial roots arising from the bases of the branches covered and penetrated the stems below them, and at length completely filled their cavities, becoming the real substance of the tree as the soft tissues of a fossil are supplanted by the silica of

petrification—so that the old trunk was no more than a sepulchre of ancestral dust—and the gnarled monster, witness of antedeluvian catastrophes, remnant of geologic ages, slowly died through the centuries, eating out its own heart, becoming constantly more of an anachronism like a veritable Tithonous of the plant world. Its parents were perhaps companions of the Pterodactyl and Iguanodon, and one would not have been astonished to see some grotesque, reptilian bird perched among the forbidding foliage, nor do we wonder that the idea arose in olden times that this was the fabulous dragon, guardian of the apples of the Hesperides, for its fruit was golden yellow, and hardy indeed must have been the hero who could gain access to it against the innumerable defending sword-like fingers of the many arms.

Dracaena Draco, the dragon tree, for so this wonder is called, is now found only in the Canaries, with a rare exception in Madeira. Paradoxical as it may seem, it is one of the lily family, and not distantly related to the asparagus of our gardens. A French writer graphically enlarges on the incongruity of this kinship: "O, ancient witness of primitive ages; high herbs cover thy feet; creepers encircle thy trunk and irreverently enlace thy branches; parasites grow upon thy very bosom, living upon thy substance; one has seen under thy shade happy generations, of monks useless or harmful, of warriors bloody; and during a hundred centuries men have rested in the shade of thy foliage; the conquering Alonzo de Lugo commanded mass to be said upon an altar which thou wert compelled to bear—thou who hadst witnessed the mysterious rites of Egypt, Phoenician idolatries, Greek mythologies Moorish ablutions! Eh, well! old tree, if not the first born, the most venerable of created beings, thou art dishonored without appeal, for it is in the name of science. O, fabulous dragon! thou who hast been deified, thou art now only an asparagus! an asparagus larger than others—behold that is all! Thou art no more a tree, the king of the forests; no, thou art not even ligneous—fie! Thou art only a simple vegetable in the family of the asparagus, and this downfall is irremediable!"

The enthusiastic Frenchman allowed himself to be somewhat carried away by his feelings, for the relationship is not so close that the Dragon need be discredited by the plebeian appearance of its humble relative. *Dracaena* and *Asparagus* are members of distinct sub-families of the Liliaceae. The Dragon tree is more closely allied with the *Yucca* of our gardens and the curious *Dasylirion* of Texas and Mexico, which is also often seen in cultivation.

The genus is old. Fossil remains indicate its existence in central Europe and southern Africa during the Tertiary period. It now contains about thirty-six species, all found in the warmer parts of the Old

World, in India, Australia, Mauritius, Socotra, and various parts of Africa. Some of these are arborescent (for example *Dracaena cinnabari* of Socotra, which, like *D. Draco* yields a red gum), but none equal in development the Canary Island dragon, and preeminent among the large and old examples of this species was the giant of Orotava. Six thousand years is, indeed, a conservative estimate of its age. The great Humboldt, who visited the valley of Orotava in 1799 to pronounce it the finest piece of natural scenery in the world, made careful examination of the famous tree, and recorded the opinion that it had stood at least ten thousand years, and several other scientists have endorsed his view. Be it six or ten thousand, the existence of organisms of such tremendous duration is not without bearing beyond the veneration which this vast antiquity inspires. Expressed in terms of generations of *Dracaena*, even geologic periods shrink to seemingly manageable quantities. Although a hundred successive individuals might require a million years, the dragon-tree may after all be no older as a species or a genus than other "vegetables" which stand botanically as relatives.

About five hundred years ago when the Spaniards conquered Tenerife, the venerable tree, an object of deepest reverence and possibly a temple to the aborigines, was standing in the midst of a forest of laurel, palm and arbutus. Its beautiful comrades were ruthlessly destroyed, but even the deadened senses of the exterminators were impressed by the hoary giant. He was not only left in undisturbed possession of the soil, but by order of the commander, de Lugo, the great central cavity of the trunk was converted into a chapel, though it can scarcely be hoped that any masses were there said in tardy recognition of the sin of tree-murder.

The fascination of this particular individual is more evident when we remember that its brethren were the object of the conquerors' cupidity, inasmuch as they afford a resinous gum of a deep red color highly valued in mediaeval times under the name of "dragon's blood." This is at first of gummy consistency, but soon dries and then can be easily reduced to powder. Because of its resinous properties, the Guanches used it in the preservation of mummies and in the dressing of skins, in which they excelled. It was an important article of commerce with mediaeval Europe, being employed in the manufacture of medicines and charms. Warriors furnished themselves in times of danger with a magic powder made of the gum. It was also the foundation of a very fine red varnish. One chronicler relates how his compatriots landed in Grand Canary and exchanged old knives, fish hooks and pieces of iron worth altogether two francs, for dragon's blood of a value of two hundred ducats. This greed for gain probably explains the present scarcity of the trees. The old were destroyed, and the young

are of exceedingly slow growth, reaching a height of four feet in three hundred years. As the rate decreases with advancing age, a supply accumulated during centuries would be readily exhausted.

But even the giant of Orotava was not immortal, and Le Dru, after a careful examination made early in this century, prophesied that it had only one hundred and fifty years more of life. In 1819, a great storm broke off one of the branches—nine feet in circumference—which was sent to England to be exhibited at Kew. The trunk was buttressed and otherwise artificially strengthened, but in 1867 a terrific tempest tore away all the branches. The trunk alone remained, a Niobe of trees. All efforts to preserve it were fruitless, and the only link of life binding us to the antedeluvian world, or perhaps reaching back to the third day of creation, was broken. The oldest of antiquities was dead! Happily, in the exact spot on which the patriarch stood, one of its seedlings grows thriftily to-day—and in this the spirit of the past still lives. The imagination fails in the effort to forecast the wondrous events and development which it will behold, should it inherit its progenitor's long lease of vitality. "He who lives long sees much."

Washington, D. C.

OUR PUFFBALLS.*—IV.

By C. L. Shear.

TYLOSTOMA MEYENIANUM Klotzsch. Inner peridium depressed-globose, sordid tan-color, even, glabrous, flattened at the apex, 2.5cm. broad, with a laciniate mouth; stipe solid, fusiform, glabrous, longitudinally sulcate-ribbed with transverse cracks toward the apex, 10-13cm. long, 3.5mm. thick at the base, 12mm. thick at the apex, same color as the peridium; capillitium whitish; spores globose, sessile, uniguttulate, rusty brown. New Mexico.

TYLOSTOMA VERRUCOSUM Morgan. Inner peridium depressed-globose, rather thick, firm and rigid, about 12mm. in diameter, covered with the minute brown warts and scales of the outer peridium; mouth small, circular, prominent, entire; stipe 5-10cm. long, 6mm. thick, slender, lacerate-scaly without, white within; spores irregularly globose, minutely warted, pale brown, 5-6μ. Ohio.

TYLOSTOMA WRIGHTII Berkley. Inner peridium depressed-globose, pale, ochraceous, glabrous, 2cm. broad, umbonate, the wall of the umbo disappearing at maturity and forming a small circular mouth; stipe

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*Continued from *The Asa Gray Bulletin*, 8: June, 1900.

hollow, equal, ochraceous, even, glabrous, 6cm. long, 4mm. thick; capillitium threads hyaline, thick-walled, branched, 5mm. in diameter; spores globose, pale yellow-brown, minutely warted, 5-6μ. in diameter. "On the ground, Rio Grande, north Mexico." Said to be distinguished from *T. Meyeniaum* by its entire mouth and hollow even stem.

TYLOSTOMA CAMPESTRE Morgan. Inner peridium depressed-globose, somewhat squamulose, submembranaceous, becoming smooth and white, 12-18mm. in diameter; mouth plane, irregular, lacerate but not fimbriate; stipe 2-3cm. long, about 6mm. thick, subequal, brownish, squamose; capillitium threads long, slender, hyaline, branched; spores irregularly globose, pale brown, minutely warted, 4.4-5.5μ. Sandy soil, Nebraska and California.

TYLOSTOMA PUNCTATUM Peck. Peridium about 1.3cm. in diameter, subglobose, flattened and umbilicate at the base, papery but firm and tough, minutely and irregularly punctate-pitted, whitish, remains of the outer peridium persistent about the base; mouth slightly prominent, small, lacerate; stem about 3mm. thick and 3cm. long, cylindrical, obscurely scaly or rimose-scaly, sulcate-striate above, hollow, subferruginous, white within; capillitium threads hyaline, sparsely branched, broader than the spore, ends obtuse, subtruncate or sometimes thickened; spores globose, 4-5μ, pale ferruginous, minutely warted or roughened. Sandy ground, Kansas.

TYLOSTOMA SEMISULCATUM Peck. Peridium subglobose, longer than broad, 1.3-1.5cm. broad, 1.7cm. long, glabrous above, ferruginous tomentose on the lower half; mouth entire; stem about 5cm. long, even and glabrous or slightly furfuraceous near the top, the lower part longitudinally sulcate, whitish; spores globose, ferruginous, 4-5μ; capillitium threads non-septate, colorless. Sandy soil, Nevada.

GEASTER Mich.

Outer peridium rather thick, sometimes composed of two layers, dividing in a stellate manner into several segments which break away from the inner peridium and become spread out or reflexed; inner peridium thinner, dehiscing by a regular mouth at the apex.

SYNOPSIS OF THE SPECIES.

1. Inner peridium with a short pedicel.
   - A. Mouth sulcate-plicate.
     - a. Surface of the inner peridium minutely warted — *G. campestris.*
     - b. Surface of the inner peridium smooth.
       - *a.* Outer peridium of two layers.
         - x. The two layers separating nearly to the tips of the segments. — *G. fornicatus.*
         - xx. The two layers separating only near the center. — *G. turbinatus.*
       - *b.* Outer peridium of one layer. — *G. bryantii.*
   - B. Mouth ciliate-fimbriate.
     - a. Inner peridium subglobose, brownish. — *G. limbatus.*
     - b. Inner peridium ovoid, white. — *G. minimus.*

2. Inner peridium sessile, spores 3-6μ.	
A. Mouth stellately-lacerate.	*G. delicatus.*
B. Mouth dentate-lacerate.	*G. argenteus.*
C. Mouth sulcate-plicate.	
a. Mouth in a depressed disk.	*G. umbilicatus.*
b. Mouth prominent, not in a depressed disk.	*G. striatus.*
D. Mouth ciliate-fimbriate.	
a. Inner peridium 2cm. or more in diameter.	
a. Outer peridium of two layers, the inner one separating and becoming vaulted.	*G. radicans.*
b. Outer peridium of two layers, the inner one becoming partially separated and forming a cup.	*G. triplex.*
c. Outer peridium of one layer.	*G. fimbriatus.*
b. Inner peridium less than 2cm. in diameter.	
a. Segments of outer peridium with lower surface longitudinally cracked.	*G. vittatus.*
b. Segments of outer peridium with lower surface not thus cracked.	*G. saccatus.*
c. Inner peridium ovoid.	*G. lagenaeformis.*
d. Inner peridium globose.	*G. velutinus.*
E. Mouth dentate.	*G. rufescens.*
3. Inner peridium sessile, spores 8-10μ.	
A. Mouth ciliate-fimbriate.	*G. mammosus.*
B. Mouth lacerate	
a. Inner peridium somewhat reticulate	*G. hygrometricus.*
b. Inner peridium smooth.	*G. fibrillosus.*
c. Inner peridium rather thick, mouth rigid	*G. linkii.*

GEASTER FORNICATUS (Huds.) Fr. Outer peridium consisting of two layers, usually four parted but rarely five or more parted, whitish, becoming brownish and much reflexed when dried, the outer coat separating from the inner and remaining attached to the ground, 1-3cm. high and 1-2cm. broad; inner peridium subglobose, grayish brown with a short pedicel 1.5-2.5cm. in diameter; mouth prominent, elongate conical, sulcate-ciliate; columella slender, subclavate; capillitium brown; spores subspherical, reticulate, brown, 3.5-5μ. On the ground, frequently among pine leaves, eastern United States. Fig. 1.

GEASTER RADICANS B. & C. Outer peridium of two layers, the inner separating from the outer and becoming vaulted, the segments reflexed; the inner peridium reddish, very short pedicellate, about 1.5cm. in diameter; mouth ciliate-fimbriate, silky. Carolina.

GEASTER TRIPLEX Jungh. Outer peridium consisting of two layers, the inner layer becoming detached near the middle and forming a cup about the base of the inner peridium; segments 4-6, revolute; inner peridium globose or depressed-globose, pale, 1.6-2.5cm. in diameter; mouth conical, ciliate-fimbriate; spores subglobose or globose, 5-5.5μ. Eastern and central United States.*

**The Asa Gray Bulletin*, 6: 93, *pl. II. f. 3.* December, 1898.

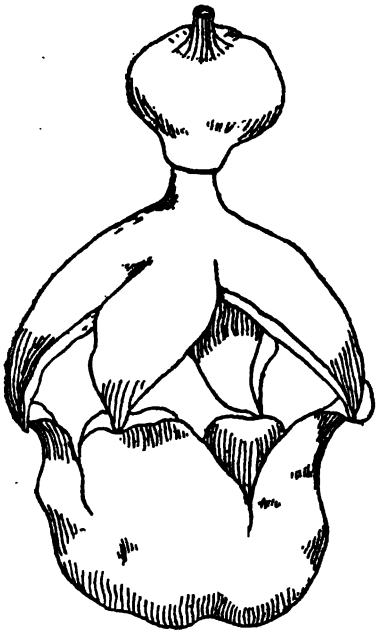

Fig. 1. *Geaster fornicatus.*

GEASTER TURBINATUS Cragin. Outer peridium consisting of two layers not separating except near the center, the outer grayish-white, the inner chocolate-brown, segments 8-10; inner peridium pedicellate, slightly constricted below the middle; the upper part depressed-globose with a yellowish-gray mealy appearance, the lower part broadly obconic with a thicker wall which is covered with a part of the inner coat of the outer peridium; mouth conical, radiate-plicate; capillitium and spores dark umber; spores globose, granular, 4.5-5μ. Kansas.

GEASTER BRYANTII Berk. Outer peridium about ten lobed, leathery, expanded and finally reflexed, lobes unequal, acute; inner peridium subglobose, pale bluish-gray becoming brown-spotted, pedicellate, 2-2.5cm. in diameter; mouth conical, sulcate-plicate; capillitium brown; spores globose. echinulate, brownish, 4-6μ. New York.

A MARCH DAY'S FLOWERS.

By Charles Elmer Jenney.

"APRIL showers bring May flowers," is an old New England adage. Nothing is said about any earlier flowers in that latitude. Therefore the list of blossoms that a single March day in California revealed should be somewhat of a wonder to those botanists who are enjoying March gales *sans* flowers.

On March 24, 1901, all of the plants hereafter enumerated were in flower near Fresno, California, on the San Joaquin river, and within a space of probably less than two square miles. Such a variety in such a limited space is quite remarkable.

Of course the list should be headed with the California poppy, *Eschscholtzia Californica*, whose red-gold blazoned wide stretches of land once sowed to wheat, and even crept up the lines of new wheat in thick masses. The less showy poppy, *E. caespitosa*, was also common. Mixed thickly among the poppies were the gaudy fiddle-heads, *Amsinckia spectabilis* and the less brilliant *A. lycopsoides*. The delicate bird's eyes, (*Gilia tricolor*) and a pure white species of *Gilia*, the tender blue-eyes (*Nemophila Menziesii*), and its relative *Phacelia Douglasii*, and the fragrant forget-me-not (*Myosotis verna*), whose little white flowers looking like pop-corn scented all the air. The sunshines (*Baeria gracilis*), shone like little suns among the low herbage.

Along the bluffs of the river the beautiful tidy-tips (*Laya platyglossa*), grew in scarce clusters; mingled with them their less favored composite friend the false tidy-tips (*Leptosyne Douglasii*). There were also numbers of a large composite flower like a small sunflower, but difficult of determination. On the dry plains the plumes of the paint-brush (*Orthocarpus purpurascens*), gaily waved, and smaller members of the genus, *O. micranthus* and the yellow *O. erianthus* were found. Hugging close to the earth into which their long, slender roots extended to a remarkable length, were the sun-cups (*Oenothera ovata*), while *O. bistorta*, with its reddish, wriggled stem was present all over the plains. The shrubby lupine (*Lupinus Douglasii*), and the minute one (*L. micranthus*), were common, as also the white and a similar blue species, all besieged by many bees. Among the high grass and bushes of the river bank twined the wild cucumber (*Echinocystis fabacea*). A small clover and the stately larkspur (*Delphinium Menziesii*), grew in the desolate hog-wallow wastes. On the hill-side the bright western wall-flower (*Erysimum asperum*) grew. The wild blackberry (*Rubus ursinus*), whitened the bramble patches by the river. The tree tobacco (*Nicotiana glauca*), with its long yellow tubes hung over the river. The two species of alfilaria (*Erodium cicutarium* and *E. botrys*), the cream-

cups, *Platystemon Californicum*, *Collinsia tinctoria*, *Phacelia tanacetifolia*, *Brodiaea capitata* and Chia appeared frequently. Yarrow, the California dandelion with its scarce-opening blossom, chickweed (*Stellaria longipes*), *Microcala quadrangularis*, *Arenaria Californica*, *Streptanthus peramoenus*, *Tellima Bolanderi*, and two species of mustard were other plants found.

In damp localities the yellow *Mimulus luteus* and the tri-colored mimulus; in dry ones *Eritrichium Scouleri*, *Capsella Bursa-pastoris*, wild portulaca (*Calandrinia Menziesii*), alfalfa, *Mentzelia gracilenta*, *Hosackia subpinnata*, brass buttons (*Cotula coronopifolia*), a small mint, pepper-grass (*Lepidium nitidum*), the little yellow thistle (*Cnicus Californicus*), *Salvia columbariae*, the yellow wild carrot (*Daucus pusillus*), *Gilia achillaeifolia*, miner's lettuce (*Montia perfoliata*, the perpetual blooming *Heterotheca floribunda*, and the thistle-sage (*Salvia carduacea*. About four-o'clock, true to its name, the fragile spice-scented four-o' clock (*Gilia dichotoma* began to unfold its white ruffles, and the time arrived for us to start home.

We had spent literally a day among the flowers, sixty-four distinct species being noted. Probably an experienced botanist would have added greatly to this list, especially from the minute and almost microscopic specimens which were frequently noticed. I have enumerated only the more familiar ones which even a novice would recognize as distinct species, and it will suffice to give a good general impression of the spring flora of the San Joaquin valley, or at least a small section of it.

Fresno, California.

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

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

"It is thoroughly established in both localities, and should be included in the flora of the United States."—C. D. Fretz, M. D., in *Torreya* for July.

THOMAS CONRAD PORTER.

By A. A. Heller.

ON April 27th, at his home at Easton, Pa., at the ripe age of 79 years, death claimed the last of the older botanists who added so much to the taxonomic knowledge of the science during the latter half of the 19th century.

Thomas Conrad Porter, D. D., LL. D., was born at Alexandria, Huntingdon county, Pa., January 22, 1822. In 1840 he graduated from Lafayette College, and from Princeton Theological Seminary in 1844. His first charge was a mission at Monticello, Georgia, where he spent one year, dating from April, 1846. This southern field was an enjoyable one, as it afforded an excellent opportunity for botanical exploration at such interesting localities as Stone Mountain and Toccoa Falls. A number of strange plants not easily determined were carefully described and figured by him, and these were usually sent to Asa Gray. On Stone Mountain he discovered *Gymnolomia Porteri*, expressing the opinion that it was an undescribed plant. Dr. Gray did not agree with him at first, but shortly afterwards described the plant as *Rudbeckia ? Porteri*. It was always a source of regret to Dr. Porter that he failed to obtain specimens of *Quercus Georgiana* which he noticed on Stone Mountain before the species was described.

Only last December while visiting him at Easton, the writer had the pleasure of listening to the reading of an interesting and beautifully written letter sent from Monticello in 1846 to one of his relatives.

After serving as pastor of the Second Reformed church at Reading, Pa., for one year, he went to Mercersburg, Pa., in 1849, as Professor of Natural Sciences in Marshall College. When that institution was merged with Franklin College at Lancaster in 1853, he removed to this city, occupying the same chair in the newly organized Franklin and Marshall College, which he filled until July, 1866.

He was one of the founders and the first president of the Linnaean Society of Lancaster. While located here he collected assiduously in many parts of the county, whose flora is one of peculiar interest on account of the work done upon it a century ago by Muhlenberg, and in 1869 the results of these explorations appeared in a list entitled "Enumeration of the Indigenous and Naturalized Plants of Lancaster County, Pennsylvania," published in Mombert's "Authentic History" of Lancaster county.

In 1866 he was elected Professor of Botany, Zoology and General Geology in Lafayette College at Easton, Pa., which position he held until 1897, when he was retired as Emeritus Professor and Curator of the herbarium.

THOMAS CONRAD PORTER

From a recent photograph

The degree of D. D. was conferred upon him in 1865 by Rutgers College, and that of LL. D. by Franklin and Marshall College in 1880. Both of these degrees were richly deserved, as he was a thorough biblical scholar and theologian, as well as a fine all-round scholar, a poet and master of both ancient and modern languages.

Besides many purely literary productions, he was the author of some fifty botanical papers, the first of which was a "List of Plants collected by Mr. Thaddeus A. Culbertson on an Expedition to the Mauvaises Terres and Upper Missouri in 1850," published in 1850 in the Fifth Annual Report of the Smithsonian Institution, and the last in the *Bulletin of the Torrey Botanical Club* for September, 1900, entitled "A new Variety of Azalea nudiflora L."

For many years his attention was directed toward obtaining material for a flora of Pennsylvania, and arrangements had been made only a short time before his death for the publication of this work. Provision fortunately was made in his will for the carrying out of the plan.

Particularly pleasing to him was the reinstatement about a year ago of the genus *Porterella*, dedicated to him in 1872 by Torrey, but afterwards wrongly referred to the Old World genus *Laurentia*. Specimens upon which *Porterella* was founded were collected by him in Wyoming in 1871, and the writer has heard him narrate the particulars about finding a patch several square feet in extent completely covered by plants bearing a profusion of delicate blue flowers. His name is also commemorated in *Porteranthus*, an eastern rosaceous genus of two handsome species.

Although the author of comparatively few plant names, his work was always well done, and will stand the test of time better than that of some of his more voluminous contemporaries. If we were trying to find fault with him, we would say that he was perhaps too cautious, as well as too generous. By far the greater part of his work went in the shape of specimens and notes to enrich the collections and writings of others, for which he often received no public acknowledgment.

We can find no fitter conclusion than the words of Mr. Frank Dieffenderfer, of this city, a life-long friend:

"Dr. Porter was a genial man and a favorite with those who knew him. Among his friends he was most companionable. His large attainments, his fine literary tastes and his broad scholarship gave him command of a wide range of knowledge, which was certain to make itself heard and appreciated when the mood was upon him. He will always stand among the foremost of the sons of his native State, and his death removes a most genial personality from a large circle of attached friends.

Lancaster, Pa.

BRIEFER ARTICLES.

A Green Trillium.

Among a number of large-flowered trilliums (*Trillium grandiflorum* Salisb.), gathered recently for decorative purposes near Winona, one plant was found in which all the flower organs had reverted to green leaves. There snould be five of these, *one each* for calyx, corolla and pistil, and *two* for the six stamens. But a study of the top view in the accompanying drawing shows that there are here *six* whorls. How is this extra whorl to be accounted for? Professor Rodwell of our high school has preserved this plant in formalin solution, and the writer's thanks are due him for the loan of the specimen, from which the accompanying drawing was made by a student. The figure in the lower right corner is a top view of an ordinary trillium flower.—John M. Holzinger, Winona Normal School, Winona, Minn.

A Standard College Entrance Option in Botany.

At the meeting of the Society for Plant Morphology and Physiology, held at Baltimore, December 28, 1900, a committee was appointed to consider the formulation of a standard college entrance option in botany. The committee consists of Professors Ganong, Lloyd and Atkinson. A provisional report has been prepared, copies of which may be obtained on application to the chairman, Professor Ganong, Northampton, Mass. The following is a brief outline of the report:

The full year option to count as one unit for entrance, consists of two half year courses, either of which may be offered as an option for a half unit.

I. General Principles of Anatomy, Morphology, Physiology and Ecology.

II. The Natural History of the Plant Groups, with classification.

For the first half year the following topics are suggested: *A.* Anatomy and Morphology: The seed, structure, germination and food supply; the shoot, anatomy of stem, leaf and bud; the root, anatomy and structure of tissues; the flower, structure and function; the fruit, structure and relation to flower; and the cell. *B.* Physiology: Role of water in plant, photosynthesis, respiration, digestion, irritability, growth and fertilization. *C.* Ecology: Modifications of parts for special functions, dissemination, cross-pollination, light relations of green

A green Trillium.

tissues, plant societies and plant associations, and zonal distribution.

While the subjects of physiology and ecology are treated separately from morphology for the sake of convenience, they should be studied in connection with the structures with which they are most closely connected.

In the second half year a thorough study of the following types is recommended: *A.* Algae, *Pleurococcus*, *Haematococcus*, *Spirogyra*, *Vaucheria*, *Fucus* and *Nemalion*. *B.* Fungi: Bacteria, *Mucor*, yeast, *Puccinia* and mushroom. *C.* Lichens: *Physcia*. *D.* Bryophyta: In Hepaticae, *Radula;* in Musci, *Polytrichum*. *E.* Pteridophytes: In Filicineae, *Aspidium;* in Equisetineae, *Equisetum;* in Lycopodineae, *Lycopodium* and *Selaginella*. *F.* Gymnosperms: *Pinus*. *G.* Angiosperms: A monocotyledon and a dicotyledon. Classification should include a study of the primary subdivisions of the same groups.

The use of manuals for the determination of the species of flowerfng plants is not considered an essential part, nor the preparation of an herbarium a desirable part of the regular course. If either of these lines of work is to be introduced at all, it should be voluntary for such as show a taste for it.—Gilbert H. Trafton, Normal School, Randolph Center, Vermont.

An Abnormal Mandrake, Dandelion and Banana.

The specimen of *Podophyllum peltatum* L. in question consists of a stalk bearing first, a small leaf, five inches broad, with a bud upon a long slender peduncle in its axil; secondly, the stem continues upward for two and half inches, and bears an unusually large peltate leaf, like that of a sterile plant and a large flower upon a short stiff peduncle. It is as if the stem had been elongated, separating the two leaves of a normal plant, and two flowers formed instead of one. The lower flower is axillary and the upper one terminal.

A double-headed dandelion is quite unusual in New Jersey. The one before me is not a flattened scape with a head many times longer than wide, but instead the flower stalk is cylindrical with a normal head at its summit. A half inch below the terminal inflorescence there is another nearly sessile in the axil of a leaf two inches long and an inch broad. This second head is larger than the first, blooming at the same time, and has enough in the way of flowers for any dandelion scape to bear.

The third freak is a double banana that consists of two fruits of the ordinary size that are joined upon one side throughout their whole length. The edible portion of each is separate, but there is no rind between them.

All the above abnormalities were found by Mr. Kelsey, my assistant, within the past few days.—Byron D. Halsted, New Brunswick, N. J.

GENERAL ITEMS.

Dr. David Griffiths, expert in charge of field management of grasses and forage plants in the Bureau of Plant Industry, and Mr. E. L. Morris, special agent of the same office, have left for field work in Nevada, Idaho and Oregon. They expect to take an overland trip from Winnemucca, Nevada, and investigate the condition of the ranges of eastern Oregon and western Idaho.

As we go to press we learn with deep regret of the death of Dr. Charles Mohr, the veteran botanist of Mobile, Alabama, at his late home in Asheville, N. C. Dr. Mohr's new flora of Alabama had just been completed, ready for the press, and he had been living in the hope of witnessing the fruition of his labors. We shall publish a more extended tribute at a later date.

One of the most attractive features of the California exhibit at the Pan-American Exposition is the collection of fruits, nuts, etc., sent by the business men of Los Angeles county. A prominent feature of this collection and the one that first attracts attention is a full sized elephant built of English walnuts, that is not only attractive in itself, but is typical of this young giant industry, as it indicates the present "jumbo" importance of what was but a short time ago merely an experiment. Fourteen years has sufficed to develop the business of growing English walnuts in California from nothing to its present international importance.

We regret to record the death, in New York City on July 7th, of Dr. Theodore Greely White, Assistant in Physics in Columbia University. Dr. White will be remembered by former readers of the *Asa Gray Bulletin* as most active in his work for the journal, and for the Asa Gray Memorial Chapter of the Agassiz Association. While his professional studies had been mainly in the field of geology and physics, he had devoted considerable attention to botany, and was the author of a revision of the North American wild peas of the genus *Lathyrus*, as well as of numerous popular articles published in the *Asa Gray Bulletin*.

NOTES ON CURRENT LITERATURE

In the May issue of *Torreya* Mr. F. H. Burglehaus gives an account of the discovery of a smooth fruited form, of *Circaea*, the fruit of which is usually provided with hooked bristles, and is well known as a "stick-tight." This discovery is of great interest as necessitating henceforth a change in the generic description.

Bulletin No. 4 of Pacific University, Forest Grove, Oregon, is devoted to "Preliminary Notes on a few Oregon Toad Stools." The more common genera of Hymenomycetes are described and figured by the author, Professor A. R. Sweetser. Two half-tone plates are included, illustrating eight species. At the end is a partial list of Oregon fungi, collected in the vicinity of Portland by Professor H. Lane.

In the July issue of *Torreya* Miss B. S. Miller gives an interesting account of the finding of *Amsonia* in New Jersey. This is a southern plant with delicate blue flowers, belonging to the dogbane family, and it was originally brought to Ridgewood, N. J. for horticultural purposes some twenty-five years ago. Although the plant still thrives in the reclaimed meadow where it was first placed, the remarkable fact in the case is that it has spread, not from this point, but from another garden to a high rocky field a quarter of a mile away. Miss Miller found a number of plants in this field, growing with lupines, brakes and blackberries. It is an interesting question for the ecologist to settle why the *Amsonia* should not have spread from the original colony, apparently thriving in a congenial situation, but should instead have chosen to establish itself in a dry field some distance from the point of its introduction.

A new candidate for the favor of the nature student, in the guise of a 16-page periodical entitled "The American Botanist" lies before us. It is called "a monthly journal for the plant lover," and is edited by Willard N. Clute, the former business manager and publisher of THE PLANT WORLD. The aims and objects of this new venture are set forth in a series of brief editorials, and may be gathered from the following extracts therefrom:

"To supply information about plants and to supply it in language that the general reader can understand, is the province of The American Botanist. * * * It is not necessary to be a prominent scientist to write an article that will interest the flower-lover. * * * Turning to the dictionary, * * * we find that a botanist is 'one versed in the knowledge of plants.' That is exactly what this magazine aims to be. * * * While we shall use original matter for the bulk of The American Botanist, we shall also make a feature of re-publishing everything of a popular nature appearing in other botanical journals. * *"

The last quotation evidently contains the keynote of the editor's intentions, since in the July issue before us three of the six leading articles are quoted from other journals. Without questioning the convenience of this practice from the editorial standpoint, we are inclined to doubt whether, in these days of cheap first-class magazines, a publication without illustrations, consisting of only sixteen pages of reading matter composed largely of extracts, is likely to find favor with the public at the subscription price of one dollar per year.

The popularization of science does not necessarily mean the writing of "articles that will interest the flower-lover." A journal claiming to be in any sense scientific should endeavor to instruct as well as to amuse, and we venture the assertion that an examination of the pages of any current magazine of popular science will disclose the fact that the most readable, as well as the most instructive articles, have been written either by absolute professionals, or by amateurs with more or less scientific training. It is certainly no compliment to the attainments of our American botanists to suppose them incapable of writing in language free from technicalities, and the lay public, having confidence in the specialist's knowledge of the subject, will read what he has to say with interest and profit. An editorial experience of several years has proven conclusively that most articles written by so-called amateurs are valueless for publication.

Our contemporary also indulges in an editorial denunciation of the use of scientific names in popular writings. This objection strikes us as rather trivial. Besides being absolutely necessary for proper identification of the plant which is being discussed, such names are almost always inserted in parentheses, and can be readily passed over by those to whom they are unfamiliar.

We do not wish to imply, by this somewhat extended criticism, that there is not a wide field in this country for the exploiting of amateur botanical journals conducted in the right spirit, that is, with the advancement of botanical science as the paramount object. We trust that our new contemporary will belong to this category. Its attractive cover and neat typography are certainly to be commended; while being "versed in the knowledge of plants," it may be expected to supply an aching void in the demands of popular botany.

EDITORIAL.

Writers in *Vick's Family Magazine* and in *Park and Cemetery* have recently discussed at some length the improvement and adornment of school grounds. There can be no question that the brightening of a child's surroundings during his working hours has a very direct and vital bearing on his mental development. The love of nature and natural objects should be carefully fostered in the young mind, and it should not only be taught to appreciate the beauties of plant life, but should receive at least an introduction to those problems of growth, relationship and environment that will later form parts of the botanical course in the high school or college curriculum. Many a botanist has derived his love of the science from childhood experiences with plant life. The importance of botany in its relations to agriculture, medicine, chemistry, and dietetics, is now everywhere recognized, so that all possible encouragement should be given to the younger generation of prospective professionals.

The concluding sentence above, suggests another aspect of the subject of botany as a profession. The death of Professor Thomas C. Porter, whose biography and portrait are published in this issue of THE PLANT WORLD, removes from us the last member of that brilliant galaxy of botanists of the past generation, among which Asa Gray shone as the central guiding star. In the still more recent decease of Dr. Charles Mohr, the veteran botanist of Alabama, we have lost practically the last of another group of men, scarcely less eminent in their studies, but to whom botany was of necessity subordinated to the demands of active business professions. This means the beginning of another era in botany. Whether it will embrace so many illustrious names, or whether it will be productive of so many important results, we cannot now predict. There is an opportunity for every young student of the science.

BOOK REVIEWS.

METHODS IN PLANT HISTOLOGY. By Chas. J. Chamberlain, Ph. D. 160pp. octavo, illustrated, cloth. University of Chicago Press, 1901. $1.50.

The work which has just appeared under the above title is based upon a series of articles which have already been published in the *Journal of Applied Microscopy*. The articles, however, have been thoroughly revised and enlarged, so that the present book contains about twice the matter of the original articles. The subject is treated in two parts, Part I. containing chapters on apparatus, re-agents, temporary mounts, the general method, killing and fixing agents, staining, general remarks on staining, practical hints on staining, the celloidin method and the glycerine method. Part II. describes the special methods of technique to be applied in studying the different groups of plants, beginning with the algae. Fungi, hepatics, mosses, ferns, horsetails, lycopods, gymnosperms, and angiosperms are taken up in their regular order, and simple and comprehensive directions for the preparation and study of members of the various groups are given. The final chapters are devoted to "a class list of preparations" adapted to meet the needs of a regular course in plant histology, and formulae for reagents in which are brought together the various fixing agents and stains in general use. The work is evidently intended to meet the needs of general students in plant histology, and is based upon the outhor's own work with his classes at the University of Chicago. While it is not so complete in some ways as Zimmerman's work, yet it seems much better adapted to the use of general students. The matter is well arranged and illustrated. The second part of the book, though rather brief in its treatment of some groups, will, we believe, prove very useful to all teachers of plant histology. The book will no doubt find a place in every well regulated laboratory, and will be found very useful by private students. C. L. S.

OUR FERNS IN THEIR HAUNTS: A GUIDE TO ALL THE NATIVE SPECIES. By Willard Nelson Clute. Illustrated by William Walworth Stilson. New York. The Frederick A. Stokes Company. Price $2.25.

Under the above title Mr. Clute has issued an excellent popular treatise upon the ferns of eastern North America north of the Gulf States. The book is intended primarily for the beginner in fern study;

but the author has included such interesting data of every sort relating to the growth and habits of each species, that it must indeed prove of great value to all professing an interest in this group of plants. Above all should be mentioned the very complete and careful diagnoses of the species, and the high character of the illustrations which accompany them. The first excellence arises from the fact that the author has not relied exclusively upon previous descriptions, but has had the benefit of fresh material, good eyes, and a ready pen. The illustrations, barring one or two of the colored plates, are uncommonly good, many of them far ahead of any we have hitherto seen. Little folk-lore attaches to the exclusively American species, but of those common to both hemispheres many quaint superstitions are recited by the author. A noteworthy feature is found in the illustrated key to genera, in which the generic diagnoses are accompanied by drawings of characteristic fruiting parts of typical species. With all these helps the merest amateur can hardly go astray in identifying a given specimen, and certainly fern study in America, even now strongly on the gain, will be further stimulated directly through this book.

The work is, however, not without its shortcomings. Certain portions betray a most unscientific spirit, and the author is not to be commended for proposing in an altogether haphazard way a number of supposedly new combinations. Thus in discussing the lady-fern (*Athyrium Filix-foemina*), a comparison is drawn between the rhizomes of the European and American specimens, and a supposed difference "seems to indicate that the two are not identical. In this case our plant would be known as *Athyrium Michauxii*, or perhaps more properly *Athyrium filix-foemina Michauxii*." Both combinations had previously been published, but had they not, as the author evidently believed, a fuller discussion of the claims of the American plant to recognition would have been quite in order. Another passage which is curiously out of place relates to the scientific name of the American ostrich fern (p. 259). The author takes up *Struthiopteris Germanica*, and notes that the name *Matteuccia*, which has been used by recent writers, will probably not prevail. Nevertheless, in the contingency of its subsequent general acceptance he provides the name *Matteucia struthiopteris Pennsylvanica* Clute! Another rather odd practice we note, too, that of making *Botrychium dissectum* a subspecies of *B. obliquum*, published some six years later. For certain reasons the author has retreated to the nomenclature of Gray's Manual, and in many ways endeavors to discredit the more modern effort toward "stability." Thus, little discussions on nomenclature appear under many species. They serve to mar the book as a popular treatise, but on the other hand they indicate more plainly than a simple statement of synonymy the total lack of justice and stability in what may be called the *lazy* (rather than conservative) nomenclature chosen by the author. Nomenclature as a debatable question had best been eliminated from the work. In other points, with the exception of the quality of paper used, the book merits hearty approval, and this it will doubtless receive. Its publishers have advertised it as "The American Fern Book;" as such it will undoubtedly command a wide sale.—W. R. M.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

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AUGUST DAYS.

By John Burroughs.

ONE of our well-known poets, in personifying August, represents her as coming with daisies in her hair. But an August daisy is a sorry affair; it is little more than an empty, or partly empty, seed-vessel. The daisy is in her girlhood and maidenhood in June (in the Northern States); she becomes very matronly early in July—fat, faded, prosaic—and by or before August she is practically defunct. I recall no flower whose career is more typical of the life, say, of the average European peasant woman, or the women of barbarous tribes, its grace and youthfulness pass so quickly into stoutness, obesity, and withered old age. How positively girlish and taking is the daisy during the first few days of its blooming, while its snow-white rays yet stand straight up and shield its tender centre somewhat as a hood shields a girl's face! Presently it becomes a perfect disc and bares its face to the sun; this is the stage of its young womanhood. Then its yellow centre—its body—begins to swell and become gross, the rays slowly turn brown, and finally wither up and drop, and it is a flower no longer, but a receptacle packed with ripening seeds.

A relative of the daisy, the orange-colored hawkweed (*Hieracium aurantiacum*) which within the past twenty years has spread far and wide over New York and New England, is often at the height of its beauty in August, when its deep vivid orange is a delight to the eye. It repeats in our meadows and upon our hill-tops the flame of the columbine of May, intensified. The personified August with these flowers in her hair would challenge our admiration and not our criticism. Unlike the daisy, it quickly sprouts again when cut down with the grass in the meadows, and renews its bloom. Parts of New England, at least,

have a native August flower quite as brilliant as the hawkweed just described, and far less a usurper; I refer to meadow-beauty, a *Rhexia*, found near the coast, which suggests a scarlet evening-primrose.

Nature has, for the most part, lost her delicate tints in August. She is tanned, hirsute, freckled, like one long exposed to the sun. Her touch is strong and vivid. The coarser, commoner way-side flowers now appear—vervain, Eupatorium, Mimulus, the various mints, white-weed, asters, golden-rod, thistles, fireweed, mulleins, motherwort, cat-nip, blueweed, turtle-head, sunflowers, clematis, evening-primrose, lobelia, gerardia, and, in the marshes of the lower Hudson, marshmal-lows, and vast masses of the purple loosestrife. Mass and intensity take the place of delicacy and furtiveness. The spirit of Nature has grown bold and aggressive; it is rank and coarse; she flaunts her weeds in our faces. She wears a thistle on her bosom. But I must not for-get the delicate rose-gerardia, which she also wears upon her bosom, and which suggests that, before the season closes, Nature is getting her hand ready for her delicate spring flora. With me this gerardia lines open paths over dry knolls in the woods, and its little purple bells and smooth slender leaves form one of the most exquisite tangles of flowers and foliage of the whole summer. It is August matching the color and delicacy of form of the fringed polygala of May.

One may still gather the matchless white pond-lily in this month, though it is in the height of its glory earlier in the season, except in the northern lakes.

A very delicate and beautiful marsh flower which may be found on the borders of lakes in northern New York and New England is the horned-bladderwort, yellow, fragrant, and striking in form, like a mini-ature old-fashioned bonnet, when bonnets covered the head and pro-jected beyond the face, instead of hovering doubtfully above the scalp. The horn curves down and out like a long chin from a face hidden within the bonnet. I have found this rare flower in the Adirondacks and in Maine. It can doubtless be found in Canada, and in Michigan and Wisconsin. It is the most fragrant August flower known to me. This month has not many fragrant flowers to boast of. Besides the above and the pond-lily I recall two others—the small purple-fringed orchis and a species of lady's-tresses (*Spiranthes cernua*).

* * * * * * * *

August days are for the most part tranquil days; the fret and hurry of the season are over. We are on the threshold of autumn.

Nature dreams and meditates; her veins no longer thrill with the eager, frenzied sap; she ripens and hardens her growths; she concen-trates; she begins to make ready for winter. The buds for next year are formed during this month, and her nuts and seeds and bulbs finish

storing up food for the future plant.

From my outlook upon the Hudson the days are placid, the river is placid, the boughs of the trees gently wag, the bees make vanishing lines through the air. The passing boats create a great commotion in the water, converting it from a cool, smooth, shadowy surface to one pulsating and agitated. The pulsations go shoreward in long, dark, rolling, glassy swells. The grapes are purpling in the vineyard. The apples and pears are coloring in the orchard; the corn is glazing in the field; the oats are ripe for the cradle; grasshoppers poise and shuffle above the dry road; thistle-down drifts by on the breeze; a sparrow sings fitfully now and then; dusty wheelmen go by on their summer vacation tours; boats appear upon the river loaded with gay excursionists, and on every hand the stress and urge of life have abated.—*From Harper's Magazine for August, 1901, by permission of the publishers.*

NOTES FROM WESTERN KENTUCKY.

By Sadie F. Price.

ON a collecting trip through Muhlenberg county a few weeks ago, I visited "Airdrie," on Green River. It is General Buell's old homestead, a peaceful, beautiful place where the gentlemanly old soldier passed his last days. Old-fashioned "hundred-leaf" and other roses, white jasmine, English ivy, and many wild vines covered the grounds and little bridges about the park; while the view of the river is very fine.

Near the house—a quaint old-fashioned, large log house with wide porches—is a stone marking the spot where the General's favorite war horse is buried. On the bluff about one-half mile from the house, is a coal mine, not now in use; while still farther down stands a deserted village where in 1855 sixty Scots, brought over by Lord Alexander, lived for a few years before the place was purchased by General Buell. The ruins of a tall stone tower, with iron boiler of an iron foundry is near the house, and cose by a three-story sandstone house with barred windows, while stone steps lead up to the top of the bluff where the village stands. The stone building with the inscription "Airdrie, 1855," was used as a prison for the convicts from thi Eddyville penitentiary, who worked in the mines.

The cliffs near were an ideal spot for certain ferns, but many of these had, no doubt, been long since uprooted by the many tourists and fishing parties who annually visit Airdrie. In a swamp still lower down the river I found two shrubs that I had not found before in Ken-

tucky, and doubt if they have been credited to this State. These are *Itea Virginica* and *Styrax Americana*. Both are very pretty, and would be especially handsome in cultivation. They grow, however, in a marsh in sandy soil in woods, so might not prosper in drier soil.

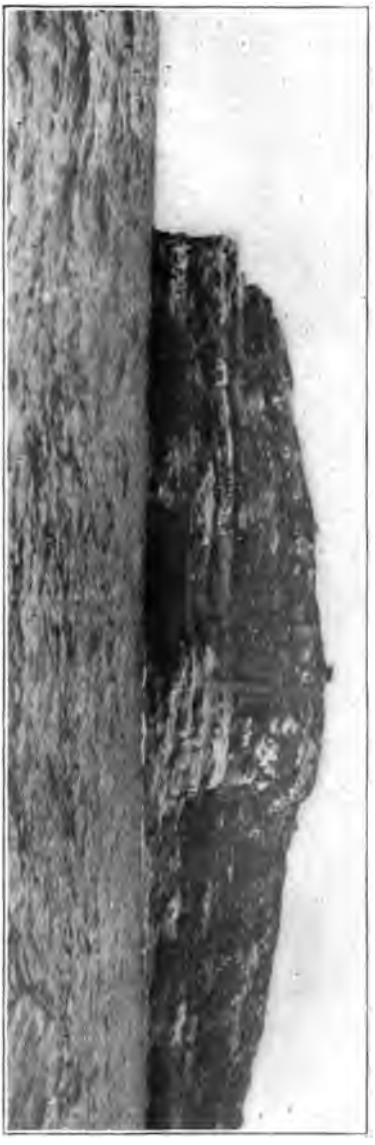
The prevailing trees near are sweet gum, black gum, Spanish oak, called there "yellow-bottom oak," but in this county (Warren) called "turkey oak;" basket oak, called white oak; and Texan red oak, called spotted oak.

The woods were bright with *Senecio lobatus* and in places *Silene Virginica* fully a month later (June 5th) than in Warren county. *Carex Asa-Grayi* was common, and there were several shrubs of *Ilex decidua* near the river bank; also a single tree of the new *Cornus Priceae*, and *Prunus hortulana*. *Catalpa speciosa* is rather common. The beeches are being cleared and shipped to Evansville to be used in making wood alcohol.

In Barren county I heard several local names of plants that were new to me: Tangle-foot (white aster); seven-bark (*Hydrangea*) bark used for bruises, felons, etc.; devil's shoe-strings (*Pachysandra*); nigger-bush (*Ailanthus*); devil-in-the-bush (wild carrot); saw-brier (green-brier); Robin Runnel-head (*Galium*), the four-leaved species used for the bite of a spider, the six-leaved ones used for hives; sang-sign (*Botrychium*), it being believed by the country people that the apex of the leaf points to a "sang" (ginsing) plant.

A new lock (No. 5) on Green River at Glenmore, Edmonson county, has raised the water some sixteen or twenty feet higher, causing the smaller streams near to be navigable. On Bear Creek the sandstone cliffs are from thirty to ninety feet high, and here are many hemlocks, laurel, and other more northern plants. *Osmunda regalis*, not a common fern in this part of the country, grows here in abundance, with fronds four and five feet high. *Nuphar advena*, not before collected in this region, grows in the slow stream. *Trautvetteria palmata* is common on the cliffs, while poison hemlock grows in abundance along the lower banks. *Viola hastata* is rather common under beech trees and on decayed stumps.

Bowling Green, Kentucky.



"Bird Rock, Gulf of St. Lawrence. The areas appearing white or whitish are densely covered with birds."

A SCANTY FLORA.

By Henry E. Baum.

A PAUCITY of vegetation on circumscribed islands is no unusual thing, and, indeed, the occurrence of numerous forms of plant life on such islets is to be treated as an exception rather than as a rule. But when the sum total of vegetation is obtained after only three forms have been enumerated, we have a condition, to say the least, rather out of the ordinary. This large and verdant flora covers, in places, the red sandstone of Bird Rock, one of the most famous of the bird rookeries of our northern waters. Forming the extreme northern tip of the Magdalen Islands in the Gulf of St. Lawrence, this rock rises cliff-like from the sea, attaining occasionally a height of nearly two hundred feet, its top being practically inaccessible to all creatures without wings until the erection of a lighthonse on its summit by the Canadian government in 1869. Visitors now reach the top by means of a bucket and windlass. Two smaller rocks lie about a half-mile from Great Bird, the intervening shallow water testifying to their former connection with the main rock.

This rock has long been famous as a sea-bird rookery, and numerous records of the habits of its feathered citizens have been left by various scientists whose attention has been claimed by the excess of bird life, to the entire exclusion of the sparse and small flora. In the summer of 1900, however, Miss E. M. Leech, of Washington, spent some little time on the island, and made a careful collection of all the forms of plant life found growing on the summit. On examination these proved to consist of *Poa compressa* L., *Achillea borealis* Bong. (given in *Index Kewensis* as a synonym for *A. millefolium* L.), and *Plantago maritima* L., and as these specimens appear to be the first to be collected in this corner of the world, it seems desirable to record them.

To determine with any approximation of correctness the origin of this flora seems to be largely a matter of individual opinion. The fact of its presence, however, before the advent of man has been established by Professor A. S. Packard, who in 1854 reported that "but for a central patch of brown and green herbage," the island was turned white by the great numbers of female nesting gannets. Just 330 years before, Jacques Cartier, the St. Malo seaman, on discovering these rocks entered in his journal this choice bit, here given in the quaint English translation of Hakluyt:

"The Ilands were as full of birds, as any field or medow is of grasse, which there do make their nestes; and in the greatest of them there was a great and infinite number of those that wee call Margaulx,

that are white, and bigger than any geese, which were secured in one part. * * Wee named them the Ilands of Margaulx."

From this evidence it appears that this rookery was a great gannet colony, and since these birds are strictly maritime in their habits, they cannot be accused of conducting a seed and plant introduction business. So in this case it falls to the lot of wandering and storm-driven land birds to uphold the traditional and orthodox theory of seed transportation on bill and foot.

As before noted, the Bird Rocks are situated at the extreme northern tip of a thin chain of sandstone islands running from northeast to southwest in the Gulf of St. Lawrence. Assuming that the Rock had, at one time, a much larger area than at present, a probable explanation of the scanty flora seems to be that as the sandstone weathered, the retreating cliffs drove back the nesting birds and their accompanying guano, effectively stamping out plant life, and that high tide was probably reached about the time of Professor Packard's visit in 1864. This view seems to be strengthened by the fact that since the coming of man and the subsequent departure of the birds, vegetation has spread over all available parts of the Rock.

ORCHIDS IN CENTRAL PARK.

Continued.

By Pauline Kaufman.

For some weeks past dozens of the stately evergreen plants of *Phaius grandiflora* have beautified the orchid house. The leaves are from two to three feet long, broadly lanceolate; the flower spike is two to four feet in height, and bears twenty or more fragrant blooms. These seen from the outer side resemble a vigorous stalk of tuberoses, but viewed from the inner side the likeness ceases, the color changing to brownish-red; the convolute lip is white with dark crimson throat. This species is found from China to Australia, and is also known as *Bletia Tankervillei* and *Limodorum Tankervillei.*

Peristeria elata, called by the Spaniards Espiritu Santo, flower of the Holy Spirit, dove or Holy Ghost flower, is represented by but one plant. The waxy purity of the sweet-scented flower, which is one and a half inches across, is disturbed only by a few lilac specks on the base of the lip. Here too the spikes are erect, three feet or more in height, and rising from the base of pseudo bulbs. The flowering season continues for more than two months. It takes its name from the appearance of the column, which is thought to resemble a brooding dove.

The lanceolate, strongly ribbed leaves are six inches wide and over three feet long. Three to five of these leaves are borne by the pseudo bulbs, which are as large as swan's eggs. There are but five species of Peristeria known, all native to the Columbian Andes.

Often mistaken for *Cattleya triana* is its beautiful relative, *Laelia anceps*. True, the flowers are identical in coloring, and in having a column resembling a tiny white owl, but the former has terminal flowers, a fluted lip, and four pollen masses, while the latter is smaller in every way, bears blossoms on a raceme, and has eight pollen masses. Oblong-lanceolate leaves five to ten inches long arise from the pseudo-bulbs; keeled scales clothe the scape, which is a foot or two long; the lanceolate, acuminate sepals and the ovate, acuminate petals are rose-purple, with a greenish line on the back; the labellum inside of the lateral lobes is yellow with red marks, the under lobe oblong, acute, deep purple, white on the disk, with a thickened yellow keel terminating in the ridges. The outline of the lip has the form of the whip-poor-will. In Mexico and Guatemala, the homes of the Laelia tribe, they are found clinging to rocks and trees, exposed to the full rays of the tropical sun, and in the wet season to daily drenching rains. Some grow at elevations of from 7500 to 8500 feet.

Burmah sends as her representative *Calanthe Veitchii*, one of the tribe Vandeae. The derivation (*Kalos*, beautiful), speaks for itself. These are robust plants, producing large, broad, many ribbed palm-like leaves, usually evergreen; the flower spike often three feet long, with an immense quantity of bright rose-colored flowers with white throats; the pseudo-bulbs are flask-shaped.

We now come to a large plant of *Maxillaria nigrescens* (from maxillae, the jaws of an insect), referring to a resemblance in column and lip. This epiphytal plant has a group of large pseudo-bulbs bearing thick mottled leaves two inches broad and five long. The rhizome has bulb-like thicknesses the size of a hickory nut at one inch intervals, each producing a solitary grass-like leaf, and three flowers at the apex. These flowers are one inch across, dull maroon, with lip of pale yellow spotted with maroon, and moveably articulated to the column. Although I counted fifty-eight flower sprays of three flowers each, their deep maroon coloring does not attract the attention it would were they of a lighter and brighter hue.

From Trinidad we have *Gongora atropurpurea*, another of the Vandeae, and named after the Bishop of Cordova, Don Antonio Gongora. Not common in cultivation, it is of but little value, except to collectors. The cylindrical pseudo-bulbs have two lanceolate, subplicate leaves, one foot long; racemes two feet long, full of chocolate-colored spotted flowers, two inches in diameter; margina of sepals revolute;

petals small, twisted at the apex; labellum four-horned at base, the apex folded so as to form a vertical triangular plate. It flowers all summer. This plant is able to grow upright, but in its home, where vegetation is crowded, the flower spike is often pendulous, allowing the curious, grasshopper-like flowers to hang two feet and more below the branch.

Pseudo-bulbs are, as a general thing, reservoirs containing and retaining the moisture until required; but in the Gongora, as well as in many other of the South American orchids, they furnish a garrison for carniverous ants. There is a hollow pseudo-bulb with either a doorway ready made, or inducements offered to the ants to make one. The result is a perfectly dry, hollow chamber, which, on splitting, shows tiers of cells and galleries. The plants suffer greatly from the depredation of cockroaches, their chief enemy, and other pests. In the treaty between the plant and the ants, the latter, in return for a home, destroy the roaches and other insects that attack the leaves of the former. James Rodney in his "Guiana Forest" gives us this experience: While collecting orchids, he saw in a tree overhanging the water, a great clump of *Oncidium altissimum*, its graceful flower stem loaded with yellow blossoms hanging over in every direction. The plant was four feet thick, with panicles rising to a height of twelve feet. He sent one of his boatmen to bring it down. Taking a cutlass, the negro climbed up and began to chop at it, but immediately came down with a run, rubbing his hands and face and picking a swarm of ants from his clothes. Finally they secured the plant, after having been kept at bay for over half an hour, and threw it into the stream, pushing it under water with a long pole. As the roots became soaked, the creek was covered with black patches. Presently larger forms were seen swimming. These were cockroaches. Then came a centipede. It was supposed that the ants had not had time to demolish all of the insects.

Of *Dendrobium* there have been several varieties. At present *D. nobile* is out in full force. Its sheathing leaves are on an upright stem, about one inch apart and alternate, five inches long by one and a half wide. The buds are exactly like those of a lily, if we except a small spur projecting from the under side; flowers in pairs, two inches across; sepals and petals one and a half inches long, from white to deep heliotrope; lip formed like a small calla lily, the edge tipped with rose-purple, the deep heart of royal purple velvet; habit drooping; the stem bearing sixty flowers and over. Suckers or rootlets hang from various parts of the stem. *D. Wardianum* has dozens of white blossoms edged with rose-purple, with two eyes of gold in the throat.

In *D. fuscatum* the deep orange-yellow blooms are two inches across; sepals and petals oblong, somewhat incurved; lip shorter,

cucullate, with two crimson spots at the base, the margin fringed; racemes produced from the nodes of the leafless stems, drooping, four to seven inches long, many flowered; the rachis is zigzag; the ovate-lanceolate leaves five inches long; the stems from two to three feet long. These orchids are native in Khasya and Sikkim.

New York City.

THE DWARF MISTLETOE, RAZOUMOFSKYA PUSILLA.

By John Gifford.

THE Loranthaceae or Mistletoe Family is represented in the northeastern United States by only two species of mistletoe. One, *Razoumofskya pusilla*, is small, of local occurrence, and parasitic on the black spruce. The other, *Phoradendron flavescens*, is larger in size, and so abundant southward that it is collected and sold as an evergreen at Christmas time. It occurs on the black gum, red maple, and now and then on other trees. It is, however, not a serious pest, because it infests trees of little commercial value, and because it is kept in check, in fact in places has been almost exterminated by collectors of Christmas greens.

Razoumofskya pusilla, although it occurs only here and there, is a serious pest where it does occur. The affected spruces are usually yellow in appearance, and finally die of the depletion caused by the myriads of fleshy guests which cover the tender twigs.

C. F. Wheeler reports (in the First Report of the Upper Peninsula Experiment Station of Michigan) that it is common and very destructive to black spruces in upper Michigan. He states that the parasite is widely distributed in northern Michigan, and that in some swamps every spruce has been killed. He found also that this mistletoe was infested by a fungus parasite *Walkrothiella arceuthobii* Peck. *Razoumofskya pusilla* causes what are commonly called witches'-brooms on the limbs of the spruces. This term witches'-broom, or Hexenbesen in German, is a generic word for malformations of a broom-like nature.

On the 25th of April, 1901, Mr. William Howard, a student of the New York State College of Forestry, found this mistletoe in considerable quantity on the spruces around Panther Pond in the College tract in the Adirondacks. Although there was still some snow on the ground, the parasite was in full bloom. In Britton & Brown's Flora June is stated as the blooming time. It was in full bloom here in the mountains on the 25th of April. There were evidences that quite a number of spruces had been killed by it.

It appears from the descriptions that this plant is either very imperfectly known, or that the plants we have collected belong to another species. We have compared several descriptions, and have concluded that the former is the case. One says that his plant is "strictly dioecious," another that it is "usually dioecious," and another "mostly dioecious."

After long and diligent search, we found a few flowers which correspond to what are described and pictured as pistillate flowers. These were extremely few in comparison with the staminate flowers, which were present in many instances in such large numbers that they completely covered the twigs of large trees. The shape of the tree and general appearance of the foliage were often completely changed by its presence.

We were led to believe that the flower is sometimes at least regular, although the fact that the ovules and placenta are not at all or barely distinguishable in this order, rendered it difficult for us to determine (with the means at hand in camp), anything definite in this respect.

Since our first find, we have noticed that it is extremely abundant in the lowlands, and especially in the swamps around ponds and lakes in this vicinity. At any rate, should this pest spread, it might in time become as serious as in the upper peninsula of Michigan. Although small in size (about two and one-half inches in height), almost every twig of the infested trees was covered with it.

In Europe the true mistletoe, *Viscum album*, is injurious to a great varfety of trees. It is very destructive to fruit trees, silver fir and poplar. Other species of mistletoe are common in the West and in the South. Most of these are semiparasites. *Razoumofskya pusilla* appears to be much more of a parasite than any other mistletoe I have ever seen. Most mistletoes assimilate part of their food material, but in the case of *Razoumofskya pusilla* this is probably slight.

As the forest becomes better cared for, the significance of parasites and weeds increases. Let us hope at least that our mistletoes may never become as common and troublesome to both fruit and forest trees as is the mistletoe of Europe.

RARE PLANTS AND THEIR DISAPPEARANCE.

By L. H. Pammel.

A CORRESPONDENT at Corydon, Iowa, Mr. T. S. Whittaker, has sent me a specimen of *Veratrum Woodii*, which is one of the rarest plants in this State, with the following explanatory remarks:

"I send you by this mail under separate cover a specimen and stalk of a plant found growing wild on the prairies. The specimen I send is hardly a fair sample, as they usually grow to the height of from three to five feet, and the flowers are two or three times as large. It is a new plant to me, and I have failed to find any one who has ever seen one before. I found them first eight years ago this season growing in a 'sloo' on the prairie—extending up and down for about one-half mile were probably several hundred of the plants in sight. I gathered probably fifty of them and took them home and used them to decorate a church with—pulpit and organ. They created general interest, but no one had ever seen one before.

"I went back early in the fall to get some roots or seeds, but the 'sloo' had been burned over, and not a sign of them could be found. Every time I passed by there—summer or winter—I looked to see them—none there. Five years after (three years ago this summer) I found about two dozen of them in the same locality. They were in full bloom. I went out next day; took a couple of boxes in a buggy, and a spade, and dug up four of the plants, roots and all, dug up sod for about eight inches each side of the plants, then cut the sod away until they would fit in the boxes. I brought them home, set them out very carefully, and they did not wilt at all. They have come up every season since, but this is the first time they have blossomed, and only two have bloomed this season.

"The one I send you is about three feet high, and has only four branches to the flower, whereas they generally have ten or twelve, making the flower much larger than this. The two plants had six flower stems and flowers, two on one and four on the other, but the wind blew a tree on them and damaged part of them. I do not understand why they are no larger, unless perhaps on account of the extremely hot, dry weather. I have been out to where I got these, and found but one plant growing, and that not going to blossom. I took it up and brought it home.

"I presume this is a well-known plant to you, but I have lived here forty-three years, and these are the only ones I have seen, and I fail to find any one that has seen them before. I presume the birds dropped the seeds at first."

An old coal miner called my attention to a few of the plants that were found in the vicinity of Ottumwa, which he had growing in his yard. Of course it has been reported before in this State, but it certainly is not common.

This plant, together with a number of other rare plants, are disappearing, because of the drying up of sloughs or because of the overpasturing of the woodlot. *Cypripedium spectabile*, which a few years ago was common in northern Iowa is now quite rare. I know of one locality in the vicinity of Steamboat Rock where it still occurs in quantities, but in some localities in central Iowa, near Ames, it is disappearing, and along with it a few of the other rarer orchids. *Cypripedium pubescens* is also becoming quite rare here at Ames.

Recently I spent a few days collecting in the vicinity of La Crosse, and in one locality where I used to find plenty of *Sarracenia purpurea Drosera rotundifolia, Vaccinium macrocarpon, Habenaria psycodes, Calopogon pulchellus, Pogonia ophioglossoides, Sphagnum* sp., all have disappeared. *Menyanthes trifoliata* was pushing its way up through two feet of sand which had washed over the entire bog, and the bog is now being rapidly covered with *Salix longifolia*, while on its edges a few examples of *Salix lucida* still occur about the margin of the ponds. A long list of other plants locally disappearing in this section might also be given.

Ames, Iowa.

In the utilization of vegetable waste much of a surprising nature could be said. The seeds or stones of many fruits which would apparently seem useless have some economic value. In some parts of Egypt the date stones are boiled to soften them, and the camels and cattle are fed with them. They are calcined by the Chinese, and said to enter into the composition of their India ink. In Spain they are burnt and powdered for dentifrice, and vegetable ivory nuts are said to be applied for the same purpose. Some species of attalea nuts are burned in Brazil to blacken the raw India rubber. In India the seed or stone of the tamarind is sometimes prescribed in cases of dysentery as a tonic. In times of scarcity of food the natives eat them after roasting and soaking them for a few hours in water; the dark outer skin comes off, and they can then be cooked in various ways. From this seed an oil has also been obtained. The seed of the carob bean is ground up as food for cattle, and is used in Algeria, when roasted, as coffee. The use of some Mexican and other grasses for brushes is being rapidly developed. This material is as strong and flexible as bristles, and even the refuse from this is being used as stuffing for mattresses. The use of esparto grass for paper making is well known, and straw is largely used for the same purpose.—*The Washington Post.*

BRIEFER ARTICLES.

Everyone will appreciate the following graphic description of a "New Kind of Plant" which recently appeared in the columns of one of our leading metropolitan dailies:

An entirely new plant has been produced this summer by a man living in the suburbs of Chicago by means of a cross between the Scotch thistle and the ordinary greenhouse carnation. The flower is called the Centura and is purple and white. The stalk is smooth like that of the carnation, although stronger, and the leaf is similar to that of the thistle, but softer to the touch. The blossom, too, resembles the thistle, but is larger and more delicate and ornate. The plant blooms profusely and can be grown out of doors in all but the most severe weather. The plants in this man's gardens have now attained a height of two feet, and the only point in which they are inferior to either of the parent plants is in lack of perfume. The fragrance is faint, and slightly like that of the thistle.

Of course no reader of THE PLANT WORLD needs to be told that a carnation, belonging to the Pink Family, could not possibly be crossed with a plant belonging to the Compositae! It seems strange that newspapers do not employ upon their staffs specialists in the more important branches of science, who would see that this and similar absurdities were avoided.—C. L. Pollard, Washington, D. C.

Louisiana Woods at the Exposition.

Louisiana is rich in woods. The most important include the long and short leaved pine, water elm, pecan, the southern hickory, bitter pecan, hackberry, persimmon, red oak, water oak, sycamore, beech, willow, magnolia, thorn-locust, locust, red maple, box elder, red gum, black gum, tupelo gum, blue ash, white ash, bass wood, cedar ash, prickly ash, red haw, wild plum, cotton wood, yellow poplar, cypress, and the osage orange or bois d'arc. Bois d'arc is an exceedingly hard wood, bright orange in color, and is used extensively for paving blocks and fence posts. This wood is also used as a substitute for box wood in making roller skate wheels and rollers for pulleys. The cypress is used extensively for making posts and railroad ties, shingles, splints, and is bought largely by brewers for cooperage purposes. Cypress is more durable and lasting than cedar. Samples of all the woods men-

tioned are exhibited in the Forestry Building, at the Pan-American Exposition, the cross and the quarter sections being shown.

In the Agriculture Building at the Lousiana exhibit are shown twenty-four varieties of the pecan nut, ranging in size from the ordinary pecan, which we can buy in our markets, to a variety much larger than the ordinary pigeon's egg. Nearly all of these varieties are paper-shelled and can be easily broken with the hand. Turpentine, tar, tar oil, creosote, pyroligneous acid (wood vinegar), and wood alcohol are produced in Louisiana from fat or refuse pine. The broken and fallen wood of the pine which has lain waste in the forests is cut into foot billets, put into a copper still and heated, dry distillation being used. It first produces a gas, then the wood alcohol, creosote and turpentine which afterward separate, next tar oil and pyroligneous acid or wood vinegar, lastly tar. The charcoal derived from this dry heat process is of a superior grade, very solid and heavy, and burns much longer than the ordinary charcoal, giving a more intense heat. This is an entirely new process of distillation, the old process of tapping the tree being more expensive and taking more time.

Ramie Fibre.

Ramie fibre is displayed in the Louisiana State pavilion in the Agricultural Building at the Pan-American Exposition. Ramie was first introduced into the United States in 1855 from Japan. It will grow in any soil where the winters are not too severe. A temperature of 32 degrees, however, will kill it. The yield is from fifteen to twenty tons to the acre. The fibre is made from the inner bark, which is cut in strips four feet in length. Samuel B. Allison, of Galveston, Texas, invented and built the only machine for separating the inner from the outer bark. This machine was taken to Galveston by Mr. Allison, and was destroyed with its inventor during the disastrous storm of last fall, with all data regarding the specifications of the invention. The outer bark is of a resinous nature and in Japan is separated from the inner bark by hand, each stalk being handled separately and the two layers of bark separated with a knife. All the fibre now used in this country is procured from Japan, Louisiana having no machinery to produce the fibre, and labor being too expensive to compete with the cheap Japanese labor. Ramie can be made into cloths of various textures, and will take any dye. It has a silky appearance, and when interwoven with silk it is next to impossible to discover the ramie fibre. The sails of the Shamrock and Constitution and nearly all the racing yachts are made from ramie fibre. Ramie is the strongest and longest vegetable fibre known. A very superior grade of plush is made from it. The reed grows profusely throughout Louisiana without any cultivation whatever. It grows to the height of from four to eight feet, four foot reeds being the most desirable for use. It is of rapid growth, sometimes producing as many as five crops a year. The Louisiana commissioners say that State produces enough ramie to supply the United states, and are anxious to interest capital in the production of it.

GENERAL ITEMS.

The price of cow peas has risen from 85 cents to $2.00 per bushel during the past year. This is not due to a shortage in the crop, but is merely significant of the increased value of the cow pea as a forage plant and edible vegetable as well.

The herbarium of the late Dr. Charles Mohr, comprising about 18,000 mounted sheets, has been shipped to the National Museum, where it will be kept in separate cases. It consists principally of Alabama plants, and contains many types of species published by Dr. Mohr and other botanists.

The annual meeting of the Society of American Florists and Ornamental Horticulturalists was held at Buffalo from August 5th to 10th. Several hundred members were in attendance. The Society was organized in Cincinnati in 1886. Its object is the advancement of floriculture. Two years ago its title was lengthened to "Ornamental Horticulturalists," so that it has taken in park superintendents, private gardeners, and others interested in horticulture.

Australian papers say that the ramie plant, *Boehmeria nivea*, thrives so well in that part of the world that cultivators are about to try it for fibre for lace making purposes. That it will grow and produce delightful fibre, from which articles as fine as cambric can be produced, is well known in America, but no machinery for cleaning the fibre cheaply has been invented.—*Meehan's Monthly for June.*

Among the best ornamentals grown are the flowers belonging to the family Amarantaceae. Sometimes the individual flowers are not showy, but they are so brilliantly colored that, in the aggregate, they are very attractive. The prince's feather is an illustration. Another kind, known as the bachelor's button or globe amaranth, has its small flowers collected in round heads, and gives varieties of white, orange, and purple colors. In many cases the leaves are colored, and make as much show as would the gaudiest of flowers. But the greatest recommendation of the flowers of this family is that they seem to thrive all the better for hot and dry weather. Certainly they are among the best of plants to submit to these extreme conditions.—*Meehans' Monthly for August.*

NOTES ON CURRENT LITERATURE

The second number of *Muhlenbergia* has appeared. It contains a list of the fungi collected by Mr. Heller in Porto Rico during January and February, 1900. Professor F. S. Earle who worked over the material, describes several new species, mostly Pyrenomycetes. Following this, lists of two previous collections, one made by Schwanecke and the other by Sintenis are given, thus bringing together the published records of Porto Rican fungi where they can be easily consulted. These lists probably include but a small proportion of the species occurring there, as no very thorough collection of these plants has yet been made.

Mr. B. D. Gilbert has published an attractive pamphlet entitled "A Working List of North American Pteridophytes North of Mexico." It is a check-list for the use of students and collectors, with an appendix consisting of an extended commentary on various rare species, together with a number of new varieties, here printed for the first time. It is unfortunate that original descriptions should be inserted in a work of this kind, the title of which is cumbrous to cite; but even worse is the lack of system in indicating new names and combinations. The author is inclined to be very conservative in his treatment of species, reducing many which have found general acceptance elsewhere to varieties or even to mere forms.

The editor of *The American Botanist* has called our attention to a statement made in the course of our comments on the first issue of that journal published in THE PLANT WORLD of last month, and complains that it is misleading. We observed that "our contemporary also indulges in an editorial denunciation of the use of scientific names in popular writings." The editorial in question distinctly states that such names will be inserted in parentheses, and we did not intend our remark above quoted to convey a different impression. But the spirit of hostility toward the technical names is quite manifest, nevertheless, and is emphasized in the succeeding issue of the journal, where the editor

makes sarcastic allusions to "dry-as-dust" scientists. It is the fashion at the present time to decry the labors of the student in herbarium and laboratory, and to indulge in high-sounding panegyrics upon nature. There can be no popular knowledge of botany, or indeed of any science, however, without the firm groundwork which has been built up by generations of professionals, and which is being strengthened and enlarged by every individual research.

The current number of the *Journal of the New York Botanical Garden* contains an account of the re-discovery at a station in Georgia, by Mr. Roland M. Harper, of that exceedingly rare shrub of the heath family, known to botanists as *Elliottia*. This has been found in only a few localities, and was thought to have been completely exterminated.

Mr. Frederick V. Coville has recently published in the Proceedings of the Washington Academy of Sciences a most exhaustive and interesting account of the willows of Alaska, the species being illustrated by beautifully executed drawings. The cold northern bogs are a veritable paradise for the willows, and they vary in size from the diminutive and exceedingly rare little *Salix polaris*, to the large bush of the Sitka willow, *S. Sitchensis*.

EDITORIAL.

The subject of botanical nomenclature is not one of much popular interest, and we have always pursued a consistent course of barring from our columns all discussion of this subject from a technical standpoint, although our book reviewers, writing over their own initials or signatures, have naturally expressed their own personal convictions. We have, however, frequently explained the necessity for the use of scientific names, and have pointed out numerous cases, such as geranium, gladiolus, rhododendron, bouvardia and camellia, in which the scientific and popular appellations are one and the same. We believe no one will deny the great advantage of this condition of things, or will fail to admit that the practice should be extended as much as possible. Why not speak of an Erythronium rather than a "dog's-tooth-violet;" and a Polygala rather than a "white snakeroot," when the latter terms are absolutely meaningless, and convey no hints as to the characters or appearances of the plants? On the other hand, such familiar words as honeysuckle, buttercup and the like, are classics, and serve a distinct use in the language. They are part of the folk-lore of plants, and frequently, if not always, are self-explanatory.

We have had under consideration for some time the feasibility of publishing a list of genus names which should be adopted into popular usage, together with their present equivalents. An expression of views on this topic from our readers would be welcome.

BOOK REVIEWS.

YEARBOOK, U. S. DEPARTMENT OF AGRICULTURE, 1900. Government Printing Office.

This book, which has recently appeared, contains several articles of interest to botanists, nearly all of them being written, however, from a practical or economic standpoint. Besides the report of the Secretary and the Appendix, the volume contains thirty-one articles, being five more than were contained in the preceding volume. All but one of these articles were prepared by employees of the Department, and represent the result of original work, with the exception of those prepared in the Division of publications. The book is profusely illustrated, containing eighty-seven plates, nine of which are colored, and eighty-eight text figures. An excellent portrait of Mr. William Saunders, late Superintendent of Gardens and Grounds of the Department occupies the frontispiece. Of the various articles pertaining to botanical subjects the following may be mentioned as of particluar interest: Forest Extension in the Middle West, by William L. Hall, discussing the subject of tree planting on the western plains, where so much valuable work of this sort is being undertaken by the Bureau of Forestry; Fungus Diseases of Forest Trees, by Herman von Schrenk, describing the more common forms of fungi destructive to trees and the manner in which the trees become infected; Some Poisonous Plants of the Northern Stock Ranges, by V. K. Chesnut, describing and illustrating some of the most important plants which poison stock on the range, and the methods of treating stock which have been affected by them; and Our Native Pasture Plants, by F. Lamson-Scribner, containing an account of some of the most important native pasture grasses of the United States, with illustrations of most of them. A very important and useful feature of the work is the Appendix, which contains a large amount of useful information to agriculturalists. The value and usefulness of this publication of the Department is being increased each year, and it will be an important factor in promoting the development of scientific agriculture in this country. As the Secretary points out in his report, the Department of Agriculture differs from the other Departments of the government in that the appropriations made for its use may properly be regarded as investments rather than as expenses, since they yield direct returns by adding to the wealth of the country.—C. L. S.

PRACTICAL TEXT-BOOK OF PLANT PHYSIOLOGY. By Daniel Trembly MacDougal, Ph. D. Octavo, 338 pages, 159 illustrations. Longmans, Green & Co. New York, 1901.

Numerous text-books on general botany have lately appeared, but works devoted to physiology alone have not been so plentiful. In regard to the scope of this work, we may quote from the preface; "The chief purpose of the author is to present practical directions for the demonstration of the principal phenomena of the physiology of the plant and also details of experimental methods suitable for exact analysis and requisite in research work." The phases of physiological botany which have been attracting the greatest attention recently, such as the relation of plants to various stimuli, is given considerable space, the first seven chapters being devoted largely to the different phenomena of irritability. The second part of the book is devoted to a more general treatment of the various activities of the plant. In the preparation of chapters relating to special subjects, the author has had the assistance of specialists in those particular subjects, for which due credit is given in the preface.

As a text-book for use by instructors and teachers of physiological botany as well as for the laboratory student and investigator, the work will no doubt be found very helpful. The discussions of the various subjects are necessarily brief, and much attention is given to suggestions for experimental work. Citations of literature are frequent. For a fuller treatment of the subjects, the student should have at hand Pfeffer's excellent work, of which a translation recently appeared.

A very useful portion of the work, and one which will be appreciated by the instructor as well as the laboratory worker, is the appendix, which includes tables for the conversion of British into metric linear measures, also for the conversion of metric weights and measures to United States weights and measures, comparison of Fahrenheit and centigrade scales, besides the density of different substances at different temperatures, etc.; also some formulae and a table of osmotic values, the latter taken from Pfeffer's work.—C. L. S.

Avenue of Royal Palms, with Mango on the left.

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

Vol. IV. SEPTEMBER, 1901. No. 9.

NOTES ON TREES OF CUBA.

By Dr. Valery Havard, Surgeon, U. S. A.

HAVANA, on the northern shore of Cuba, is on the 23rd degree of latitude, and therefore just within the tropics. Santiago, on the southern shore, is on the 20th degree. The temperature of the island, in the shade, seldom rises above 95 degrees Fahrenheit, and hardly ever falls below 65 degrees at Santiago, or 55 degrees at Havana. So far as temperature is concerned, then, Cuba is a tropical island, but its rather limited and unevenly distributed rainfall prevents the vegetation, in spite of a generally fertile soil, from acquiring the luxuriance and density which we expect in such latitudes. The mean rainfall for Havana for the past 28 years, is 51.73 inches, which is less than that of the southern Atlantic States, while the evaporation due to a constantly high temperature is much more active. More than two-thirds of this amount falls from May to October, the winter and spring being often rainless for weeks, when crops and plantations are liable to suffer severely from continued drought.

Cuban vegetation may be said to occupy an intermediate position between that of the Gulf States and that of Venezuela and Guiana. Although varied and interesting, it does not equal the richness of the Blue Mountain one of Jamaica, nor that of the Central American States, and has but little to compare with the magnificence of equatorial forests.

Ornamental Trees.

Of all the trees of Cuba the first place belongs to the appropriately-named royal palm, *Oreodoxa regia*,* the most striking vegetable feature

*No attempt has been made to revise names and apply the laws of modern nomenclature.

of this and other Antilles. It is found in all parts of the island, a constant reminder to the northern visitor that he is indeed in a strange land. Generally 50 to 80 feet high, with straight trunk gracefully swelling at the middle, bearing at the top a huge tuft of feathery, spreading leaves, from among which springs the slender and sharp central shoot. It is probably the most useful native treee, but its value for ornamental purposes, in judicious combination with exogenous plants, can hardly be overestimated. It was formerly much used to line the avenues leading to planters' mansions, and the perspective effect of those long, straight rows of slender white shafts, topped with tufts of dark green plumes, is strikingly beautiful. The leaves are everywhere employed as thatch in the country, while their broad sheathing base is a popular substitute for boarding and sacking. The central shoot, like that of the Palmetto of the Southern States, furnishes an excellent salad, and is often cut off for that purpose, although the life of the tree is thereby sacrificed. The outside wood of the trunk is much used in rural districts, and the thick clusters of seeds are eaten with avidity by swine.*

Oreodoxa oleracea, distinguished from the preceding by the greater altitude of the even, unexpanded trunk, is also said to be in Cuba, but I doubt if these two species are really distinct.

The cocoanut (*Cocos nucifera*), is, of course, a very familiar object; being planted in groves in low rich ground, where, under favorable circumstances, it produces fruit all the year round.

The carojo (*Cocos crispa*), a native species with somewhat the aspect of the royal palm, is more ornamental than useful, although the small plum-like fruit is eatable and palatable.

Of the several species of the native palms, still much in need of study and definition, perhaps the most interesting is the miraguano or yarey (*Thrinax argentea*), which furnishes a very useful fibre. The trunk of the Palma Barrigona (*Colpothrinax Wrightii*), of Pinar del Rio, is abruptly expanded at the middle, and made to answer the purpose of barrel, box, hive, etc. In the Palma Barrigona de Sierra (*Gaussia princeps*), also common in Pinar del Rio, the large, hollow expansion is at the base of the trunk.

Of imported cultivated species, *Latania borbonica* is seen in all houses and patios, and occasionally in arborescent form in gardens. The fishtail palm (*Caryota urens*), found in many gardens, is strikingly effective when it reaches arboreal size, with semi-erect, spreading branches and long, drooping fruit clusters; but this climate is too dry for its best development.

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*[Compare in this connection Mr. William Palmer's article on "Cuban Uses of the Royal Palm," published in our June issue.—ED.]

As the American traveler lands at Havana and takes his first walk on the Prado or Parque Central, he is confronted by trees entirely distinct from anything he is familiar with. Doubtless he should expect a surprise, but it is difficult not to wonder at such a radical change. The two most common shade trees on the Prado are introduced figs, *Ficus religiosa*, the sacred tree of Hindostan, here called laurel de la India, its small, oval, shortly acuminate leaves having some resemblance to those of the classic laurel, and *Ficus Indica* or Alamo, with smooth, shining, long-acuminate leaves, looking very much like those of the Mexican alamo (*Populus monilifera*), the cottonwood of the southwestern States. The laurel fig is a beautiful, quick growing, round, spreading tree with dark green foliage, forming a dense shade all the year round. Its many aerial branchlets seldom reach the ground so as to be a nuisance. Unfortunately, like all figs, it is short-lived, and begins to lose its top foliage and become partly bald before it is thirty years old. Its roots creep along the surface to enormous distances, and enable it to grow and thrive on rocky ground with only a few inches of soil. This wandering habit of the snperficial roots, sometimes penetrating into buildings or into neighbors' yards, is very objectionable. The innumerable small pea-like fruit littering the ground is another objection. The reddish wood is tolerably hard and makes good fuel, but is of little value in carpentry. The Alamo fig is also a fine tree, of easy and rapid growth, but its lustrous foliage is not so dense and its shade not so dark.

The rubber tree (*Ficus elastica*), is often planted in gardens and parks; it is quite pretty when young, but loses its beauty as it grows to a medium sized tree with unsymmetrical limbs and scant foliage.

Of native species of *Ficus* there are ten or more, all with neat, lustrous foliage, some, like *F. suffocans*, very common and conspicuous parasites in forests, their long aerial roots growing into stems which, uniting, form in time a huge, misshapen hollow trunk enclosing the host tree in a tight embrace and destroying it.

One of the handsomest trees in Cuba, plentiful everywhere in streets, parks and gardens, is *Poinciana regia*, the flamboyant of the French and Spaniards, and fire tree of the English, native of Madagascar, thence carried to Martinique and later to all the other Antilles. Its dense, finely divided, fern-like foliage, as it gracefully undulates under the breeze, displaying various, harmoniously blended shades of green, or as seen sharply projected against the luminous blue of the Cuban sky, baffles description. During the summer it becomes a burning mass of fiery red blossoms, truly a "flamboyant" object. It has one serious objection; its leaves are deciduous, and in the winter the bare straggling limbs are redeemed from vulgarity only by the long

pods, machete-like, depending therefrom. Its near relative, *Poinciana pulcherrima*, is one of the commonest shrubs in cultivation.

Also a notable street tree, planted on account of its quick growth and hardiness, more common in Santiago than Havana, is the sandbox, (*Hura crepitans*), with thorny trunk, spreading limbs, heart-shaped leaf and tomato-like fruit. The latter, when dry, bursts with a loud snap, scattering its flat seed for thirty or forty yards (farther if the wind blows) round about.

Driving on the beautiful macadamized roads, or calzadas, which radiate from the capital into the country, we find various species of trees often forming for miles almost an uninterrupted arch of verdure. Unfortunately they are planted so close together that few reach their perfect development. Besides the flamboyant and the figs already described, these calzada trees are mostly the leguminous Egyptian Acacia, Algaroba, shell-podded Acacia, and the malvaceous majagua, all combining ornamental qualities with longevity and useful timber. The Guines calzada is perhaps the one richest in species and most interesting to the student of arboriculture.

Egyptian Acacia (*Acacia Lebbek*), a medium-sized spreading tree, with dense dark green foliage, conspicuous clusters of yellow stamens, and flat pods drying white.

Algaroba (*Calliandra Saman*), a magnificent, wide-spreading tree with thick, glossy foliage (pinnae and leaflets closing tight at night), handsome clusters of crimson stamens in April and May, and long, linear, pulpy pods. Apparently introduced, and not yet as common as it deserves to be.

Shell-podded Acacia (*Enterolobium cyclocarpum*) with much the habit and foliage of the flamboyant, but white flowers in small, round heads and flat pod incurved on the edge into a complete circle, the old black fruit often abundant in May when the tree is in blossom.

Majagua (*Paritium tiliaceum*), shrub or small tree, with showy yellow flowers, and *P. elatium*, a larger tree with light pink flowers changing to orange and red, probably only forms of the same species, with the aspect of an overgrown Hibiscus. It yields a hard, flexible, greenish-blue wood highly prized by cabinet-makers, and a tough, fibrous inner bark.

Also more or less ornamental, and seen on calzadas, in gardens and squares, the following may be mentioned:

Terminalia catappa, the East Indian almond tree, with ample leaves and palatable, almond-like fruit; its limbs often growing in two or three spreading, parasol-like whorls, producing a fine effect.

Coccoloba uvifera, seaside grape, or uva caleta of the Cubans, a pretty little tree, common on sandy shores and in cultivation, with

The Date Palm (*Phoenix dactylifera.*)

large, round, shining leaves and narrow bunches of black grapes; berries rather sour to the human palate, but greedily devoured by birds; wood reddish-brown, hard, compact and durable.

Bougainvillea spectabilis, a large nyctagineous shrub or short-stemmed tree, one of the commonest and brightest ornaments of gardens, with spreading, long, reclining branches forming an arbor, covered nearly all the year with a profusion of bell-shaped, purplish flowers, the apparent corolla being in reality formed of three large bracts enclosing three smaller inconspicuous flowers.

Lagerstroemia Indica, crape-myrtle, is not rare in gardens, but I have never seen it with the profuse inflorescence which makes it so attractive in the Southern States.

Pachira aquatica, Carolina, large native tree, of peculiar beauty when putting forth its large conspicuous balls of purplish stamens in the early summer on limbs still bare of foliage. *P. insignis*, with brick-red flowers appearing with the leaves, is occasionally cultivated.

Adansonia digitata, baobab, an African giant sometimes seen in Cuba; a specimen in Guanabacoa is seven or eight feet in diameter, and very attractive when in blossom, with cup-shaped flowers hanging from long pedicels; the hairy fruit is filled with farinaceous pulp which makes an agreeable, refreshing drink.

Melia Azederach, China tree, seldom more than a shrub or small tree, and not as common as it ought to be.

Castilloa elastica, American rubber tree, introduced from Mexico, thriving only near water.

Tecoma pentaphylla, good sized native tree with conspicuous pink flowers and digitate leaves. *T. serratifolia*, with bright yellow flowers has been sparingly introduced. The shrubby *T. stans* is very common all over the island, in dry, rocky places, much as in western Texas.

Thevetia neriifolia, cabalonga, handsome shrub or small tree, very common in cultivation, with linear leaves and saffron colored corolla. Its relatives, the oleander and jessamines are, of course, frequently seen.

Parkinsonia aculeata, Jerusalem thorn, so common in the Southwestern States is rare here, although of great merit for ornament.

Moringa pterygosperma, horse-radish tree, an elegant little tree naturalized from the Old World, with dissected foliage, white or lilac flowers, and winged seeds in long, ridged pods. A good oil may be obtained from the seeds, and the roots are said to be an excellent substitute for horse-radish.

Clusia rosea, a handsome native tree, the foliage and flowers suggesting those of Magnolia.

Eugenia Jambos, pomarosa or rose apple, introduced from the Old

World, becoming naturalized; with conspicuous white flowers and perfumed fruit. To the same family belongs the pomegranate, *Punica granatum*, cultivated for its pretty flowers and fruit in all warm countries.

Crescentia cujete, calabash of the English, and güira of the Cubans, small native tree common in cultivation, although neither handsome nor very useful, with spatulate leaves on the spreading undivided branches, and subglobose fruit the size of a large orange, its hard shell used as dipper, vase, and for ornament. *C. cucurbitina*, magüira, is another native but less common species, with oblong leaves and ovoid, brittle fruit. The wood of both species is white, fine-grained, tough and compact.

Eucalyptus. Only one species, *E. globosus*, the blue gum, has been tried in Cuba, and proved a failure; specimens are seen here and there but almost always undergrown, gnarled, and struggling for life. Other species are being planted: *E. resinifera*, *robusta*, *amygdalina*, *rostrata*, *cornuta*, etc., and the result will be watched with interest.

Pandanus utilis, screw pine, under several forms; small palm-like tree with ensiform crowded leaves arranged spirally on the woody stems.

Casuarina equisetifolia, Australian pine, tall pyramidal, upright tree, with the aspect of a pine, but having nothing else in common with conifers, the long, drooping, filiform, leafless branchlets giving it a rather dishevelled, mournful appearance, and therefore an appropriate ornament of cemeteries, where it takes the place of the cypress of other climes, being particularly conspicuous in Colon cemetery.

The North American visitor here sadly misses the coniferous evergreens. How many would thrive I cannot tell, but certainly some would repay a trial. With the exception of *Araucaria* and an occasional *Thuya* or *Cunninghamia*, none are to be seen.

(*To be continued.*)

DR. CHARLES MOHR.

By S. M. Tracy.

DR. Charles Mohr was born in Esslinger, Wurtemburg, Germany, on December 28, 1824, and died at Asheville, N. C., on July 17, 1901. In his death the country has lost one of its ablest botanists as well as one of its best men.

He was educated in the polytechnic school of Stuttgart, where he gave special attention to the study of the natural sciences, and on leaving the school in 1845, he was appointed botanist of an exploring expedition sent to investigate the natural resources of the country along the Surinam river in Dutch Guiana, South America. The climate there proved unfavorable to his health, and at the end of a year he was obliged to return to Germany. He soon secured employment as a chemist in a manufactory of chemicals at Brunn, in Moravia, where he remained until the stormy times of 1848 compelled the closing of the establishment with which he was connected. He then came to this country, reaching New York in October, 1848, and Cincinnati a few days later. He soon found employment in a chemical establishment there, but early the next spring he, like thousands of others, determined to seek his fortune in the newly discovered gold fields of California. He joined the "Cincinnati Gold Mining and Trading Co.," composed of about fifty of the best young men of the city, and in March began their long journey. The party outfitted at Independence, Missouri, and made rapid progress for a time, but lacking in experience, their fast travel was done at the expense of their teams, which were compelled to draw heavily loaded wagons across the open prairie day after day. On reaching Fort Laramie their horses were so broken down that a different mode of travel became a necessity. Mining tools, scientific instruments, apparatus for assaying, and everything excepting articles of the barest necessity were abandoned, pack-saddles were substituted for wagons, and the party divided itself into a number of independent squads. Fort Hall was reached early in July, when a still further reduction in baggage became necessary, and Dr. Mohr was compelled to abandon the collection of plants to which he had made almost daily additions since leaving the Missouri river. This was a loss which caused the deepest regret to the young collector, and one which can be appreciated only by those who have known by experience the labor, cost, and delight of collecting unrecognized material in an unknown region. It was a foot-sore, starved and ragged party of seven which finally reached Sacramento on August 12th, and began its search for gold. The party had fair success in mining, but the following spring a severe attack of mountain fever left Dr. Mohr so weak that he returned

to the East, coming *via* the Panama route. On reaching the Isthmus he was prostrated with Chagres fever, and during his sickness his pack mules were stolen, and with them disappeared the large botanical collection which he had made in California.

Soon after his return he established himself in the drug business at Louisville, Kentucky, where in 1852 he married Sophie Roemer, who survives him. In 1856 his health became such that he was obliged to find a more southern climate, and he spent the following year in the vicinity of Orizaba, Mexico, and the collections which he made at that time gave us almost the first botanical knowledge of that section, which has been visited by so many botanists during the last fifteen years. On his return to this country in 1867, he located in Mobile, where he established himself in the drug business, which he continued until his retirement in 1892, his firm being at that time the oldest drug firm in the city. At the outbreak of the civil war, he, together with Dr. F. J. F. Rohmer, established a laboratory for the preparation of medical supplies for the Confederate army.

In 1880 he made the investigation of the forests of the Gulf region for the 10th census. In 1883 he made collections of field and forest products of the Louisville and Nashville Railroad region for the New Orleans Exposition, and in doing that work made the finest collection of woods which had ever been brought together in the United States. In 1884 and 1885 he had charge of the Alabama exhibit at New Orleans. He was an honorary member of the Ohio and the Louisiana State Pharmaceutical Associations, a member of the American Pharmaceutical Association, a corresponding member of the Philadelphia Academy of Natural Sciences, of the Massachusetts Horticultural Society, of the Torrey Botanical Club, and a fellow of the American Association for the Advancement of Science. From the time of its organization he was an active and leading member of the American Forestry Congress, and attended its meetings more regularly than those of any other association. The degree of Ph. D. was conferred on him by the State University of Alabama.

After his retirement from active business in 1892, he was engaged for a number of years in a systematic investigation of the forest trees of the South for the Department of Agricultrure, and was busied more or less constantly with that work until 1900. During that time he gave special attention to the pines, and in 1896 published an exhaustive review of the "Timber Pines of the Southern United States," which was issued as Bulletin 13, of the Division of Forestry.

During all his long residence in Alabama, he found his rest and recreation in studying the flora of the State, storing away his collections and notes until he should be able to make them a valuable con-

Charles Mohr

This brief sketch of his life and work can give no real idea of Dr. Mohr to those who had not the good fortune to know him, but to those who shared his work and know how the love of nature warmed his heart and shone from his face, no words can add to the value and joy of his memory which will abide in the hearts of his friends.

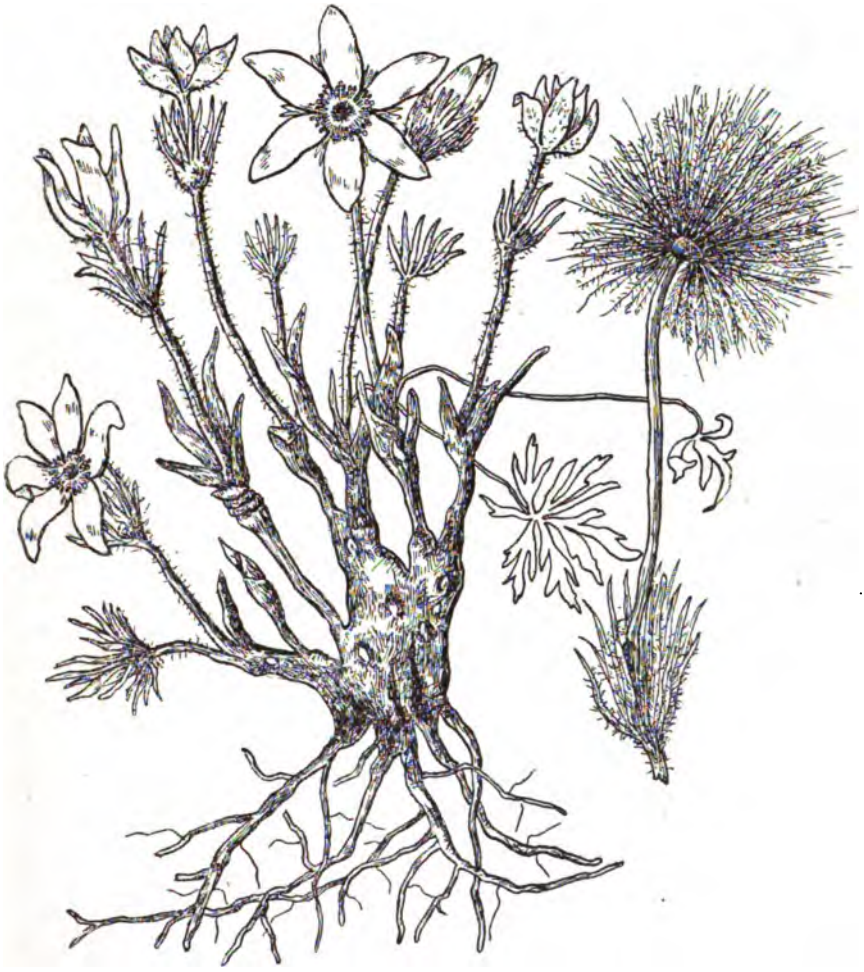
Biloxi, Mississippi.

THE PASQUE FLOWER.

By John M. Holzinger.

ONE of the most conspicuous objects on many of our western prairies, soon after the winter's snow is gone, is the pasque flower (*Pulsatilla Ludoviciana*) wrongly called crocus. They dot the drier gravelly fields, the flowers appearing at first very short-stemmed, peeping barely above the bunches of last year's dry leaves, later with elongated scapes, some singly, others in clumps of ten, twenty, and even more flowers. Herbarium specimens are inadequate for representing the curious underground development of this plant from year to year, and it is hoped that the accompanying study will be a satisfactory supplement to existing descriptions and figures. The left-hand figure represents a younger plant of a few years' growth, blooming the first or second time, with three leaf buds of different ages. As in *Caltha*, *Hepatica*, and many other perennial so-called "stemless" herbs, the underground buds of the pasque flower have for bud scales the bases of last year's leaves. These, to avoid multiplicity of detail, are mostly removed both in the smaller and in the larger central drawing. The latter represents about one-half of a clump which was estimated to be over twenty years old.

It appears, from a study of the several stages of bud growth, that a newly set bud has to function as a modest leaf-bud for at least three years before it can aspire to the reproductive functions, and add to its two or three leaves a flower. The stem, of which an enlarged cross-section is shown in the lower right-hand corner, never rises above ground. It becomes ultimately much ramified, appearing like a diminutive tree top, with its branches all submerged beneath the soil. Both root and stem tissues persist and accumulate from year to year. A striking difference is noted, in this respect, in different herbaceous plants, and by way of comparison the case of the marsh marigold only may be mentioned. At the blooming time of the latter plant, three generations of annual, or better biennial roots, may be observed—a set of decaying roots perpendicularly below those that are concerned in



The Pasque Flower (*Pulsatilla Ludoviciana.*)

the growth of the year, and a set of little "sprouting" roots just above that ring of active roots. It must be that this root arrangement compels the plant to *pull itself down* into the ground each succeeding year. The pasque flower, on the other hand, having a root system like trees and shrubs, can not thus tuck itself back, but eventually forms a slight elevation, the soil for which is supplied by ants and the wind.

The flower bud, at first surrounded by the silk covered fringes of the involucre, at the time of flowering is raised about an inch above it. But soon after flowering, this little inch long stem rapidly lengthens (eight inches or more), bearing aloft the head of hairy-tailed achenes, while the scape below the involucre does not lengthen at all after flowering. This development is moderately shown in the lower right-hand figure.

Winona, Minnesota.

It goes without saying that an annual plant must seed every year and go through the whole round of life safely, or it will be destroyed But a perennial, on the other hand, need seed and grow from seedlings perhaps only once in a generation. Mr. Clement Reid, in his unique and valuable work on the "Origin of the British Flora," makes the following interesting statements regarding a number of common British plants:

"The horse-chestnut grows well even as far north as Bergen in Norway, and in Britain it produces abundance of ripe seeds every year; but even in the south of England, as far as I am aware, it never succeeds in establishing itself from self-sown seeds. The common elm (*Ulmus campestris*), on the other hand, in England only produces perfect seed about once in forty years. Forty years is far less than the life time of an elm, and if the tree seeds once in a life time, and the seed germinates, the species may establish itself. Perfect seeds have not come under my observation, and I cannot therefore say whether this elm does grow from seedlings. It is generally said only to occur where planted. The butcher's broom (*Ruscus aculeatus*) is an instance of a plant which just manages to hold its own. After watching it fruiting for twelve years in succession, I find that as a rule only about one plant in fifty produces any fruit, and these are not only few in number, but, as they ripen in November, an early winter may prevent them ripening at all. The plant being perennial and hardy can survive, but it has evidently reached its northern limit in Britain. The sycamore, maritime pine and common rhododendron (*R. Ponticum*) are instances of plants undoubtedly introduced, which seed and grow freely from seedlings in the south of England."

Have any of our readers made observations on our plants along these lines?

BRIEFER ARTICLES.

What Shall We Do About It?

Some weeks ago the business management of this journal sent out mailing cards to all the former known subscribers to the *Asa Gray Bulletin*, with the view of ascertaining whether sufficient financial support to warrant the reprinting of Volume I. No. 1 of the *Bulletin* could be secured. Those receiving the cards were requested to sign a promise to pay twenty-five cents for such reprint, and to return the cards to the office of the Plant World Company. At the present time we are obliged to announce that the response has not been sufficient to justify the expense of making the plates.

The *Asa Gray Bulletin* was established as the organ of the Asa Gray Chapter of the Agassiz Association—a small but earnest body of amateur students who issued a small and unpretentious magazine. There was at first no thought of attempting to secure a subscription list beyond the Chapter membership, and hence the edition of this first number of the *Bulletin* was very limited, and was almost entirely distributed among the members. Later the growing interest in popular botany, and the need of some publication to represent this science in the primary and secondary schools caused the editors to materially enlarge the pages and scope of the *Bulletin*, which continued to grow and gain in importance until the time of its absorption by THE PLANT WORLD. Since that time the sales of back issues have been quite extensive, and most of the purchasers of these back volumes are naturally anxious to complete their sets of Volume I. The net proceeds from these sales are turned over to the families of the late editors of the *Bulletin*, Gilbert H. Hicks and Thomas A. Williams, so that our own interest in the matter is purely that of an agent. We do not therefore feel warranted in reprinting the number in question unless the amount is practically assured by subscription aside from the revenues now derived from the sale of the *Bulletin*. At the same time it must be admitted that Volume I, if complete, could probably be disposed of to much greater advantage, and the families of the deceased editors would reap greater benefits. We will accordingly hold the question open for a short time to await the effect of this public announcement to readers of THE PLANT WORLD, many of whom were former supporters of the

Bulletin; and we hope that sufficient pledges of financial support may be received to insure the re-publication. From the standpoint of the bibliophile alone the opportunity is an important one, since this number of the suspended journal can never be obtained hereafter, and will become rarer with each succeeding year.

In our advertising pages of this issue will be found a full price list of the *Bulletin*, with a synopsis of its leading contents during the eight years of its existence.—Publishers of THE PLANT WORLD.

Australian Forests.

The importance of forest conservation is beginning to receive increased attention in Australia, where the revenue from the state forests remains considerably below that obtained in countries possessing far less wealth of timber. In New South Wales, according to Mr. Coghlan, forests, contrary to the popular idea in Europe and America, extend over almost the whole area of the State, excepting portions of the Monaro, the Lachlan, the Murrumbidgee districts, and the trans-Darling region, where extensive treeless plains occur, clothed with salt-bush, scrub, or species of natural grasses. The country covered by timber may be divided into three classes—open, brush, and scrub forests. The first of these cover the greater portion of the surface of the State, and are found in every formation. The trees met with are chiefly species of Eucalyptus, Angophora, and other genera of the family Myrtaceae. The prevalence of the eucalypti, and the large extent covered by the forests, give the country a rather monotonous aspect; but the park-like appearance of the open forests, and the beauty of the many flowering shrubs, win admiration in spite of the sameness of the trees, while even the dull, greyish-blue of the foliage of the gum tree, when relieved by the yellow blossoms of the wattle, including the graceful myall, or the beautiful and shapely kurrajong, is not without its attractiveness. The trees, are, for the most part, straight and cylindrical in the trunk, and when full grown, their first branch is a considerable height from the ground. The roots of the eucalyptus often lie at no great distance from the surface soil, an adaptation of nature to the peculiar climatic conditions of the country. The finest specimens of most of the timber trees, those yielding the most valuable timber, are found on ridges and hillsides, in places frequently too rough and stony for cultivation. This circumstance is in many ways fortunate for the State. In the course of settlement, when the rich plains are denuded of their trees, and when scarcity will make timber more appreciated than it is at present, land not adapted for agricultural settlement will still be available for the cultivation of the finest trees. Among the many trees of commercial

value, immense specimens of red gum and apple trees, on the northern river flats, mark the course of the stream; while on the ridges and mountain sides, other species predominate, such as the white or she-ironbark, narrow-leaved ironbark, broad-leaved ironbark, mugga or red ironbark, blackbutt, white mahogany, tallow-wood, spotted gum, grey box, red mahogany, grey gum, forest red gum, and Sydney blue gum. Neither must turpentine, one of the most beautiful trees of the State, nor the brush box of the northern rivers, a tree much in request for ornamental purposes, be forgotten. The brush forests cover a large extent of country along the coast. The trees found in them differ entirely from those of the open forests, and there is no lack of variety either in the character of the trees or the color of their foliage. Tall, graceful fern trees, sometimes attaining a height of sixty feet, beautiful species of palms, cabbage trees, and Moreton Bay figs of enormous proportions are prominent features of the northern brushes, though these are perhaps more ornamental than useful. There are, however, found in the brush forests timber trees of the greatest value. Among these may be mentioned the red cedar and its close allies, rosewood and red bean, three of the most valuable woods of the State; beech, a valuable, little shrinking wood, now getting scarce; colonial or hoop pine, a soft wood, not of the best quality; brown or berry pine, which resists white ants and other timber pests in a marked degree. Besides the timbers mentioned, there are worthy of note the silky oak, the red silky oak or beefwood, tulipwood, flindosa or cudgerie, native teak, blueberry ash, maiden's blush, red ash, corkwood, and many others too numerous to mention. The character of the vegetation of the brush forests alters considerably according to the latitude. The trees of the genera *Araucaria* and *Flindersia*, as well as cedar and its allies, find a home chiefly in the northern parts of the State, while many of the trees growing in the south have no representatives in the northern forests. The soil of the brush lands is wonderfully fertile, consisting as it does of decomposed volcanic rocks, enriched by the accumulation of decayed vegetable matter, and when cleared it yields an abundant return. The scrub forests are found in the poor soils, principally in the Lachlan and Darling districts. The chief genera represented are the pines, and multitudinous species of acacia and eucalyptus; but although some of the trees are of great beauty, they have little commercial value. The most uninviting portion of the State is covered with scrub, and the mallee districts, clothed as they are with stunted timber—species of eucalyptus—impress the traveler more unfavorably than would even a barren waste. The varying character of the forest country in New South Wales readily explains the conflicting accounts of visitors, each of whom simply describes what he saw, accepting it as representing the whole.—John Plummer, in *Forest Leaves* for August, 1901.

GENERAL ITEMS.

The *Journal of the New York Botanical Garden* for August contains a very interesting and instructive article on the nature and uses of the peanut. This was delivered as a lecture at the Garden last May, but the author is not stated. A full account of the peculiar method by which the plant ripens its seeds is given, followed by a discussion of the food value of peanuts and their other economic uses.

In nearly every old-fashioned garden in the north of Europe, a plant of wormwood is regarded as essential. The leaves dried, reduced to powder, mixed with bread into a pill, is an infallible remedy as a vermifuge. It is also called "old man," but why is not on record. Singularly, on the Pacific, *Artemisia Californica* is also called "old man." The Indians believe they can fortell the weather. If before the rainy season comes, the roots are not more than six inches long, there will be plenty of rain—if over a foot, there will be a dry season. It is supposed that the plant knows beforehand that there will be little rain, and so sends its roots deep, in order to prepare for the drought at the surface.—*Meehans' Monthly for August.*

The John Day Basin, in which I spent practically the entire month of July just passed, is situated in north-central Oregon, where it occupies a position between the north and south ranges of the Blue Mountains. It is drained by the John Day river and its numerous branches and tributaries, and is from one to two hundred miles from the Columbia river. The cultivation of the region is confined to very narrow strips along the river bottoms, and is dependent entirely on irrigation. The principal crop is alfalfa. I was struck by the number and homelike appearance of certain common weeds. Thus the mullein (*Verbascum Thapsus*) covered every hillside, the stalks often eight feet in height. Sweet clover is there regarded as a pernicious weed. It lines every irrigation ditch, and as it seeds freely, is distributed over all the ground reached by the water. Yarrow is also an abundant weed.—F. H. K.

NOTES ON CURRENT LITERATURE

The Broom-Grasses of Wyoming is the subject of a Bulletin (No 46, Wyoming Agric. Exper. Station) by Professor Aven Nelson.

In an interesting paper recently published in the Proceedings of the Iowa Academy of Sciences, Mr. Carleton R. Ball enumerates the willows of the State of Iowa. He describes fourteen species.

In the Proceedings of the Iowa Academy of Sciences (Vol. VII.), Professor L. H. Pammel describes and figures a remarkable quince fruit which produced over one hundred seeds, contained in five cells. Ordinarily the cells are normally three to five, and the seeds much fewer in number.

Bean diseases and their Remedies is the subject of a valuable Bulletin by Dr. B. D. Halsted (N. J. Agric. Exper. Station, No. 151), in which he describes the fungus diseases that have become troublesome to the grower of the ordinary garden sorts. Each form is fully illustrated, and the best means of combating it given.

In my notes on Kentucky plants in your last issue, I should have said that *Styrax pulverulenta* and not *S. Americana* was found in Ohio county, and that I also found *Cornus stricta*, these both out of their usual range. I also find *Hicoria Carolinae-septentrionalis* in this county. This extends its range considerably to the northwest.—Sadie F. Price, Bowling Green, Kentucky.

A few years ago the supposed number of North American species of *Antennaria* could be counted on one's fingers, but once attention was turned to them, each form was found to be an aggregate, with the result that within the past five years some fifty species have been characterized. In a recent paper Mr. Elias Nelson (Proceedings U. S. National Museum, Vol. XXIII. pp. 697-713) has presented a timely revision of

the species allied to *Antennaria alpina* and *A. dioica* occurring in northern and western North America. He enumerates 35 species and 7 subspecies, of which number 4 are described as new.

The genus *Nelumbo* exhibits such a variety of peculiar and seemingly inconsistent characters, that its systematic position has been much in dispute. In anatomy the plant seems to conform more nearly to the type of the monocotyledons, while on the other hand the large peltate leaves with their reticulate venation are perhaps more suggestive of the dicotyledons. The flower might easily belong to one of either class. With the view of ascertaining the bearing of the development of the embryo on the question of systematic position, H. L. Lyon has recently studied (Minnesota Botanical Studies) the fruit. He concludes that both in its anatomy and embryology it conforms to the type of the monocotyledons, and should be classified among them in the series Helobiae.

EDITORIAL.

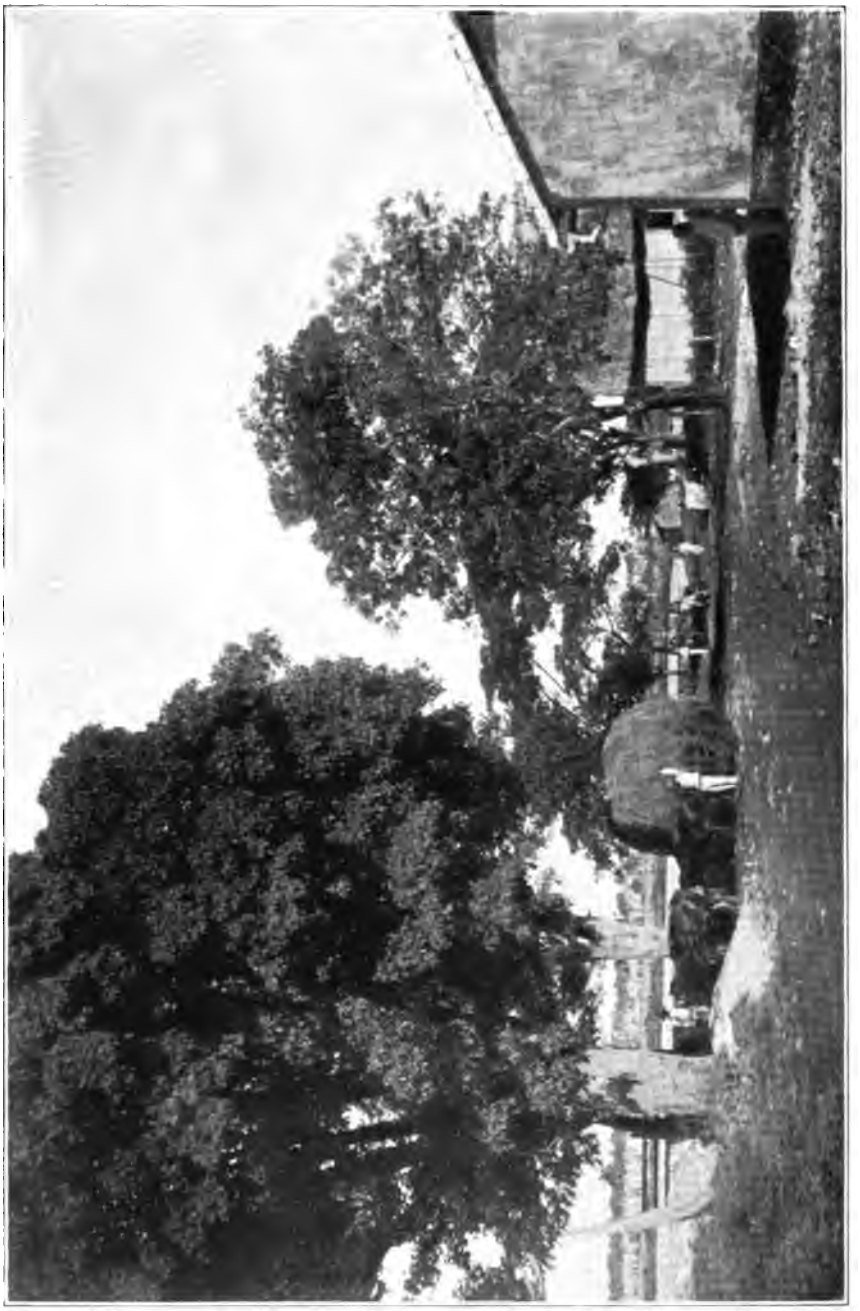
It has not usually been found necessary to protect plants against botanists, for no true plant-lover will uproot the last specimens of a rare species, no matter how much he may desire them for his herbarium. The perpetuation of a plant in its original habitat is of far more importance than the possession of the last-known dried specimen of it. But with some amateurs and the pestiferous "summer visitor" the case is far different, and well may concealment be resorted to to save the showy, rare or otherwise interesting plants from vandal hands. The passing of the climbing fern from many of its New England haunts, is still too fresh in mind to permit of experiment. It is, therefore, with feelings of profound astonishment that we open the pages of a recent issue of a prominent botanical journal, and find therein the advertisement of a well-known railroad under the caption: "If you are looking for the best botanizing in the Eastern States you should save up pennies enough to visit The * * *"! Then follows a two page list of rare or interesting plants, with explicit directions how to reach them—*via* this railroad! Of course this advertisement, or the essential part of it, was written by a botanist (*sic*), and evidently a thoroughly competent one, who has sold his birthright for a mess of pottage, possibly in the form of an annual pass over this railroad: The certain effect of turning loose a horde of more or less irresponsible people among "rare" plants is shown conclusively in the *same issue* of this journal, and in the *same State!* Following is the wail of despair: "*Camptosorus rhizophyllus.* In one locality only, growing over a ledge, near * . When I last visited the place in 1894, the plants were being decimated by local amateur collectors." "Twelve years ago *Adiantum pedatum* was very common all about this region; but the plant has been so much sought after by summer visitors that it is practically extinct in all accessible localities."

Need anything further be said?

BOOK REVIEWS.

DISEASE IN PLANTS. By H. Marshall Ward, Sc. D., F. R. S. 309 pages. Macmillan & Co., New York and London, 1901.

In the above work we have a fresh and interesting general discussion of this subject. The book is one of a set termed "Nature Series." In the treatment of the subject the author has departed somewhat from the usual method of presentation. The book is divided into two parts, the first of which, "Some Factors," is scarcely covered by the title of the work. This consists of eight chapters devoted to a concise and very readable account of the present status of our knowledge of the principal facts of plant physiology, pointing out the great advances which have recently been made in our knowledge of this subject. Part 2, "Disease in Plants," includes chapters IX to XXX. In the first chapter of this part are given brief but comprehensive discussions of phytopathology and the most important steps in its developments with its divisions. In the next chapter we have a discussion of health and disease, in which is pointed out the difficulty of giving an exact definition of disease and of deciding when disease is present in a plant. In the next chapter on "Causes of Disease," attention is called to the great number of factors which influence the plant, and the difficulty of deciding to which the disease is attributable. The living and non-living environments with their complex interactions make it very difficult to determine the exact cause of any trouble. The next chapter is given to a discussion of the living environment in its relation to plant diseases. Here brief discussions are given of injuries by man and other animals, and also those which are either directly or indirectly caused by plants. Next follow chapters on the nature of disease, spreading of disease and epidemics, the factors of an epidemic, remedial measures, variation and disease, symptoms of disease, artificial wounds, excrescences, exudations and rotting, necrotic diseases, monstrosities and malformations, and finally one on life and death. The book is intended for the use of practical agriculturalists and the gardeners, and treats of the various subjects in a brief and non-technical manner, but at the same time presenting the essential facts regarding the subject as they are understood at present. The book should be carefully read by all students taking up work in phytopathology. The author's scientific standing as a phytopathologist is sufficient guarantee for the accuracy of the work, which should be ead by all who are interested in this subject.—C. L. S.



Mamoncillo (*Melicocca bijuga*).

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

Vol. IV. OCTOBER, 1901. No. 10.

NOTES ON TREES OF CUBA.

By Dr. Valery Havard, Surgeon, U. S. A.

(*Concluded from page 166.*)

Fruit Trees.

TROPICAL fruits, as a very general rule, contain much more sugar than northern fruits, and the period during which they are palatable and wholesome, that is, from the time they are fully ripe to that when they begin to ferment and decay, is relatively short; they appear also to be more readily affected by weather, soil and culture, hence great variations in their flavor and quality. Americans seldom take to them kindly at first, but after some cultivation of taste, often become fond of them. The various species of *Citrus* thrive in Cuba, and yield prime fruit. The fine flavor of the uncultivated orange shows how easily it would be to develop superior grades by selection and cultivation. So far, the attention of all land owners and planters has been absorbed by sugar cane and tobacco, so that fruits and vegetables have been neglected to an amazing degree, but it is very probable that in the near future the bulk of the best oranges and lemons in the market of the United States will come from Cuba and Porto Rico.

Of all fruit trees in Cuba, the Mango (*Mangifera Indica*) stands pre-eminent by the size and beauty of the tree and abundance and quality of the fruit. It must have been imported from India at an early day, for groves of it are found in all parts of the island, hardier and apparently more at home than many native trees, thriving in all kinds of soils and situations. When fully developed, its noble stature, strong, spreading limbs, ample, thick and glossy evergreen foliage, thick clusters of white flowers in winter, and abundant drupes hanging

from long pedicels in summer, make it one of the handsomest trees in the world. The fruit is about the size of an apple or pear, but of unique and characteristic shape, which might be described as a flattened cone with oblique base, and rounded, slightly incurved point. There are dozens of varieties of mangoes, some entirely delicious, others more or less stringy and resinous, but in all of them the bulk of the stone is a sore disappointment. The future Cuban cultivator who first obtains a notable reduction of stone and corresponding increase of pulp, will do as much for his country as the patriot who first establishes a well ordered government. The mango is perfectly wholesome, in spite of the injurious remarks levelled at it by the ignorant and the prejudiced. In the first days of the invasion of Cuba by American troops, when rations were scant, the writer has seen whole regiments feeding on mangoes, and never heard of a case of sickness resulting therefrom.

To the same family (Anacardiaceae) belongs the cashew, or marañon of the Cubans (*Anacardium occidentale*), a small, pretty tree with large, leathery, rounded leaves and the peculiar, often-described kidney-shaped fruit resting upon the much larger, pyriform pedicel. The roasted nut is very fine, somewhat like peanut, but of much more delicate flavor. As to the fleshy pedicel, it is so pungently astringent that no one with normal taste ever eats it a second time.

Here also belong the hog plums (*Spondias lutea* and *S. purpurea*), the jobo and ciruela of the Cubans, both (especially the latter) cultivated, the plum-like fruit with large ridged stone, thick skin and scant but pleasantly acidulated pulp, much relished by the natives.

The one tropical or semi-tropical fruit which northern visitors like from the very first and remain fond of, a delicious and most wholesome fruit-vegetable is that of *Persea gratissima*, the aguacate, from which Indian-Spanish name are derived the alligator pear of the English and the avocatier of the French. It is a rather tall tree of upright habit, with elliptical, shining leaves a half-foot long. The pear-shaped fruit begins to ripen in April and lasts all summer; it consists of a large stone, thick greenish-yellow oleaginous pulp and hard skin. The pulp is mostly eaten as a salad, but is very palatable in any shape.

The Anonaceae play an important part in the fruit supply of the Cuban market, the four following species, small, uninteresting trees, being commonly cultivated. The first two are native, the last two introduced.

Anona squamosa, sweet sop of the English, anon of the Cubans; common in fields, its fruit resembling a small pineapple and the best of the genus, being much consumed raw and in ices.

A. muricata, sour sop, the guanabana of the Cubans, has a much

larger fruit, covered with soft, curved prickles, looking somewhat like a dark green porcupine; the white pulp makes delicious drinks and ices.

A. reticulata, custard apple, the mamon of the Cubans, is hard to distinguish by the foliage from *A. cherimolia*, the cherimoya of Spaniard and English. The fruit of the former has an areolated, reticulated surface, and ripens in March and April; that of the latter is minutely tuberculate, and ripens much later. The taste of both is described as "a slight, agreeable acidity mingled with a luscious sweetness," but is seldom appreciated by the visiting stranger.

Next to Anonaceae, the Sapotaceae contribute the greatest number of trees with edible fruit. The following three, whose fruits are commonly kept in Cuban markets, deserve mention:

Chrysophyllum cainito, star apple or caimito, a medium-sized, shapely tree with oval to oblong leaves, lustrous above, golden pubescent beneath, and round fruit, eight to ten-celled, the reddish pulp of a very pleasant sweetish-acidulous flavor.

Lucuma mammosa, mamey colorado or mamey sapote (called Sapote in Santiago), the mammee sapota of the English. In common cultivation; not unfrequently fifty to sixty feet high, the obovate-oblong leaves with long wedge-shaped base; fruit ovoid, four to five inches long, with hard, rough, brownish skin, and one to three large, shining, black seeds; the reddish, soft, homogeneous pulp is not unlike rich custard.

Achras sapota, sapote of the Cubans (called nispero in Santiago) and sapodilla of the English. A smaller tree than the preceding, with oblong-lanceolate, wrinkled leaves, crowded at the end of the branches; the globose or ovoid fruit one to two inches in diameter, with brownish, thin skin, and eight to ten seeds in a yellowish pulp. Eaten as it becomes soft, in the incipient stage of decay, it is very palatable, being more acidulous than the preceding, and preferred by many.

The mamey de Santo Domingo (*Mammea Americana*), of the Clusiaceae, not to be confounded with the mamey colorado, is a large, beautiful tree, fifty to eighty feet high, with obovate-oblong, lustrous leaves; the globose, russet fruit, three to six inches in diameter, contains one to four seeds in a yellowish, granular pulp, and is eaten raw or cooked, but not highly esteemed in either state. The reddish wood is very hard and durable.

The Rosaceae, which in higher latitudes produce the bulk of our best fruits, here do not furnish a single fruit of any value. *Prunus occidentalis* is described as a pretty tree, with hard, compact wood, but its cherry is not used except perhaps to impart a flavor of hydrocyanic acid to certain liquors. The only tree of that family cultivated to any

extent, sometimes large and handsome, is the Japanese nispero or medlar, loquat (*Eriobotrya Japonica*), whose yellow, marble-shaped fruit, produced in abundant clusters, has a really delicious acidulous flavor.

Allied to the rose family is the native icaco (*Chrysobalanus Icaco*), seldom more than a large shrub, with white flowers in cymes and plum-like, ribbed fruit, mostly used in preserves and confections.

One of the most common and popular fruits in Cuba is that from the mamoncilla (*Melicocca bijuga*), a large fine tree with characteristic leaf of four leaflets. The perfectly round, green fruit is very astringent until fully ripe in July, when it becomes deliciously flavored, and is much consumed in spite of the large stone and rather scant pulp.

To the same family belongs *Blighia sapida*, the akee of the English and arbol del seso of the Spaniards, with strikingly ornamental scarlet fruit, containing an eatable white arillus. This tree, so commonly cultivated in Jamaica and other Antilles, is very rarely seen in Cuba.

The most profitable of all native fruits is that of the guava or guayava of tke Spaniards (*Psidium Guajava*), which grows wild everywhere as a shrub or small tree, with stiff, strongly-veined, oblong leaves and globose or obovate, many-seeded berries, which, besides being made into the well-known paste and jelly, are also very good raw.

We have already seen that the Cubans have their plums or ciruelas, species of *Spondias;* they also have their cherries or cerezos (*Malpighia glabra* and *M. punicifolia*), allied, if not identical species, with ovate to elliptical, small, entire leaves, reddish, umbellate flowers and red drupe of the exact shape and color of the cherry, but a poor substitute for it. This fruit is rather too acid to be palatable, but makes an excellent jelly; instead of a stone, it contains three leathery, winged pyrenes. A remarkable feature of these cerezos is their prolificacy, producing, in the summer, new crops of cherries every six weeks, so that they are always in blossom or fruit. I have not yet seen a single specimen of *Prunus Cerasus* in Cuba.

A hardy, quaint but graceful tree, cultivated in all gardens, is the papaw or papaya (*Carica Papaya*), with simple unbranched trunk, palmate leaves with pinnatifid lobes, and yellowish, ovoid fruit, ranging in size from an orange to a shaddock and clinging to the trunk. This fruit has a rich, sweetish, not unpleasant taste, and is said to have some of the digestive power so remarkable in the milky juice of the plant.

Another medicinal fruit is the pod of *Tamarindus Indicus*, a large, handsome, spreading tree, abundantly naturalized in Cuba. Its habit of branching near the ground makes it undesirable for roadsides, but can be grouped together into beautiful groves. The pulp of the fruit, although always acid, is quite palatable when fully ripe.

Commonly cultivated on the hills, in the province of Santiago, is

the cacao tree (*Theobroma Cacoa*), and under the shelter of its foliage, the shrubby *Coffea Arabica*. This industry, brought from Hayti and San Domingo by emigrating Frenchmen early in the last century, and once prosperous and lucrative, is now falling into decay, although the climate, soil and altitude are suitable and the quality of both fruits excellent.

The breadfruit or arbol del pan (*Artocarpus incisa*), is a tall tree seen in many gardens, with huge, roundish, pinnatifid leaves, cultivated more for ornament than use, although the excellent flavor of its large, farinaceous iruit, eaten either baked or boiled, will be a revelation to the uninitiated.

Havana, Cuba.

SOME INTERESTING CASES OF PLANT DISTRIBUTION.

By John M. Holzinger.

IT is now twelve years since the writer found *Claytonia Chamissoi* more than a thousand miles out of its range, discovering a colony of this species at the foot of Queen's Bluff in southeastern Minnesota. It ranges throughout the Rocky Mountain system of North America, from New Mexico to Alaska, and occurs mostly at altitudes varying from 6000 to 9000 feet above sea level, apparently rarely descending below 5000 feet, as is attested by a long series of herbarium specimens from upward of fifty localities in the National Herbarium, a complete list of which was furnished by the courtesy of Mr. F. V. Coville. Not a single station is known outside of that range in the intervening belt of a thousand miles and more of the Great Plains, except the little patch at the foot of Queen's Bluff.

To this single flowering plant have been added in the past ten years of field work, six similar cases of distribution of mosses. It is necessary to briefly take them up in order.

1. *Coscinodon Raui* is a common moss on boulders of calcareous sand rock near the tops of bluffs about Winona, some 500 feet above the Mississippi, or 1300 feet above sea level. Outside of this area it is so far known only from Colorado, where it rarely occurs at an altitude of less than 5000 feet.

2. *Coscinodon Wrightii* occurs in similar situations, both near Winona and in Colorado. It is, however, known also from Kansas, Texas, and New Mexico, but not from points intermediate.

3. *Ditrichum flexicaule brevifolium* (*D. elatum* Kindb.) occurs at the same altitude on our bluffs as the Coscinodons, but grows usually in

loose sand on north exposures, not attached to rocks. It is very abundant here but always sterile. Being a reduced form of a rather variable species, considerable care has been taken to determine its exact relationship (see *The Bryologist*, July, 1901). It appears that this particular form occurs also in England and in the Canadian Rocky Mountains.

4. *Grimmia teretinervis* occurs abundantly near Winona in the same dry situations as do the Coscinodons. It is not known elsewhere in North America, and we have to go to the alpine regions of southern Europe before we find it again—to Tirol, Kärnthen, Steiermark. From both regions it is known only sterile.

5. *Webera proligera* occurs abundantly but always sterile at several stations within twenty miles of Winona. It was recently found also in Massachusetts, but is at the present writing not known from any other stations in North America.* In Europe it is found in the alpine regions, ranging through Steiermark, Kärnthen and Tirol. It also occurs in England and Norway, where it occasionally fruits.

6. *Weisia Wimmeriana* may also be cited here. It was first found near Taylor's Falls, Minn., in the valley of the St. Croix river, and was recognized as this species by my friend M. Jules Cardot. Plants since collected near the mouth of the Minnesota river, near the Lamoille cave, fifteen miles below Winona, and in the valley of Trempealeau river in Wisconsin, are identical with the Taylor's Falls plant. In Europe this plant is considered rare; according to Limpricht (see *Laubmoose* I: 258), a true alpine moss, it occurs from the Pyrenees through the Alps to Steiermark, "descending rarely below 3300 feet," and yet none of the American stations so far established for it are over 900 feet above sea level!

We have thus seven plants, occurring from one thousand to five thousand miles or more apart from their natural range, in a limited area in the upper Mississippi basin, at an elevation of 2500 to 5000 feet less than these same plants require in their wider range. Four of these have come from the Rocky mountains, the remaining three from Europe. And it is a matter of especial interest, under the circumstances, that while the latter have a considerable alpine range, they were *all three* collected by one and the same European student, Mr. John Breidler, in Steiermark, as is attested by the citations in Limpricht's *Laubmoose*. Of the Coscinodons, it is also to be noted that they occur *together*, both in the Mississippi valley and in Colorado, in both of which regions they were collected by the writer. Converging to this little spot from the Rockies and the Alps, they must needs be under somewhat of a climatic strain, especially at the lower level at which they are

*See, however, *The Bryologist*, 4: 62, October, 1901.

compelled to live. That this strain has not worked out even varietal differences since the beginning of their isolation is very strange indeed. The identity of each species has been placed beyond doubt by scrupulous comparison with Rocky Mountain and Alpine specimens, and by helpful conference with European students. In only one case is a diversity of opinion to be recorded, and the circumstances justify a reference to it here. The noted Scandinavian bryologist, Dr. Kindberg, dissents from the general judgment regarding *Webera proligera*, and considers it sufficiently different to stand as a distinct species. On all the other plants the judgment is unanimous for perfect identity.

One is naturally struck with the insular isolation in which these plants exist in the midst of hundreds of strangers. Like Robinson Crusoe on his island, they seem stranded on this area, living in it, cramped climatically it may be, yet safely, as in a haven of refuge, since they have ceased battling with the fiercer elements in the Ice Age. This geological event seems to furnish the only satisfactory explanation for their existence together in this, to them, out-of-the-way corner of the earth, for it may be stated, in closing this note, that the area on which they occur is a part of the so-called Driftless Area, stretching out as it were along its northwestern border. According to a letter from Dr. F. W. Sardeson on this subject, the general boundary of this Driftless Area "might be given as from Winona, Minn., to Dubuque, Ia., to Freeport, Ill., to Madison, Wis., to Baraboo, to Black River Falls, to Winona." Undoubtedly a closer study of the plants in this large area, and more especially of the northern borders of it, in the four states involved, will reveal other strangers as isolated as the above seven plants; and when this survey is more complete than it is at present, it is not unlikely that it will at least aid in answering some of the puzzling questions regarding the physical and climatic conditions of the Driftless Area in inter-glacial and early post-glacial time.

Winona, Minnesota.

THE KNUBBLE—ADVICE TO BEGINNERS IN BOTANY.

By Walter Deane.

AS I turn over the botanical sheets of mounted plants in my herbarium, I frequently come across one labelled "The Knubble, Shelburne, New Hampshire." What a flood of delightful recollections that word Knubble brings with it, for it was on that very spot that years ago I began my botanical experience.

In the broad valley of the Androscoggin River, in eastern New Hampshire, there rises abruptly from a bright, green meadow, a wooded mound some thirty feet high. It is about two hundred feet in length and one hundred in breadth, and is intimately associated in my mind with my visits to Shelburne in the early eighties, and the happy days that passed so quickly among the plants that clothed its sides and top. I was filled with the keen enthusiasm of a beginner, and many of my first discoveries were made on this Knubble, as it was always called. It lay but a few minutes' walk from the house across the field, and the river flowed swiftly by its foot. It was my Mecca. Mount Moriah towered across the sparkling waters to the south, while to the northwest Bald Cap frowned with its beetling cliffs. The accompanying illustration was taken by a friend of mine in April, 1898, before the snow had entirely left the ground. The view is looking south. The eastern spur of Moriah is seen to the right, and the river, not visible in the picture, flows in an easierly direction through the intervale just behind the Knubble. The view of Mount Moriah* was taken later in the season of the same year. The heavily wooded foothill is Mount Olivet. On the right of the picture is seen the south bank of the river, which cuts through the plain.

The beaked hazel nut (*Corylus rostrata*) fringed the borders of the Knubble, and I eagerly watched the lengthening beaks as the summer advanced. A plunge through the hazel and a short scramble up the slope gave me a most interesting find. Springing up through the soft moss was the little mountain cranberry (*Vaccinium Vitis-Idaea*). It was on July the second, and the plant was still in flower, and a mounted sheet of it is still in flower near me in my herbarium. Parts of the Knubble were carpeted with it, in company with the bunch berry (*Cornus Canadensis*) that beautiful little white flowered plant that clothes our northern forests. Its bright red berries are most attractive in the autumn. I well remember how surprised I was to find that the white involucre was not the corolla and did not belong to the flower at all. Surely I thought that botanists had a strange way of referring the con-

*The two photographs were taken by Professor James B. Greenough, of Cambridge, Massachusetts, and kindly loaned to me for this paper.

The Knubble.

Mount Moriah.

spicuous showy part of a flower, or what seemed to be one, now to the calyx which is generally green and inconspicuous, and again to the involucre or circle of modified leaves below the flower cluster. These are the surprises that delight the young botanist.

In regard to the fruit of the mountain cranberry, William Oakes, who was one of our early New England botanists, and whose name is identified with the flora of the White Mountains of New Hampshire, says: "The fruit when ripe resembles almost exactly in taste the common cranberry, and is equal or superior for tarts and jelly. Expertus dico." I can testify to its fine qualities for jelly, for several years ago, aided by some young friends, I collected my large botany box full of the pretty red berries, on the summit of Mt. Monadnock, New Hampshire, and supplied the table of forty guests at our boarding house with a most delicious sauce. The reason that the berry is not common in our markets is because it softens in a short time. The plant is very abundant in the Scandinavian peninsula, and the fruit is imported into this country in small casks which contain just enough water to float the berries and keep them from getting badly crushed, and is sold in Chicago under the name of Swedish Lingon. The berries become soft, and the juice escaping mingles with the water, making a rich sauce.

My Knubble was well wooded. The gray birch (*Betula populifolia*) and the white birch (*Betula papyrifera*) were both there. It is the tough bark of the latter species that is used in the manufacture of the well-known birch bark canoes, and how pleased I was to see and know the tree. Of the cone-bearing trees there was plenty of white pine (*Pinus Strobus*), and I was delighted to find a seedling pine with its many cotyledons or seed leaves, arranged in a whorl or circle. It had a good start in life, I thought, and bore the promise of a mighty tree. Two species of poplar were abundant, the American aspen (*Populus tremuloides*) and the large-toothed aspen (*Populus grandidentata*). The almost incessant trembling of the leaves of the aspens even under the slightest breath of air, I could not understand till I examined the flattened petioles or stems. This flattening I found to be at right angles to the surface of the leaf, and hence the leaf shakes edgewise. All these well-known facts I then learned for the first time, and I think my pleasure was as great as that of the first discoverer, for was not I a discoverer myself? The hop-hornbeam (*Ostrya Virginica*) was full of the greatest interest to me with its branches laden with the hop-like fruit. It was strange that the fruit of this tree, which belongs to the oak family, should resemble so much that of the twining hop, which with our American elm belongs to the nettle family. It was merely another surprise, and it told me that I must study the structures of the flowers and the relations of one family to another to understand rightly these

things. What a pleasure it was to enter my little wood daily, botany book in hand, and force an introduction to all these plants. Some of them were very reluctant to reveal their names, but they all came round in time, and we were ever after the best of friends, all the more so because no third party hastened the acquaintance.

The red oak (*Quercus rubra*), the beech (*Fagus ferruginea*), and the noble American elm (*Ulmus Americana*), were all there. No other species of oak could I find in Shelburne during the six summers that I was there. This led to an intimate aquaintance with the species, and I always look upon it as the typical oak. Rock or sugar maple (*Acer saccharum*) and the red maple (*Acer rubrum*) were abundant, as well as the moose maple (*Acer Pennsylvanicum*). Throughout Maine and New Hampshire the red maple is called white maple. The true white maple (*Acer saccharinum*) is a very small tree or even a shrub in Shelburne. I asked a native what he called it. He said that he didn't call it anything, and yet he had a keen knowledge of every tree or shrub that had any practical use. The shad-bush (*Amelanchier Canadensis*) flourished also on the Knubble. It was very common all through Shelburne, and fruited profusely. The round red berries when ripe are delicious, and much sought after by boys and birds. I remember once when trouting up one of the beautiful mountain brooks, that I found the fruit a cool and refreshing lunch.

Shrubs there were in plenty on my mound: Scarlet thorn (*Crataegus coccinea* or one of its many segregated forms), so beautiful in the autumn when laden with its scarlet fruit; dockmackie (*Viburnum acerifolium*), with its maple-like leaves, whence its specific or Christian name, for all plants have a surname or genus, and a Christian name or species, and the withe-rod, its near relative (*Viburnum cassinoides*). The withe-rod has such tough, pliable stems that it is used to-day in many places as a substitute for cord. Of the orchids, *Habenaria Hookeri*, a species of rein-orchis, was so abundant on the top of the Knubble that I thought it must be the commonest species, and was much surprised afterwards to learn that it was comparatively rare.

One day I thought that it was time for me to attack the grasses, and so with considerable difficulty I first read up carefully the characters as given in Gray's Manual. I then ran over to the Knubble to find a specimen: There were plenty near the house, but my first species must come from my favorite spot. I found a rather odd-looking grass growing very abundantly on the top in the cool shade. This, I said, shall be the first to be wooed and won. I gathered some specimens and began my task. An hour's work on the key brought me to the genus *Panicum* or panic-grass, a rather difficult grass for the beginner. I then found that I had as much or even more work beyond, for there

were twenty-five species to determine between. I persevered, however, and finally landed on *Panicum xanthophysum*, marked "rare" in the Manual. I declared that of course I was wrong, for my first grass, picked at random, could never be rare. But no, I found out later that I was right. I rejoiced, and began to feel that my Knubble was capable of producing anything. This grass was named by Professor Asa Gray in 1835, when he was but twenty-five years of age. The name *xanthophysum* refers to the yellowish-green color of the plant. Though I found this grass so abundant on that particular spot, yet in all my botanical wanderings since then in apparently precisely similar situations, I have never met with it again. This shows how very local or restricted a plant may be in its range.

This is a very simple story, but my object in telling it is to advise and urge every beginner to seek out for himself some spot as I did, and to make his pilgrimages there many and many a time, till he feels that it is his second home. Analyze every plant that grows there. Become familiar with the species, the genus, and the family of each one. You will be surprised to find how many interesting plants can grow in a small compass, and a thorough knowledge of them will give you a splendid start. Puzzle out the names by yourself, no matter how long it takes you. The longer time you spend, the more familiar will you become with the plant and the fonder of it will you grow. Why do I love so dearly the common agrimony (*Agrimonia Eupatoria*), that homely plant with small yellow flowers, that grows by our roadsides? Shall I ever forget that it has two akenes or small hard fruits inclosed in a top-shaped calyx which is almost closed at the top? Why does that picture always come up before my mind whenever I see the plant? It is because when I first analyzed the agrimony in Shelburne years ago, I spent two whole days in trying to find out its name. I am glad that I did spend that time. I thought that the nearly closed calyx was the ovary, and that the two akenes were seeds. No wonder I was thrown off the track. I shall never forget my joy when I reached the truth. Nature does not reveal her secrets too easily. Such delights can all be yours if you will begin your study in this way, and as the years roll by these fond recollections will grow deeper and deeper and whenever you see a species of herb, shrub or tree that grew on your Knubble, you will experience, as I always do, the keenest pleasure and the fondest remembrance of early botanical days.

Cambridge, Massachusetts.

BRIEFER ARTICLES.

The Society for the Preservation of Native Plants.

The following circular, which was issued recently, merits the careful attention of all plant lovers:

A number of persons who take a keen interest in wild flowers have united to form a "Society for the Protection of Native Plants." The objects of this society are to try and do something to check the wholesale destruction to which many of our native plants are exposed—a destruction often a matter of pure thoughtlessness in the excessive picking of flowers, and unnecessary pulling up of roots, or an extensive collecting of flowers and plants for sale.

It is the intention of the society to publish brief articles, or leaflets, calling the attention of thoughtful people to the matter, and to point out what plants especially need protection and in what way the desired end may be best affected. It is the intention to distribute these leaflets to teachers in our schools, to flower missions and village improvement societies, and in such other places as it may seem that they will be effective.

This movement for the protection of native plants has the approval of the New England Botanical Club, which, as a body, feels keenly the loss or great reduction of many plants once more or less abundant in the neighborhood of our large cities.

For information in regard to the Society for the Protection of Native Plants, or its leaflets, application may be made to Miss Maria E. Carter, Curator of Herbarium, Boston Society of Natural History, Berkeley street, Boston, Mass.

In addition to this circular the society has sent out the first of a series of educational leaflets, in which some of the plants especially in need of protection near Boston are enumerated. There should be a large enrollment of botanists and nature students in this society, and the fullest measure of support should be extended to its aims and endeavors.—C. L. P.

Veratrum Woodii in Iowa.

In the August number of THE PLANT WORLD Professor Pammel gives some interesting notes concerning the above-named species. We have lived many years in southern Iowa and have had occasion to observe this species at its best in its native haunts. This *Veratrum* has been regarded as a rare species in Iowa and is seldom found in herbaria made up of Iowa material. The reason we shall try to explain.

A number of years ago we found specimens of a monocotyledonous plant not in bloom, and showing no tendency to bloom. These specimens were from a perennial root which was covered with a fibrous coating and had many slender rootlets, the portion above ground consisting of two to several lanceolate parallel-veined leaves, a foot or more in length, acuminate at both ends, the petiole being slender and about half the total length of the leaves. The plant grew in rich woodlands, and was of frequent occurrence. Its identity was puzzling for quite a while until finally we found a colony in early July in southeastern Iowa in a rich soil surfaced with sand in rather old woods. There must have been a hundred of them to a square rod, and a solitary one in the center of the colony had sent up its stem and was beginning to bloom. The means were now at hand to unravel the mystery, and the result was that the heretofore stranger became known as *Veratrum Woodii*. Specimens in our herbarium are from Decatur county, immediately west of Corydon, Wayne county, the locality mentioned by Professor Pammel; also from Appanoose county, immediately east of Wayne county, and from Jefferson county, in southeastern Iowa, the locality where we first found the plant in bloom.

The results of our observations are: 1. The plant is of frequent occurence in southern and southeastern Iowa. 2. The supposed rarity of the species may be accounted for by the fact that the plant seldom blooms, and the flowerless forms are not recognized. This habit is analogous to that of *Erythronium albidum*, which gives a thousand or thereabouts of flowerless forms to a flowering one. Professor J. C. Arthur reported the species from Des Moines county, southeastern Iowa in Volume III of the Proceedings of the Davenport Academy of Natural Sciences, the locality being given as Burlington, which report we believe to be the first reference to the occurrence of the species in Iowa, Professor Pammel's report the second, and this the third.—T. J. and M. F. L. Fitzpatrick, Iowa City, Iowa.

Additional Notes on the Habitat of the Mesquite in Oklahoma.

In a short note in THE PLANT WORLD for April, 1901, I stated that the mesquite (*Prosopis glandulosa*) was found in southwestern Kansas and on the salt flats of the Cimarron river in northwestern Oklahoma, but that in these regions it always appears stunted and dwarfed. During the past summer I have had opportunity to examine the plant in the newly-settled Kiowa and Comanche country, and in Greer county in the southwestern part of the Territory. In this region the mesquite is quite abundant on the flat lands both north and south of the Wichita mountains. It is rarely found near a stream, but appears to prefer the dry and almost barren plains composed chiefly of a stiff red clay soil.

So abundant is it in places that several localities in the region are known by the characteristic name "Mesquite Flats."

The trees sometimes attain a size of nearly a foot in diameter and twenty-five feet in height. They are usually straight and symmetrical with a bushy spreading top but scant foliage. The fact that they make good fence posts and excellent fuel, taken with the other fact that in many places they are the only tree to be found, will shortly result in their practical extermination in the region. Already over a good part of the country nothing but stumps remain. It is not an unusual occurrence to meet loads of wood and posts coming into the new towns that are springing up all over the country. Unless the settlers take the matter in hand, it seems but a question of a few months till the mesquite will be gone from the region.—Charles Newton Gould, University of Oklahoma.

Dyed Flowers.

French scientists have recently taken up the artificial coloring of flowers, and a series of lectures has been given at the Sorbonne by a French chemist who has made a specialty of this particular subject. According to this professor, the problem of coloring flowers by artificial means has for several centuries past interested chemists. In 1709 a scientist named Magnal caused a sensation by producing tuberoses of a most exquisite pink, ordinary tuberoses being colored by plunging them into the juice of phylotagne. Some twenty-five years later Comparetti a scholar of Padua, made himself famous and added distinctions to the last days of his town by furnishing for the decoration of churches and cemeteries, wonderful wreaths of black convolvulus. Having made a fortune, he at last agreed to tell his secret, and declared that he had colored the flowers by putting their stems in common ink. The scheme didn't work when tried by the townsfolk, so the esteémed Paduan was apparently a liar of parts as well as a maker of the famous Paduan convolvuli.

Boissin in 1840 obtained marvelous hyacinths and lilies colored by chemical means, and since then not only chemists but practical florists have made frequent use of dyes in the coloring of flowers. Camellias grown in earth mixed with rosin show fine veins of coral red on their white petals. Earth mixed with iron filings will also color some flowers blue, and pansies take on wonderful hues by the dipping of their stems in certain aniline dyes. Some of these unnaturally tinted flowers are dangerous, and the green carnation was suppressed by the municipal laboratory of Paris, because scientists said that the odor of the flower had poisonous effects.—*New York Sun.*

GENERAL ITEMS.

The field work of the Division of Agrostology from the date of its establishment by Congress in 1895, is made the subject of an interesting report by C. L. Shear. It is taken up by regions, showing that work has been done in all parts of the country, and is profusely illustrated.

Mr. Frederick V. Coville, noticing Dr. Knowlton's reference to yarrow as an abundant weed in the John Day Valley of Oregon, calls our attention to the fact that this western yarrow has been shown to be a distinct species from the one with which we are familiar in the east. The western yarrow is entirely a native plant, and was so recognized by Nuttall, who gave it the name *Achillea lanulosa* on account of the densely woolly herbage. In discussing the use made of the yarrow by the Klamath Indians, Mr. Coville remarks that it is "from the evidence of its occurrence even in very remote and unsettled parts of the plains and from the statements of the Indians, unquestionably native in our Northwest" (Cont. U. S. Nat. Herb. **5**: 105. 1897).

The outlook for gardening and some agriculture in the cold interior region of Alaska, along the Yukon, is made quite encouraging by official reports recently received at the U. S. Department of Agriculture at Washington. Professor C. C. Georgesen, who is in charge of the Alaska experiment stations, has spent the summer in the interior and along the Yukon Valley, visiting the experiment station established by the Department of Agricvlture last year at Rampart, just outside the Arctic Circle, and other points where experiments were arranged for. Good gardens were found all along the route, especially at Eagle City and Holy Cross Mission. Although the season was unusually late this year, new potatoes, cabbage, cauliflower, beets, and other vegetables were ready for the table before the middle of August, and lettuce, radishes, and turnips, grown in the open had been in use for some weeks. Flower gardens containing a large variety of annuals grown from seed furnished last year were in full bloom. At the station at Rampart, rye seeded the previous fall wintered perfectly and was ripe in July. Spring seeded barley had ripened about the middle of August, and there was quite a prospect for oats and wheat to mature.

NOTES ON CURRENT LITERATURE

The Catalogue of hardy trees and plants lately received from Messrs. Thomas Meehan & Sons contains a number of inviting pages for those interested in landscape gardening.

We learn from the *Journal of the New York Botanical Garden* that the expedition of Dr. Britton and Mr. Cowell to St. Kitts, of the British West Indies, has proved highly successful. A large number of seeds and living plants, and 1200 herbarium specimens have already been received at the New York Botanical Garden.

Professor Edward L. Greene has published the second of his essays on "Some Literary Aspects of American Botany," in which he continues his criticisms of some of the titles used for American serials, and administers a reprimand to a luckless young author who in the title of one of his unpublished papers was careless enough to use the word "asymmetry" in place of "irregularity." The influence of these entertaining papers upon the deplorable tendency to looseness of speech and writing exhibited by so many of our professional botanists cannot fail to be excellent, and we hope that the author intends to continue them in the same vein.

The Forester for September is an unusually interesting number. It contains a report of the meeting of the American Forestry Association recently held in Denver, an outline of the forestry work which is being undertaken in the Philippines, and the first part of a paper on The Open Range and the Irrigation Farmer, which was read before the Association by Professor R. H. Forbes, Director of the Arizona Agricultural Experiment Station. Professor Forbes points out the great importance of conserving and encouraging the native vegetation, especially the grasses, which are such an important feature and bear such a direct relation to the conservation of moisture.

Meehans' Monthly for October opens appropriately with a fine colored plate of the witch-hazel (*Hamamelis Virginiana*), the curious fall-blooming shrub.

In a short paper in the Yearbook of the Department of Agriculture, Mr. V. K. Chesnut describes some poisonous plants of the northern stock ranges, this being a condensation of his larger bulletin on this subject. The plants found to be most injurious are the water hemlocks (*Cicuta Douglasii, C. vagans, C. occidentalis*), the larkspurs (*Delphinium*), and the poison camas (*Zygadenus*, species).

The October number of the *Journal of Applied Microscopy* contains an interesting account of the botanical laboratory and garden of the Tokyo Imperial University of Japan. It is written by Mr. Miyake, who is at present at Cornell University. The rapid and substantial development of botanical work in Japan is but another striking example of the great progress which the Japanese are making in all directions.

Professor William R. Dudley has just distributed copies of a short paper on the zonal distribution of trees and shrubs in the southern Sierra (Sierra Bulletin No. 24), in which he describes and in many cases illustrates the species characteristic of the various zones. He recognizes four zones: the plain, the foot-hills, the forest, and the sub-alpine woods. It should be of interest to those who are fortunate enough to visit this interesting region.

Mr. M. A Carleton has recently issued a short bulletin (Farmer's Bulletin No. 139, U. S. Dep't Agric.), on emmer, a grain that seems adapted to the semi-arid regions of this country. Botanically this grain is a wheat (*Triticum diococcum*) not greatly unlike spelt in appearance, but differing in having a closer spike and usually two-seeded spikelets. Its uses compare well with oats and barley, and it possesses the advantage of producing a good crop in regions where these often fail.

The October number of *Forest Leaves* contains an interesting article under the caption of "A Surveying Experience." In running over some old lines surveyed in 1793, it was found that certain corner stones were missing. Near where it was presumed one should be was a white oak tree twenty-two inches in diameter, which should show "witness marks." At first no marks could be detected, but some four inches of solid wood was cut away and the old "witnesses" were found still as clear as when made. The full page plate of this tree after the side was chopped away, shows the marks as plainly as though made within a few years instead of one hundred.

EDITORIAL.

We are glad to observe that Dr. Charles E. Bessey, in a recent issue of *Science*, has called attention to the excellent work among the ferns and fern allies now being carried on by the Linnaean Fern Chapter of the Agassiz Association. This organization, founded only eight years ago, has prospered so that it is no longer thought of as a branch of the parent society, but rather as an independent body of fern students. The membership is about 125, and includes representatives in several foreign countries. For three years the Chapter maintained its own publication, known as *The Linnaean Fern Bulletin*, but with the beginning of 1896 the journal passed into the hands of the present management, the name having been changed to *The Fern Bulletin*. It continues to be the official organ of the Chapter, and by arrangement between the editor on the one hand and the officers on the other, it is sent free to all members.

We have outlined the history of the Chapter at some length because we wish to commend it to the support of all nature lovers. Such organizations as the Fern Chapter, or its offspring, the Sullivant Moss Chapter, devoted as they are to special groups, serve to contribute toward a knowledge of, and respect for, many plants that might be passed over by the unappreciative; they also create a healthy public sentiment with regard to the preservation of rarities like the hart's-tongue fern; they promote good fellowship and helpful intercourse between workers; and beyond all, they are democratic organizations, welcoming all recruits, whether amateurs or professionals, seeking only to advance the cause of botany, and not attempting to overburden the literature of the science with useless publications.

Apropos of this topic, we have received from a member of the Chapter a copy of the *Joilet* (Ill.) *News* of October 29, 1901, from which it appears that the fern-lovers of that city are engaged in a most commendable undertaking. They have established in the public park a collection of American ferns, and at the close of the third year have under cultivation 102 species and 7 varieties, as well as many of the fern allies. This is probably the largest collection of native living ferns in this country, and it is the purpose of those in charge to make it as complete as possible. A greenhouse is to be constructed next season for the accommodation of the more tender forms, and as the work appears to be of a voluntary nature, it shows that the residents of Joilet, and particularly Mr. J. H. Ferriss, the superintendent, possess a degree of public spirit which other communities would do well to emulate.

The announcement made by the publishers of THE PLANT WORLD in our last issue, regarding the reprinting of Volume I No. 1 of the *Asa Gray Bulletin*, has met with a very satisfactory and encouraging response. We are glad to state, accordingly, that the work will be undertaken at once, and it is hoped that copies will be ready for distribution within two weeks. The original pages will be copied in the minutest detail, even typographical errors being set up as in the original. It may not be possible to duplicate the exact styles of type employed in the headings and titles, but such differences will in no way affect the value of the reprint as an accurate reproduction. Orders for these are now being booked, and will be filled strictly in rotation; the price list and further details concerning the *Bulletin* will be found on the back cover page of this issue.

BOOK REVIEWS.

PLANT LIFE OF ALABAMA. By Charles Mohr, Ph. D. Cont. U. S. Nat. Herb. Vol. VI. U. S. Department of Agriculture.

Dr. Mohr's *magnum opus*, the fruition of years of study and endeavor, came from the bindery of the Government Printing Office just two weeks after the author's eyes were closed by death. He had so eagerly anticipated the completion of his work, the only work of importance on southern botany issued since the last generation, that the circumstances seem almost pitiful. But the massive book of over 900 pages must forever remain as a silent testimonial to a long and useful life spent largely among the plants in the woods and field.

The scope of the volume is quite comprehensive. The main portion consists of a systematic catalogue of all plants growing without cultivation in the State, beginning with the slime moulds and so extending through all the orders up to the highest of the seed-bearing plants. The accepted names, which are in conformity with the principles of the Rochester Code, are in bold-face type, followed by the citation of the place and date of publication, and the common names by which the plant is known; then follow brief synonymy and mention of the leading authorities, a very careful statement of the distribution, comparative abundance, etc., the type locality, and the herbaria in which specimens can be found. Frequently these enumerations of species are enriched by interesting notes or observations, and there are not a few entirely new species described and illustrated.

The introductory portion of the work is of considerable value to the general reader, even if not a botanist, as it discusses in detail the character, distribution and interrelation of Alabama plant life. There are chapters on the physiographical features, including the topography and geology; the river systems and drainage; the climate; the life zones; the various plant formations and the factors on which they depend; and an elaborate comparison of the Alabama with other local floras. The account of the various areas and zones and the plants that inhabit them is of special interest, and well illustrates the painstaking care with which Dr. Mohr made his observations.

We are glad to learn that the book will also be issued by the State Survey of Alabama, which will insure for it a wide distribution. It is not too much to say that with the exception of Dr. Chapman's Manual, no work on Southern botany has ever equalled "Plant Life of Alabama" in importance.—C. L. P.

Sheldon on Rooting of Oxalis Leaves

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

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ROOTING OF OXALIS LEAVES.

BY JOHN L. SHELDON.

WHILE weeding a tray of seedling ferns last winter, I suppose that I broke off some of the leaves of a common yellow oxalis (*Oxalis corniculata stricta*) which was growing among the ferns, and left the leaves on the moist soil. The tray was kept covered with a pane of ground glass in order to prevent the soil from drying out, and also to protect the tender ferns from the sun. When I went to water the ferns several days later, I happened to notice that two of the oxalis leaves had rooted, one from the end of the broken petiole, the other at the junction of the leaflets. The rooting of oxalis leaves was to me a new method of propagation for that genus, the usual one being by bud division or tubers, and reproduction by seeds.

Leaves of several of the cultivated species were procured from one of the city florists and set out among the ferns to see if they too would also root. Most of the older leaves were destroyed by fungi or "damped off." The few that survived were transplanted when they were well rooted.

Another tray was partly filled with soil, on top of which was placed a layer of sand about an inch thick. More leaves were procured and set out so that the ends of the petioles did not quite reach the soil. The sand was kept moderately moist by sprinkling. Every few days the sand was carefully removed from one side of a few of the petioles to see what was taking place. It was found that calluses were forming in the same way that they do on cuttings. After several weeks roots began to appear and extended down into the soil. The more mature leaves did not seem to root as readily as those that were growing. A few succumbed to an attack of red spider.

The calluses on the large pink ones increased in size and became bulb-like (Fig. 1, a), while the yellow and white ones formed thickened tuber-like processes (Fig. 2, b) on their roots. The leaves remained green for a long time (however, no new leaves were produced), and finally changed color gradually and appeared to be ripening naturally.

The experiment had to be discontinued during the summer. Whether true bulbs and tubers would have been formed finally, or whether what was formed would have died soon after the leaves had ceased to function, will require further experimentation. Some plants, such as *Bryophyllum* and *Begonia*, are readily propagated from the leaves, though in a somewhat different manner than that employed for oxalis.

While the propagation of oxalis from the leaves has no commercial value at the present prices charged for bulbs, even if it can actually be accomplished, perhaps the mere rooting of the leaves may be new and of some interest to a few beside myself.

Lincoln, Nebraska.

THE BLOOMING OF TWINING HONEYSUCKLES.

By Byron D. Halsted.

A HEDGE of honeysuckle (*Lonicera Japonica* var.) near my house offers opportunity for a daily watching of the anthesis of these plants. Passing over all preliminaries of early and late blooming of this species, it may be said that the observations of a systematic sort began when marks were placed upon the nodes bearing long white flower buds, invariably four at each joint. The coarse strings were tied on at five P. M., and at six o'clock four of the twenty buds were opened; an hour later nearly all the marked buds were expanded. All except one set of buds were open the next morning, and this bloomed the following evening.

The blossom opens by one of the five lobes of the corolla, the lower one, separating from the other four which always remain as one piece with the pentamerous type plainly demonstrated in the four prominent teeth of the upper lip of the long showy corolla. As the independent lobe splits off from the other, the five long stamens and the equally long styles are exposed to view in the space between the two parts of the very irregular two-lipped corolla. The anthers at once show large quantities of pollen, and while the upper and much larger lip of the corolla is being reflexed upward, insects arrive. It is at this time that the delicate, far-reaching fragrance of the many opening flowers is borne upon the air of the approaching evening.

The earlier of the blooms are visited by honey-bees, which are content with the large quantities of pollen now found in the anthers, and do not make any attempts to reach into the long tube of the corolla for the sweets found in abundance at its base. The amount of this honey almost any child will serve as witness, for with the flower removed from its stem in hand, it knows how to draw the style backward and remove the nectar with the piston-shaped stigma, and regale itself at the expense of the bumble bee that was possibly ready to get the same delicate draught in its own natural way.

But as the sun declines and the air gets more and more laden with the honeysuckle fragrance, due to the increasing number of freshly opened flowers, the various night-flying insects are in evidence. Among the most conspicuous of these is the syhinx-moth, which pauses before each of the white blossoms long enough to take a sip and then darts on to the next. So busy are they in their round of service, that, standing motionless, the interested watcher can have them close to his eyes, see the whole and exceedingly simple process all done while upon the wing. The down-turning of the single lobe of the corolla and the upturning of the other four united making an arched opening into which the long protruding stamens and style provide guides, combine in forming a cavity into which the probosis of the moth is thrust, and the nectar being close at hand is easily removed without the flower forming any resting place for the insect attendant. The wonder is that the moths can sustain themselves so steadily in front of each blossom; but from the almost inaudible hum it is evident that the large and delicate wings are moved with remarkable rapidity. Where the moth rests himself during the hours when not in attendance upon the honeysuckle is a matter that is left to the lepidopterous entomologist to elucidate.

The moth in question has a rival in the person of master humming bird, and so much alike are these to the unobserving observer that only a dancing, swaying, hazy, vanishing blur is seen in either case against the indistinct background of the honeysuckle hedge in the deepening twilight.

The humming bird is less easy to study, and to get close to his fast fluttering wings is a rarity indeed. As soon as the busy bird is once recognized by his long, needle-shaped bill, bright, iridescent plumage, exceedingly quick, darting motions and characteristic humming of the wings he is not confounded with the sluggard of a moth or any other creature. The bird, like the insect, with which he might weigh in the same notch, pauses in the air before the evening blossom and quickly sips the nectar without indulging in the climbing method of alighting as is in vogue with the heavy, short-winged humble bee. The bird makes a cleaner job of it than the moth in every way. His

eye may be keener sighted and his body more submissive to his will. The bill may be a better instrument than the proboscis for extracting the honey. Who can tell whether the blossom and the bird are made for each other's best interests, and the moth is an interloper. Were Darwin with us we might ask him. It seems true that the flowers once visited by the humming bird are not relished thereafter by the moth, and Levite-like are passed by, while a number of moths may follow in succession in their visits to those flowers undrained by the bird.

Those who are familiar with the honeysuckle blooms are aware that upon a vine some are white and others are creamy in color, then a light yellow-orange, and lastly a darker shade of the two neighboring colors as the flowers hang collapsed upon the short stems. The rapidity with which these blossoms pass these stages has been a matter of observation and surprise. Abundant facts were obtained by the use of strings mentioned at the outset, and daily inspection of the flowering branches. Each of these branches usually has upon an average six successive nodes that are to bear blossoms, the series being preceded by a few neutral nodes and followed by an indefinite number that are entirely vegetative. The blooming of a series represented by any stem is usually compassed by a week or at most ten days—the rapidity seeming to depend upon the individual peculiarities of the plant or some circumstances of nourishment and the weather. During the period of watching there was a rainy day and night, and upon the intervening evening there was but little show of bloom and a noticeable absence of the characteristic fragrance, and of course of the insect and bird attendants. A halt was called in the regular procession of bloom that may or may not have affected the whole period of blossoming. But this is a fact that can only be obtained by extending the observations over many seasons.

To the reader unfamiliar with the Lonicera, it may be said that the long, slender, twining stems bear their leaves in pairs upon opposite sides of the stem. Between the bases of the leaf stalk and the stem above, a bud arises which quickly forms a stem an inch or so long, bearing a pair of small leaves, and between these two flower buds form. It is thus seen that at each joint or node upon the stem there are two brief side shoots each bearing two flowers—that is, four blossoms are produced with but very few exceptions at a node, or none at all. When once a series of flowers has begun there are no breaks in it until the end is reached. The four buds very regularly open upon the same afternoon or evening, and display their four white corolla lobes through the live-long night. The next morning they begin to take on a suggestion of cream color, which rapidly develops as the day declines, and become strongly in contrast with the four swelling white buds of the

next younger node that are destined to follow along the same road twenty-four hours later. By the second evening the flowers have become orange-yellow and lost their fragrance—at least it is lost in the richness of the younger blossoms which become the only ones before which the moths and humming birds pause for their evening draughts of nectar. Of hundreds of such transient visitations the writer has never seen an old flower considered for an instant. They appear as oblivious to them as if they were not there. It may be that the eyes of the night flyers are color blind to the hybrid yellow-orange, while they are sharp indeed upon the white. With thoughts like these in mind I have watched the hedge-row as the darkness deepened until the old flowers passed from sight and only the fresh white ones stood out distinctly against the black background of the obscured vegetation.

Sometimes one of the quartette of blooms gets belated and comes into flower along with the four upon the next younger node; but then it is out of place and the chances for visits are diminished, for the four make an attractive setting, and all can be sipped before advancing to the next group. The torsion common to the lonicera stems provides that all the flowers present a uniformly open front; in other words, they hang the banner upon the outer wall, even though it may be necessary to turn a sharp corner in the event.

It has been said that a new set of four flowers is not uniformly provided for each new day. That may be the rule, but there are dark days and rainy days, and so the uniformity is more or less broken. This, however, seems to be the rule—that no half-ways are indulged in, and if a bud is not quite ready to open upon one afternoon, it holds over until near the close of the next, thus giving forth its perfume upon the evening air, and at a time when night-loving insects may catch sight of its showy whiteness and sip its sweets, while incidentally bringing to it the pollen from some other blossom. Back of all the plan that has been written upon, there lies between the lines the deeper one of wide pollination, which perhaps both honeysuckle and honeysucker knew nothing about, and yet is essential for the well-being of each, and succeeds so well in the great struggle entailed upon all living things.

New Brunswick, New Jersey.

FAIRY RINGS.

By E. M. Williams.

ON coming to eastern South Dakota eleven years ago, one very noticeable thing about the flora of the prairies was the great number of "fairy rings" to be found on all the uplands where the wild grass sod had not been broken. These rings were from one to fifty feet or even more in circumference, and in more or less perfect circles which could be seen at considerable distances because of the level country and the clearness of the atmosphere. The grass is a much darker green inside than outside the ring, and also grows much more luxuriantly in these spots, particularly toward the outer edges. Occasionally toward the center of very large rings the grass is not much darker than that outside, but is always bordered by a zone of luxuriant dark green grass. These were found to be common all over the eastern and northeastern parts of the State, and probably occur farther west also. The rapid settlement of this part of the State has brought most of these areas under cultivation, but wherever the wild grass is yet undisturbed they are to be seen.

The Fairy Ring Mushroom (*Marasmius oreades*). Reprinted from *The Asa Gray Bulletin.*

Such a marked difference in these spots could hardly fail to attract attention, and various reasons have been assigned as to their origin. One student at the college at Brookings, and afterwards at Cornell, who made quite an exhaustive study of these "rings," came to the conclusion that they were caused by the growth of one or more large species of puff-ball which are very abundant on the prairies in early spring and sometimes at intervals throughout the summer.

From my own observations I could assign a no more reasonable explanation, since during six years of study I not only found many of the large puff-balls, but also several of the smaller kinds showing a decided preference for these dark green areas, though by no means confined to them. Five years ago on one of my first field excursions at Takoma Park, two large "rings" were found, and growing in them a great number of one of the common large puff-balls of that region, forming almost complete circles near the outer margin. These two rings were under observation for three years, and during that time not only large but small puff-balls and also several species of gill-bearing fungi were found in them, such as *Galera tenera*, *Marasmius oreades*, *Agaricus campestris*, *A. subrufescens*, and *A. hemervidorius*. These species of fungi were found in the surrounding meadow as well, but showed always a decided preference for the rings. Three years ago it was proven beyond a doubt that these rings were made by the growth of *Lepiota Morgani*. Other rings of a similar nature were also found, and one of them, which was illustrated in a recent Bulletin sent out by the Department of Agriculture, during a year of observation showed a similar disposition to encourage the more luxuriant growth of other species of fungi that occurred elsewhere in the surrounding field.

The crowning surprise was reserved for this year. When riding in the outskirts of the city of Brookings on October 9th, I found growing in great abundance a large species of *Tricholoma* (which for lack of literature I am unable to name), and growing too in such a manner as to leave no doubt that this was the fungus that originally caused the ring. The same fungus was found in other rings wherever the ground remained undisturbed by the plow. In one place one was seen as an almost perfect hemisphere, the other half of the ring having been made into a lawn. In all cases the mushrooms were crowded to the extreme outer edge of the ring, and grew so closely together that they seemed to be piled on each other, making in many places almost complete chains of shining white caps often six inches in diameter, surrounding the darker area inside. How so large a fungus could have escaped notice in a country where a fungus having a pileus over three inches in diameter is indeed a rarity, is a mystery that is hard to explain. Though the unusually moist autumn may account in a measure for the large size of the caps, the fact remains that the growth under any circumstances must be conspicuous. An interesting question is also raised as to the effect the growth and decay of these robust species that originally cause the rings may have in promoting the growth of other species of fungi.

Brookings, South Dakota.

"YOU WILL HAVE TO HURRY."

By Aven Nelson.

A NEW expression had birth somewhere here in the West during the present year. It originated, I believe, at some one of the numerous "street fairs" held in different cities throughout the region. The proprietors of the several attractions at these were constantly crying the superiority of their particular shows, and admonishing the crowds in stentorian tones that "You will have to hurry" in order not to miss this wonderful exhibition. "You will have to hurry" became the rallying cry, and was effective in proportion to the amount of circumflex expression that the speaker could put upon the word "hurry." The phrase proved immensely catching, and at once became exceedingly popular. It was heard on all sides, under all circumstances, and at all times. The advertisements said "You will have to hurry" if you secure one of those marvelous new gas stoves, or those superior suits at reduced prices, or those effective pills sold only by Timothy Calopstock, or that new spiced drink at August Guggenheimer's place. The bands improvised tunes more or less amusing under the title of "You will have to hurry." Were a man walking with unusual celerity, his friend would cry out to him "You will have to hurry," or if sauntering leisurely to enjoy the morning's sunshine the same expression would soon greet his ears. From the ragged newsboys up to the more dignified people in the various walks of life, the infection was all but complete. Fortunately, however, like measles and chicken-pox it will only run its course, and the epidemic has now nearly passed away.

During the height of the epidemic the thought came to me that this expression has been for untold centuries old Mother Nature's favorite one in dealing with many of her children. Some have heeded her admonition, and they and their descendants still flourish upon our mountain tops, upon our arid plains and in our wastes and deserts. Others, heedless of her cry, passed away and left no trace of themselves as the rising mountains and plateaus brought new environments.

In our mountains the cry still rings clarion clear "You will have to hurry." On the higher slopes great snow banks linger into late June, July, or even into August. Sharp freezes and skifts of snow usher in September. During the few, sometimes very few, favorable weeks, magnificent flowers, gentians and erythroniums, asters and erigerons, pentstemons and delphiniums, spring up and develop into blossom and fruit with a celerity scarcely surpassed by Jack's famous "bean stalk." These are the descendants of ancestor that for many generations have succeeded in gradually accelerating the life activities, not into the

"pace that kills," but into harmony with a changing environment.

On our cold, arid plateaus we see the same conditions and the same processes and results. The examples may be less striking, but even here the forms that survive have had many a sharp lesson.

But no more striking example can be given than is exhibited in some of the interior deserts, the Red Desert of Wyoming, for example, where not the shortness of the season but the scarcity of water is the prime cause of the noticeable haste. In such localities the moisture that falls is principally the snows of late spring. These on melting furnish the water which must carry many of these desert forms to full fruition. The cloudless skies of June bring to maturity many small annuals that spring into life in cool but moist May. More numerous perennials scatter far and wide their abundant fruitage before July's sun bakes completely dry valley, hill and plain. These latter have adopted the storage plan as the best means of securing the requisite speed when the favorable season comes. Rhizomes, bulbs, tubers and roots, often enormous, are packed full of food materials which are converted into immediately available funds to meet the heavy drafts that the rush season demands.

There is perhaps no class of plants that have learned the art of hurrying so well as the generally despised weeds. A cockle-bur and a pigweed rarely fail to mature some seed. Cut them off near the ground repeatedly during the summer, and each time they will put out new branches from the stump. These may in turn be destroyed, till as Autumn approaches you forget about them, but they do not forget their business. When the season closes a few prostrate branches will be found with mature fruit.

That plants, like most people, will not hurry except from necessity, was abundantly in evidence during the field work of the past season. The identical species (various Eriogonums, Senecios, Solidagos and many others), that were in full bloom on the higher plains of more northern Wyoming in late July or early August, had reached only the same stage of development by the first of September, in middle Colorado and southward. The contrast was all the more striking, since the Colorado season opens two or three weeks earlier as well as closes as much later.

University of Wyoming, Laramie, Wyoming.

FIELD NOTES OF A MIDSUMMER TRAMP.

By Charles C. Plitt,

MY friend and I met one day at Camden Station, Baltimore, to take the early train to Glenburnie. Arriving at the latter place, we took our usual route past the old hut to the pond. To-day again, as on our last four trips, the variety of fungi attracted considerable attention. What a harvest this year for the mycologist! We were satisfied, however, in simply admiring them. One beautiful large mushroom with a fungous growth all over the pileus, showed how these plants not only attack the higher plants, but even prey one upon the other. The parasitism of the Gerardia (*G. flava*) was examined. A plant was carefully dug up so as to disturb the roots as little as possible. The little sucker-like disks on its rootlets, attached to the roots of a species of Vaccinium (*V. vacillans*) which grew close by were readily seen. The rootlets of the Gerardia no doubt possess the power of forming these disks whenever they come in contact with other roots. That they have not the power of discernment, however, is also seen, for they frequently attach themselves to other roots of the same plant of which they themselves are members.

When we arrived at the branch, we walked along the half swampy lowland bordering its bank. The chain-fern (*Woodwardia angustifolia*) was in profusion, but what pleased us most was the finding of *Habenaria Blephariglottis*. We had never before seen it here, although during the spring I saw a plant which made me suspect its presence. This year seems to be again a good one for this beautiful orchid, judging from the number found in flower. There were many beautiful specimens, though I found none that equalled the unusually fine ones found last year year in another locality. Later we visited this spot also, but here too they were not so large. This plant, although it grows in very damp places, does not seem to like excessively wet ones. In the latter places we found instead *H. tridentata*, a much smaller and very much less showy species. We were surprised to find in one of these very wet places a plant of *Cypripedium acaule*. It had not bloomed, nor was it in a flourishing condition. The plant, in this vicinity at any rate, grows and thrives in very much drier situations. *Rhus copallina*, the dwarf sumach, is now found in flower, and I think is the last of all the sumachs to bloom.

As we left the hut, Mr. W. kept close to the stream; I took the drier path, and had not gone far when he called me. From the racket that he made, I thought that something important had been found, and so it proved to be—two beautiful specimens of *Habenaria ciliaris*. A very important find we considered it, for we know of but one other

place where it grows. As soon as I came up with him, we looked carefully for more specimens, and eight more were found. This plant, too, like *H. tridentata*, can grow in very wet places, as some were found growing in the water! The most beautiful specimen of all was observed a little more closely. To it was still attached the remains of last year's flower stalk, showing that it had not only bloomed but also fruited.

We now went directly to the pond, and while Mr. W. took a boat to get water lilies, I examined *Marsilia quadrifolia*. The water lilies (*Nymphaea odorata*) attracted our attention on account of their long rigid flower stalks, raising the flowers fully four inches out of the water. The stalks, as a rule, are not rigid but rather limber, allowing the flower to float with the motion of the water. Another plant found out of water, and where one might think a long rigid stalk would be produced, had it only long enough to bring the bud to the surface, and the flower lay expanded close to the ground. *Marsilia quadrifolia* was in fine condition, and examination showed many plants with sporocarps. These were found on terrestrial plants, none of those in the water having a single one. One plant only, and that so close to the shore that its stem was barely covered with water had them. The sporocarps, one, two, or three in number, but generally two, were on very short stalks attached to the stalk of the leaf. Another thing noticed was that some of the leaves twined around other leaves. This, however, was no doubt brought about mechanically, and not from any inclination on the part of the leaves themselves.

It was now after twelve o'clock, so we found a pretty nook on the hill overlooking the pond, and here we ate our lunch. While we were eating a shower of rain fell for a short time in large drops, but shortly afterward we had another which was of longer duration. Within half an hour, though, it had stopped, and during the greater part of the remainder of the afternoon it was only partly cloudy.

After dinner we went toward the old furnace. On our way we stopped to examine the spring which we had cleaned out some months previously. It was found with much difficulty, as brier, bramble and vine had taken possession of every available inch. While looking for it, we saw a most brilliant display of the flowers of *Lilium superbum*. They were so beautiful—in fact, I have never seen a more beautiful display—that we decided to see them at close range. They were separated from us by an almost impassable network of brier and bramble. Had we depended on trying to force ourselves through this mass, I think we would never have succeeded. But by means of a stout stick Mr. W. beat down everything before him, and thus we finally reached them. There were seven plants close together, the tallest being fully eight feet high. Forty-two fully opened flowers were counted, the

greatest number of buds and flowers on any one plant being eighteen.

We now went on to the old furnace. We did not stay here very long, but went on to the little inlet, where we found a few specimens of *Sabbatia chloroides*, *Eryngium Virginianum*, and *Discopleura capillacea*.

It was now after six o'clock, so we wended our way slowly back to the station. During the day sixty-eight different plants were found in bloom. One of them, *Clitoria Mariana*, was found very abundantly and in a number of places, which was quite a contrast to the very few plants found several years ago.

On August 10th, just two weeks later, this locality was again visited. The plants of *Marsilia quadrifolia* which were previously so full of sporocarps, were now apparently destitute of them. But on closer examination I saw the cause of this seeming scarcity, for that portion of the rootstock which bore them was now entirely devoid of leaves, and it required close observation to distinguish them from the brown soil. They were then about ripe, for they burst open with only slight pressure.

The Snow Plant (*Sarcodes sanguinea*).

BRIEFER ARTICLES.

The Snow Plant.

Although the wierd but beautiful Indian pipe is known to almost every child who frequents the August woods, fewer people have seen its blood-red relative *Sarcodes sanguinea*, the California and Nevada snow plant. Several of these growths, sent from Washoe Valley, Nevada to New York came in excellent condition, neither faded nor shriveled by their long journey. I was fortunate enough to receive one which was larger in every way than the California type. The stem was over fifteen inches high, one and a half inches thick, of a flesh pink color, glandular pubescent, and thickly clothed with small fleshy scales, the lower ones ovate and closely imbricated, the upper gradually more scattered, narrower, passing into linear bracts which mostly exceed the flower, their margins glandular ciliate. The brilliant red flower is thicker and larger than that of the Indian pipe, and instead of a single flower, there are upwards of seventy-five growing in circles around the stem, five or six in a circle. The flesh-colored pedicel one and a half inches long, at first erect, then drooping, diminishes in length as it approaches the apex. The calyx consists of five oblong, erect, hairy, persistent sepals, divided almost to the base. The corolla is cylindrical-campanulate; stamens ten, included, glabrous; filaments slender; anthers linear-oblong, attached to the outside a little above the base, not appendaged, the two cells united throughout, and with a very narrow connective, opening by the whole obliquely truncate apex; ovary five lobed, five celled; style columnar; stigma capitate, slightly five lobed; capsule fleshy, the thick placentae adnate to the axis their whole length; seeds ten, oval.

Sarcodes does not turn black on being touched as is the case with the Indian pipe, and when dried loses but little of its brilliant color. It is usually found in coniferous forests, especially of Sequoia and Abies through the Sierra Nevada at an altitude of from four thousand to nine thousand feet, shooting forth and flowering as soon as the snow melts. It is also occasionally found at quite a distance from fir or pine.—Pauline Kaufman, New York City.

Double Trilliums.

The article by Mr. Holzinger in the July issue of THE PLANT WORLD on the subject of a green trillium in which the various organs of the

flower had reverted to leafy bracts, recalls an interesting short article by Mrs. W. A. Kellerman in the *Asa Gray Bulletin* several years ago. It would seem that this feature of "doubling" or reversion to vegetative rather than reproductive organs is not uncommon in the large flowered trillium (*T. grandiflorum*). In the case cited by Mrs. Kellerman, however, the extra whorls preserved the appearance and texture of the normal perianth-segments (or petals), so that the result was virtually a double blossom of great beauty. A still more remarkable fact was the

A Double Trillium. (Reprinted from *The Asa Gray Bulletin*, 6: 17. 1898.)

constancy with which the plant produced flowers of this type each succeeding spring after it was placed in the garden. Following are Mrs. Kellerman's comments.

"When the flowers began to wither they were cut and given to me for preservation. One was pressed intact, the others carefully dissected and mounted the different whorls * * * One of the Trilliums thus mounted shows nine, the other thirteen whorls of petals. * * The plant and flowers attained the average normal size, and aside from the peculiarities noted, was normal throughout. The flower was pure white, assuming no tinge of pink even in withering."—Charles L. Pollard, Washington, D. C.

GENERAL ITEMS.

The Office of Vegetable Pathology and Physiology of the Department of Agriculture has recently purchased the large collection of fungi accumulated by the late A. B. Langlois, of St. Martinsville, Louisiana. It contains a very large and complete series of southern species, and many co-types of species described from Mr. Langlois' specimens. It will prove a very valuable addition to the mycological herbarium of the Department.

Recently a farmer brought in a plant for me to determine. He had cured a sore on the leg of a valuable horse with a poultice made of the root, when all other remedies had failed, and considers that he has found a wonderful remedy for horse-flesh. The plant is *Heuchera macrorhiza* Small. It is very common here on river bluffs.—*Sadie F. Price, Bowling Green, Kentucky.*

This note is of interest as we do not recall many cases of healing properties ascribed to Heuchera, which is a genus of the Saxifrage family. Can our readers contribute to the general information on this subject?

At the recent meeting of the British Association for the Advancement of Science, Professor I. Bayley Balfour, president of the botanical section, selected for the subject of his address a discussion of the causes which have led the Angiosperms or higher flowering plants to become the dominant types of the existing flora. Climatic differences of our epoch, contrasted with earlier periods, have been important factors, and especially the great difference in the relative proportions of the land and water areas upon the globe. He says: "The statement is warranted that the Angiosperms have become dominant in great measure because in their construction the problem of the plant's relationship to water on a land area has been solved more satisfactorily than in the case of the groups that preceded them. By the formation of flowers and seed the Angiosperms freed themselves from the risks which attend reproduction in the Pteridophytes by providing a special place for the development of the germ and thereby rendering it independent of the presence of water."

NOTES ON CURRENT LITERATURE

Nature Study is printing a series of observations on organotopic plants, by Frederick W. Batchelder. Parasitism is one of the most interesting subjects for investigation, and one who is not a botanist would scarcely suspect how many of our plants are dependent on others for at least a part of their subsistence.

In the last number of the Contributions from the U. S. National Herbarium (Vol. VII, No. 2), Mr. O. F. Cook has given an interesting and valuable discussion on the origin and distribution of the Cocoa palm. This valuable species, now widely distributed throughout the tropical regions of the globe, has long been supposed to be of Asiatic or Malayan origin, in this aspect being an anomaly, for all other genera and species of American palms are different from those of Asia. After considering all claims, Mr. Cook concludes that this palm is undoubtedly of Central American origin, and even in prehistoric times began its journey around the world.

The subject of beautifying school grounds was recently discussed editorially in this journal, and we are glad to note the recent publication by the U. S. Department of Agriculture of a Farmer's Bulletin (No. 133) entitled "The Planting of Rural School grounds," by the Assistant Superintendent of Tree Planting, Bureau of Forestry. The Bulletin calls attention to the fact that a great number of schoolhouses in the United States lack the surroundings that make for comfort and contentment. City school grounds are often so small that planting is out of the question, though where space permits, it is not uncommon to find them carefully laid out, with a good arrangement of grass plots, flower beds, and shade trees. In towns and villages also, may be pointed out many examples showing great care and attention. In the country, however, an improved school ground is rarely found. In hilly, forest regions they are often denuded of soil and full of stones and stumps, and on the prairie many are well nigh as bare, bleak, and inhospitable as when they formed a part of the unsettled plain. The paper points out the needs of rural school grounds and indicates meth-

ods for their improvement. Important lines of study are suggested for teachers and schools in connection with trees and forests, and the information and advice given apply to country churchyards and to schoolyards in many towns and villages.

The flavor of the pineapple is so agreeable that no one has to acquire a taste for it. Pineapples are on the market throughout the year, but those sold at other times than during the main crop season are too high priced a luxury for the average man. The main shipping season is from the middle of April to the middle of July. The area in the United States adapted to their cultivation is considerable, and can be greatly extended. The largest tract of pineapple land is in Florida. Pineapples can also be produced profitably on some land in southern California. Although all of Porto Rico and the Hawaiian Islands are free from frost, the soil and climate are not uniformly adapted to their production. There is more land in the Philippines adapted to the production of pineapples than will be utilized for several generations. The pineapple supply of the United States is contributed to by Porto Rico, the Bahama Islands, Jamaica, San Salvador, and Trinidad. With the view of furnishing to all persons interested in the culture of pineapples information relative to their propagation and cultivation, the U. S. Department of Agriculture has had prepared and will soon issue Farmers' Bulletin No. 140, entitled "Pineapple Growing." This Bulletin was prepared by Peter H. Rolfs, pathologist in charge of the tropical laboratory of the Bureau of Plant Industry. The publication gives a concise statement of the general operations connected with the production of pineapples in the field and on a large scale. No attention is given to the growing of pineapples in glass-houses, the method being so radically different that a separate treatise is necessary. It gives a history of the pineapple family; describes the leading varieties, and treats of all matters connected with the cultivation of the pineapple and disposal of the crop, including soil, gathering, shipping, markets, prices, fertilizers, planting, cultivation, irrigation, canning, and disease. The Bulletin is for free distribution, and will be sent to any address on application to Senators, Representatives, and Delegates in Congress, or to the Secretary of Agriculture, Washington, D. C.

EDITORIAL.

As nearly as we can now estimate, Mr. Pollard's work on "The Families of Flowering Plants," issued as a monthly eight-page supplement, will be completed by the close of 1902, and we are already planning for the preparation of some work of permanent value to be issued in the same manner, thus making use of the pages that will then be available. We have in mind two works—a popular dictionary of plant terms, or a list of American plant-names somewhat similar in scope to Britten and Holland's well-known *Dictionary of English Plant Names.* We beg that our readers will advise us as to which of these proposed works will be most acceptable, or to suggest additional lines along which we may confer the "greater good to the greater number."

It may not be generally understood, but it is a fact that the United States Government is at the present time probably more generous in the aid of botanical research than any other government in the world. Through the medium of the various scientific departments at Washington, and the Agricultural Experiment Stations and Agricultural Colleges in each State and Territory, it is appropriating annually a sum considerably in excess of half a million dollars. A very considerable portion of this is being used in the prosecution of technical research, but of course the major part is expended in fostering economic lines of study. Under the first head comes systematic botany along many avenues—the working out of the life histories of various members of the lower groups of plants, etc.; while under the second comes investigations as to methods of combating plant diseases, forest conservation and management, forage plants, etc. Another very interesting line is that of botanical exploration and plant introduction. A number of students are maintained almost constantly in traveling in all parts of

the world on the lookout for new plants that may be grown successfully in this country, or in securing better and stronger strains of well-known plants. The introduction of a hard-grained rice from Japan, of drought and fungus resisting wheat from Russia, of salt-bushes from Australia, and date palms from the Orient, are a few of the numerous examples that may be cited.

BOOK REVIEWS.

STATISTICAL METHODS WITH SPECIAL REFERENCE TO BIOLOGICAL VARIATION. By C. B. Davenport, Assistant Professor of Zoology, University of Chicago. 16mo. Morocco flexible covers, 148 pp. Protractor and 20 pp. coordinate paper. Price $1.25. John Willey & Sons, New York.

The study of biological variation has received much attention ever since Darwin first called the attention of the scientific world to its great importance as a factor in the evolution of living forms, but strange as it may appear, it is only recently that the subject of variation has received systematic and accurate study. The most work along this line has been done by the zoologists, but it is time botanists began to realize more fully the great importance of this work, and to devote more attention to it.

The little book before us is devoted to methods of making quantitative studies of species and of organic variation in general, and the plotting of the results of such study. The subjects of the first five chapters are as follows: Chapter I. On the Methods of Measuring Organisms. II. On the Seriation and Plotting of Data and the Normal Frequency Polygon. III. Abnormal Frequency Polygons. IV. Cor-

related Variability. V. Some Applications of Statistical Biological Study.

The remainder of the book is devoted to tables and formulae used in the calculation of curves. These are conveniently arranged, and are indispensable in the line of biological work.

This little volume will prove very useful to all who wish to make an exact quantitative study of the variation of organisms, which study we believe is destined to receive great attention in the future, and to give us an exact basis for testing many of the current theories and speculations regarding the various factors of organic evolution.—C. L. S.

MANUAL OF THE FLORA OF THE NORTHERN STATES AND CANADA. By Nathaniel Lord Britton, Ph. D. 12mo., pp. X, 1080. New York, Henry Holt and Company. Price $2.25.

It is a neat-appearing and compact little volume which Dr. Britton has given us as a competitor to Gray's classic work, and one which arouses interest not merely in the treatment of species by the author, but in the arrangement and mechanical construction of the book.

Brevity requires, in a comprehensive manual of this kind, the absolute suppression of unnecessary matter; so that while many persons will feel annoyance at the omission of most of the synonyms, the average student will accustom himself to using the book for the sake of the descriptions, and will look elsewhere for his bibliography. The clearness and comparative fulness of the diagnoses of species, as well as the excellence of all the keys, cannot fail to find high favor among amateur workers. One of the very best features, in contrast with Dr. Gray's Manual, is the collation of all the divisions of a key rather than a promiscuous distribution through the pages of the text. We are pleased to observe, also, the insertion of ordinal names and their descriptions.

In the preparation of his text the author has freely availed himself of the cooperation of specialists, and the treatment of many families has been revised or contributed outright by Dr. Small and Dr. Rydberg. There is a tendency to radicalism in contrast to Britton and Brown's Illustrated Flora, which was somewhat conservative. Several hundred additional species are included, many of them new, but we regret the lack of uniformity in designating these new species, as also the careless proof-reading which has resulted in such errors as "Gymnandeniopsis," a genus said to be derived from "Gymnandenia."

As a thoroughly modern and practical presentation of our present knowledge of the northeastern flora, based on the most approved principles of nomenclature and classification, this book will take its place as our standard manual.—C. L. P.

Silk Cotton Tree (*Ceiba pentandra*).

THE PLANT WORLD

A MONTHLY JOURNAL OF POPULAR BOTANY.

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FURTHER NOTES ON TREES OF CUBA.

HEDGE TREES.

BY DR. VALERY HAVARD, SURGEON, U. S. A.

BEFORE these modern days of barb wire which now so universally fences one off from fields and pastures, boundaries were marked, and cattle as well as other trespassers kept out, mostly by live hedges; these were made from certain trees and shrubs combining the necessary qualities for the purpose, especially great hardiness and quick reproduction, from cuttings thrust into the ground.

The most commonly planted hedge tree in all parts of Cuba is the piñon espinoso, *Erythrina corallodendron*, with low branching trunk and fine scarlet flowers in early spring, before the appearance of the trifoliate leaves. Bees find much nectar in the flowers, and cattle eat the foliage. Another species, probably *E. cristagalli*, is said to be also used for the same purpose.

Another very common hedge tree, especially in the province of Santiago, where it grows like a weed, is piñon botija (*Jatropha curcas*), with cordate, palmately-lobed leaves, pale yellow flowers and greenish plum-like fruit drying black, and containing three large, bluish seeds. These seeds have a sweet, pleasant taste, and may tempt the unwary; they are a much more agreeable medicine than castor oil, but it is not safe to eat more than one or two, as the writer knows from experience.

The prettiest of this class of trees is the leguminous piñon plumago (*Gliricidia sepium* Kunth, [*Lonchocarpus sepium* DC.]), remarkable for the profusion of its light purple flowers (resembling those of the locust) on the leafless branches in winter, when it becomes the most conspicuous ornament of the country. Other common hedge trees are:

Bursera gummifera, almacigo, which yields an abundance of resin.

Its smooth, brownish-red bark has popular fame as a hydragogue cathartic. Its whitish wood is so worthless as to be slighted even by the charcoal burners, so that it is generally the only tree left standing in the stunted woods or jungles in the vicinity of Santiago.

Cordia alba, varia blanca, is very common along roads in the province of Santiago. It has a bushy, spreading head, an abundance of snow-white blossoms in summer, and white, transparent berries.

Spondias lutea, the hog plum, has already been noticed.

Euphorbia Canariensis, cordon, much planted around fields and gardens in the western provinces, especially about Havana, becomes arborescent when left alone, but submits easily to any amount of trimming, and forms a tight, forbidding hedge. It leafs freely, but has never been known to blossom on the island. An abundant milky and very corrosive juice flows from all cuts and breaks.

Much less common is *Yucca gloriosa*.

Another plant worth mentioning, although not arborescent, is *Bromelia pinguin*, maya, or piña de raton of the Cubans, looking somewhat like its relative the pineapple, but with stronger, stiffer, spiny leaves, four to six feet long, which, interlacing, form a dangerous hedge, the kind our soldiers had often to cut their way through in the Santiago campaign. The spike of the pink flowers in spring is quite pretty, and the acidulous berries very palatable.

Let us add to the list two shrubs of the orange family, used here and there for ornamental hedges, *Triphasia trifoliata* with yellow fruit, and *Murraya exotica*, a handsome evergreen with red berries.

Miscellaneous Cuban Trees.

Widespread over the whole island, and conspicuous round about Havana is the ceiba or silk-cotton tree (*Eriodendron anfractuosum*), a giant among Cuban trees, its straight columnar trunk sometimes seventy-five feet high before breaking, and seven or eight feet in diameter below, with strong, twisted, wing-like buttresses at base, the huge branches spreading out horizontally above and often giving the whole tree, especially when much exposed to the wind, the aspect of a huge parasol. This is the historical tree of Cuba; under it, in 1519, was celebrated the first mass in Havana, a descendant of the original tree now growing luxuriantly on the very same spot, in front of the Templete. Under a ceiba, also, General Shafter received the surrender of the Spaniards at Santiago in 1898. The wood is worthless, but the trunk was formerly hollowed into large canoes. The abundant wool in the capsules is sometimes used by upholsterers.

Another large tree, also with palmate leaves and strong buttresses at the base, but the trunk divided a few feet from the ground, is *Ster-*

culia Carthaginensis, called anacahuite by the natives, but very different from the Mexican anacahuite (*Cordia Boissieri*). It is common in Santiago, but rare about Havana. Its strong, tortuous, wide-spreading limbs and dense foliage sometimes afford ample shade for a dozen families. The large capsules contain bluish, very palatable seeds.

Oftentimes, as one looks up a wooded slope, masses of brilliant white are seen swaying in the breeze, as if much of the slope was in bloom; this optical illusion is produced by the snow-white under surface of the moving, broad, palmate leaves of *Cecropia peltata*, a near relative of the bread-fruit tree, and sometimes mistaken for it. The wood of its cylindrical, annulated trunk is soft and useless.

Bambusa vulgaris, the common bamboo of Cuba, with stems often four to six inches in diameter (thicker in Santiago than in Havana) and sixty feet high, forming above long nodding plumes of tender green, deserves the distinction of being mentioned among trees. It is most frequent on lowlands, being thriftiest near watercourses, but it is also sometimes seen growing on high slopes and even on the very hilltops. In favorable localities the stems grow in thick clusters not unlike the fluted pillars of gothic cathedrals, the tops spreading above and forming arches through which is ever heard the murmuring breeze.

The stem being hollow, with tight partitions at the nodes, is very useful as bucket and water canteen. By boring through two or three partitions, segments of stem four or five feet long can thus be utilized and carried slung on the back like a gun. During the siege of Santiago all the water used on San Juan Hill was hauled up in bamboo stems.

Of timber hardwood trees Cuba has a number of valuable species. The first place belongs to the mahogany (*Swietenia mahagoni*), and the allied West Indian cedar (*Cedrela odorata*), both large, high trees formerly common all over the island, now only found in interior forests. The mahogany of Cuba is particularly hard and fine grained, much superior to that from Honduras which now mostly supplies the American market. Cedar wood is reddish-brown with a pleasant odor, and formerly entered largely into the construction of the best Cuban houses. Both woods are a common material of the doors, shutters, floors, ceilings and beams of old buildings, and during the war in Santiago were commonly burned as fuel.

Among valuable leguminous hardwood timber trees may be mentioned:

Braya ebenus, ebony, granadillo, a small tree, rather common, with very hard, heavy wood, sometimes pure ebony black, but generally ranging in color from yellow to deep brown with sharply defined inky bands and blotches, or again nearly black with clearly cut whitish

markings. It is much used for cabinet-work, musical instruments, canes, etc.

Hymenoea courbaril, quiebra hacha, a high spreading tree with exceedingly hard and compact wood well deserving its name of ax-breaker.

Belairia mucronata, jamaguey, with compact, heavy, fine-grained, light-colored wood.

Lysiloma sabicu, sabicu, a large tree with wood having all the qualities of mahogany, but lighter colored, and almost indestructible.

Poeppigia procera, tengue, medium-sized tree with dark, brick-colored heartwood beautifully veined.

Andira inermis, yaba, a rather common medium-sized tree with wood of variable color from reddish to dark brown and yellow; much esteemed for the construction of boats.

The mesquite (*Prosopis juliflora*), so common from Texas to South America, and in Jamaica, is not found in Cuba. *Acacia Farnesiana* is found in all parts of the island, but never larger than a small straggling shrub; whoever has seen it in Texas (the huisache of San Antonio) as a shapely tree, a foot or more in diameter, wonders at such degeneration in the tropics.

Among Sapotaceae may be mentioned:

Bassia albescens, acana, of large size, with edible fruit and reddish, almost indestructible wood; *Dipholis salicifolia*, cocuyo, a large fragrant tree with very strong, compact, elastic wood, dark yellow with black veins; *Sideroxylon mastichodendron*, jocuma prieta, a common medium-sized tree with dark, very hard, compact wood.

Other timber trees equally valuable for their hard, strong, compact, heavy, durable, often richly colored wood, but which can only be enumerated here, are: *Hibiscus tiliaceus*, majagua; *Guajacum officinale*, Guayacan; *Cordia gerascanthoides*, varia; *Guazuma ulmifolia* and *G. tomentosa*, guasima; *Calicophyllum candidissimum*, dagame; *Guettarda longiflora* and *G. scabra*, cuero; *Chrysophyllum oliviforme*, caimitillo; *Oxandra virgata*, yaya; *Cameraria latifolia*, maboa; *Laplacea Curtyana*, almendro: *Chuncoa obovata*. chicharron prieto; *Bucida capitata*, jucaro prieto; *Zanthoxylum bombacifolium*, agua amarilla; *Maclura tinctoria*, fustete; *Thiodia loetioides*, guaguasi; *Tecoma longiflora*, roble real; *Byrsonimia lucida*, carne de doncella.

The oak family is represented solely by *Quercus virens* in Pinar del Rio, where it is neither abundant nor of large size.

Of conifers, apparently only one pine is known, *Pinus Cubensis*, common in Pinar del Rio as a small or medium-sized tree, but much larger on the Isle of Pines. Three species of *Podocarpus* are described, *P. Purdieanus*, very large tree in southeastern Cuba, *P. coriaceus* and *P.*

angustifolius in Pinar del Rio. *Juniperus Virginiana* is also mentioned in Sauvalle's catalogue, but is probably not indigenous.

Of Anacardiaceae, the mango and species of *Spondias*, already referred to as fruit trees, have also serviceable wood; much more useful, however, for cabinet-work and construction is that of *Rhus metopium*, a small to medium-sized tree abundant on the Isle of Pines. The ill-famed, everywhere common guao (*Comocladia dentata*), which in Cuba replaces the poison ivy of the United States, sometimes becomes arborescent and twelve to fifteen feet high, with a verticil of spreading branches at the top; it is, however, principally noticed here on account of its virulently toxic properties.

In closing, let us mention the many arboreal and arborescent species of *Coccoloba* found near the seashore, and the ubiquitous mangrove, silently pursuing its task of reclaiming salt marshes.

Havana, Cuba.

NOTES ON THE PAN-AMERICAN EXPOSITION.

By Pauline Kaufman.

THE horticultural display on the grounds of the Pan-American Exposition was excellent. Almost every flower that blooms was shown in profusion, in its season. We were too late for the masses of roses, which were said to have been beautiful, but came in time for the grand showing which late summer and early autumn affords. Especially fine were the masses of canna and of cardinal flowers with unusually dark red leaves. Large collections of cacti, grasses and ferns were seen. Tired with sight-seeing, one had only to step out of a building and sit down to a feast of flowers. South of the Manufactures building *Victoria regia* held court, surrounded by her satellites Nymphaea and Lotus of varying shades of pink and blue, yellow and white, and guarded by tall rushes, sedges, and water plants of all kinds.

In the Horticultural building the plants were rather a disappointment, though much attention was paid to what looked like a small plantation of pineapples and to the seedling cacti in their one-inch pots. Forage and medicinal plants constituted the botanical exhibit of various countries. Of the latter Honduras had, I think, the largest number. Here we were shown a thick vine, minus leaves, from which we were told India rubber is obtained. The identity of this vine was known only to two native gentlemen, who were not yet ready to make it public. Another interesting growth was the limb of a small tree which showed on the cut ends a perfect Swiss cross. This is called the

Tree of Life. We could get no botanical names, as the labels were all Spanish, as was also our informant. A root lying on a shelf was blooming, with a raceme of bright scarlet flowers. It looked like a Euphorbia, but was rhubarb—very different from our own. Many poisonous plants and their antidotes were exhibited. One small room was also set apart for the interesting ruins of Copan.

In the streets of Mexico orchids and cacti plants could be bought, also a candy made from the melon cactus. It was made in the shape of the melon, and slices were cut off. It was quite palatable, but after a little while became stringy. The Japanese village had its usual quota of dwarf evergreens and azaleas.

Nature has done much for the Filipino. Everything is made of bamboo. The waterproof houses built on stilts and shingled with nipa, the leaf of the cocoanut palm, the furniture, almost all of the utensils used in daily life, the beautifully carved and lacquered vases that look just like bronze, even the toys of the children. The windows of the houses are made of a flat, straight, semi-transparent oyster shell, for the purpose, one would think, of keeping people from looking in. You could see the natives making rope from the fibre of a native plant called abaca; weaving the daintiest gauze from the fine strong fibre of the pineapple leaf with old-fashioned hand looms. This piña cloth is used not only by the Filipino belles, but in quite large quantities by our own. They can give us points also in ironing. This is done sitting, with a long-handled, flat-bottomed metal reed filled with burning charcoal, passed back and forth just like our smoothing irons. The betel nuts, longer than our pecans, but much like them in shape, were mostly hollow. Their jute-like exterior is used like a tooth brush, the rest being chewed. The antics of the only caribou or water buffalo, with his small attendant were very diverting, several daily baths being essential.

A corner in the Horticultural building set apart for Java was also rich in botanical interest. Cocoanuts in all sizes shapes and designs were beautifully carved and etched; calabashes with fine pen-and-ink sketches of native fruits; necklaces of various beans and seeds, particularly the glossy gray Job's tears (*Coix lacryma-Jobi*); fancy articles and exquisite doylies made from lace bark ornamented with groups of ferns and edged with French cotton, which though very like our milkweed is the product of the cotton tree; lace mats of banana fibre; the monkey tamarind, and a bean one and a half inches wide and a foot long, called by the Jamaicans woman's tongue, because the least little breeze set them all in motion. The English gentlemen in charge abjured all responsibility as to the name of the latter. Most unique were the lace bark dusters, the handle being the bark in its natural state, while the duster consists of several layers of the bark threshed out to

lace-like filminess. So far as we could discover, Jamaica was the only place in the Exposition where collections of native ferns could be purchased.

Chili had a wonderful educational display—such a number of fine pictures, marble groups and figures, native animals and fishes, minerals, manufactures, splendid work of all kinds from schools and colleges, and last but not least, a very valuable ethnological subject, the petrified body of a woman found in a copper mine. There was but the outer shell left, but the hair and nails were still perfect. The body weighs fifty pounds, and it is not positively known to what tribe she belonged. This is said to be the only petrified body found, and the authorities have refused large sums of money for it.

New York City.

THE FLORA OF SNOW CANON, CALIFORNIA.

By S. B. Parish.

MILL Creek is a stream conveying the drainage of the southern slopes of Grayback and San Bernardino mountains, the culminating summits of the range which takes its name from the latter peak. From its narrow, boulder-strewn gorge these mountains rise with great abruptness, often in acclivities of naked rocks, but generally shaggy with a scattering growth of conifers and oaks, or a denser chaparral of Ceanothus and other shrubs. At one place, secluded in a recess which it has excavated in the rock-walls, a slender stream tumbles over the precipice and then makes its way in a series of cascades to the cañon floor. On the opposite side of the stream the slopes are nearly as rugged and abrupt, but are less lofty, and are cut by a few side cañons. Botanically Mill Creek possesses considerable interest, for here have been found the types of half a dozen species, one of which, *Juncus canaliculatus*, is as yet known only by the scanty collections which have been made on its banks. But in general its vegetation is that common everywhere at the same altitude in these mountains. It has, however, a short side branch which can bear no other name than that of Snow Cañon, which seems to me one of the most interesting spots in southern California. This is a little below the falls, and on the opposite or southern side of the creek, and consequently in the lower mountains of that side, and not in the dominant peaks. The altitude of the point where it reaches the creek bead is about 5500 feet above sea level. Its mouth is choked with a great moraine of boulders, and discharges no surface water. But following up for a half mile one comes upon a pure

cold stream rippling over its stony bed. Another half mile of ascent and the cañon divides, the stream coming from the left-hand fork. The right-hand branch is a narrow gorge, having very abrupt sides, and so situated that it is sheltered from the summer sun. A miniature glacier of compacted snow fills its bed and lingers late into the summer, perhaps, after winters of unusual snowfall, carrying a lingering remnant into a second season.

At the time of my last visit, June 20, 1901, the snow-field began just above the mouth of the gorge, and extended up it nearly a mile. The altitude at the foot of the snow must be about 6000 feet, and as the ascent is very steep, the upper end must be about 6500 feet. In many places the conductivity to heat of the rock-wall of the gorge had formed a crevice between it and the snow-bank. At one point this was sixteen feet deep, which would indicate a depth of perhaps twenty-five feet in the middle of the bank. The bent and broken shrubbery of the sides showed that at the close of winter the snow had been fully eight feet deeper. No water flowed from the snow-bank, the wastage being absorbed by the dry atmosphere, or percolating through the porous bed of the gorge.

The influence of this mass of snow on the vegetation of the cañon was manifested in two ways: first, by enabling a few plants to remain at an altitude much lower than that which they usually occupy elsewhere in this region; and second, by the presence of a few representatives of a more northern flora, which are found in these southern mountains only at this place, so far as is known.

The most conspicuous member of the first group is *Pinus albicaulis*, which caps the summits of our highest peaks, at 10,000-11,000 feet, and consequently is here some 4,000 feet below its usual altitude. There are also thickets of *Salix flavescens*, which were not yet in leaf, 1,500 feet lower in altitude than elsewhere in these mountains. *Selaginella Watsoni* was plentiful in the crevices of the cliffs, a species I had never seen below 7,000 feet, and then not in abundance, and which is more commonly found at 9,000-10,000 feet. I also got a specimen of *Draba corrugata*, which has been collected elsewhere only on the summit of Grayback, 11,725 feet, and of San Jacinto, over 10,000 feet above the sea.

The second group of plants, those which have not been found elsewhere in southern California, is a very interesting one. Some of these, probably all of them, may yet be discovered in other cañons of these mountains, but as yet none, with a single exception, have been reported from any station within hundreds of miles; and it is most improbable that there is any other unexplored cañon in which so many northern strangers are congregated.

At the very foot of the snow a fringe of *Acer glabrum* skirts the ravine. The nearest point from which this has been reported is the Panamint mountains some 200 miles to the north, where it was collected by the Death Valley Expedition. It is here a graceful shrub, eight to twelve feet high, and at the time of my visit was loaded with well-grown fruit. Some of the leaves were covered with the brilliant scarlet blotches of an elegant ascomycetacous fungus, too young for determination.

On the rocks from which the maples grew were clumps of *Polystichum scopulinum*, a fern which I have collected also in one other southern California locality. I cannot find any station reported for this fern within 500 miles so far south.* With it also grows *Polypodium vulgare*, which has not been reported from any place within an equal distance,† but which may well be expected elsewhere at high altitudes. The plants are rather intermediate between the species and the variety *occidentalis*, the form attributed to California by recent writers. The last of this group is *Senecio triangularis*, for which the nearest reported station is the Big Tree Cañon of the Kaweah River, in Kern county.

These lists are not extensive, but it seems to me they are notable for a single narrow cañon, hardly a mile long. Repeated visits might be expected to enlarge them, for in the upper part of the chasm which had opened between the snow-bank and the cañon side, the crevices of the rock were full of plants just starting into growth. Every night the snow, only a foot or two away, must reduce the temperature to the freezing point. They were growing as plants grow in the far north, or on alpine heights, at the edge of the snow, but their growth was vigorous. They were quite too young to permit even a guess as to what they might be, except one, a maidenhair fern, which was just uncoiling the tips of its delicate fronds. It appeared to be *Adiantum Capillus-Veneris*, and if it were, is as far above its usual haunts in this region as some of the other plants are below theirs. One's curiosity was piqued as to what its companions might be, for what might not be hoped from these frigid surroundings? Hardly was it to be expected that the ordinary inhabitants of these southern mountains should have adapted themselves to this exceptional environment. But the determination of these questions must be left for later visits, should an opportunity permit, or, perhaps, for other visitors.

San Bernardino, California.

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*"Santa Cruz and Mendocino Counties," M. E. Jones, Ferns of the West, 26. "Near Shasta," Lemmon, Ferns Pac. Coast, 6.

†"Yo Semite." Lemmon, *l. c.* "Near San Francisco." D. G. Eaton, in Brew. & Wats. Bot. Cal. 2: 334.

BRIEFER ARTICLES.

The Preservation of Native Plants.

The thoughtless and indiscriminate picking of flowers and breaking of twigs or branches from wild plants is an offence perpetrated by many persons who ought to know better. Every effort to educate people to realize that plants which are thus picked or broken can not be enjoyed by others who follow them, is a distinct aid in diminishing selfishness and in developing the more healthy taste to preserve natural objects rather than to deface or destroy them. In the vicinity of many of our cities and towns, wild flowers, once common, have become rare by such vandalism, so that the healthful pleasure and interest of woodland walks have become much less enjoyable.

In order that the desirability of preserving native species in their full beauty shall be continuously brought to the public attention, the Misses Olivia and Caroline Phelps Stokes presented to the Board of Managers of the New York Botanical Garden, under date of August 29, 1901, the sum of $3,000, on condition that the interest of this fund should always be used for the investigation and preservation of native plants, or for bringing the need for such preservation before the public.

At a meeting of the Board of Managers held October 23, 1901, the following resolution was adopted:

Resolved, That the gift of $3,000 from Olivia and Caroline Phelps Stokes, for the investigation and preservation of our native plants, be and is hereby gratefully accepted, under the conditions of the letter of Miss Olivia E. Phelps Stokes to Professor N. L. Britton, dated August 29, 1901.

At the same meeting it was referred to the Scientific Directors, with power, to determine upon a method for the expenditure of the annual interest upon the fund, and at a meeting of the Scientific Directors held December 6, 1901, the following resolutions were adopted, they having previously been submitted to the Misses Stokes, who made some valuable suggestions concerning the details:

Resolved, That this gift be known as the Olivia and Caroline Phelps Stokes Fund for the Protection of Native Plants.

Resolved, That the annual income from the Stokes Fund be at present applied to the payment of prizes for essays upon the preserva-

tion of wild plants, including shrubs, herbs and trees, and the publication and distribution of such essays, which are to be first published in the *Journal* of the Garden, and republication of them invited from other journals, magazines and newspapers; that they also be issued as separates from the *Journal* and distributed gratuitously to all interested.

Resolved, That such essays must be submitted to the Director-in-Chief not later than February first; those accepted for prizes to be published in the March, April and May issues of the *Journal;* they must not exceed three thousand words in length and must be clearly written or type-written in triplicate; they become the property of the Garden, which does not undertake to return any essay submitted.

Resolved, That for the year 1902 the following prizes be offered, payable April 15th:

1. A first prize of $50.
2. A second prize of $30.
3. A third prize of $20.

Resolved, That the awarding of these prizes be referred, with power, to a committee consisting of Judge Brown, Professor Underwood and the Director-in-Chief.

It is further arranged that in all lectures, bearing in any way on native plants, delivered under the auspices of the Garden, this topic shall be alluded to; it will be brought out in its very important relation to forests by Mr. Van Brunt in his lectures on "Trees, their Flowers and Fruit," to be given at the American Museum of Natural History in April, and will be brought to the attention of visitors to the wild parts of the Garden by suitable notices and restrictions.

Presentation of essays in competition for the three prizes now offered is invited from anyone interested, under the conditions outlined in the foregoing resolutions.—N. L. Britton, Director-in-Chief, New York Botanical Garden, Bronx Park, N. Y. City.

Notes on Plant Distribution in Nebraska.

The article in the October PLANT WORLD on "Some Interesting Cases of Plant Distribution," has no doubt been as interesting to many of your readers as it was to me. I believe we have too little of that kind of information, and should have all that is to be had. I therefore add my little, though some of it is now growing old with me.

In June, 1891, friends brought me a violet from ten miles south of Atkinson, Holt county, which "whitened the ground like snow" in a low hay meadow on their claim. It turned out to be *Viola lanceolata*, not reported west of Minnesota. The same year I found *Brasenia peltata* in Swan Lake, twenty-five miles south of Atkinson. It was past flowering, but the ranchman, a college graduate, described the flowers,

which left no reasonable doubt after finding such unique leaves. "Manitoba and Texas," are the nearest points mentioned in the Illustrated Flora. August 22, 1896, I found *Tribulus terrestris* in the village of Newport, Rock county, very abundant, and observed during the two previous years. It formed a suitable companionship with the sand-bur (*Cenchrus tribuloides*), with which it was so intermingled that collecting it was a disagreeable task. It seemed possible that it had been brought west in "relief goods," during the drought of 1894, as the burs will stick even into boxes, and might be carried for long distances. It belongs on the Atlantic coast, as an accident from ballast, I suppose. In 1900, I found two or three hundred plants of *Sisymbrium altissimum* in a vacant lot in Ewing, the eastern village of Holt county. Previously Minnesota had been the nearest locality.

May 14, 1896, I found in Long Pine Cañon, Brown county, a plot of *Geranium maculatum* about a yard in extent. Dr. Britton would not believe that I could be correct until he saw it. It blooms profusely, but spreads only by stolons underground, probably lacking cross fertilization. A careful search has failed to disclose any other plants. Whether this is a survival of ancient times when a moister climate prevailed in this part of "the great American desert," or how else it is to be accounted for is a puzzle for the scientists. I have found no probable evidence that any settlers brought it from the east, and I am confident that no one in that vicinity knows where to find it. I did not dare to disclose it to others for fear of its destruction. Two miles up the cañon, in 1899, I found *Pyrola elliptica* and *Avena striata* growing together in a shady dell under black walnut trees. *Pyrola* had not been found before in Nebraska, and *Avena* but once, in the northwest corner of the State, over 250 miles away.

In my yard in Long Pine, I found in May, 1898, about two hundred plants of *Erysimum repandum*, a weed of Syria and Palestine. It had been found once before, on ballast in Philadelphia, and mine was the second collection to find its way into the National Herbarium. It is slowly spreading into vacant lots, and maintains itself well on the same spot. Will somebody account for it? The same year I found *Lithospermum arvense* in a back yard in Long Pine—a dozen strong plants—where it had never been seen before. It has been collected at Lincoln, 250 miles east. My friends who found it on their premises are acute observers, very fond of plants, and could not have passed it by in other years. The next year it did not "show up," nor has it since.

In Cherry county there are six miles of *Caltha palustris* gilding the marsh of Boardman creek. I know of no other locality nearer than Iowa. In Sheridan county, which is west of Cherry county, I found *Solidago speciosa* abundant in a dry cañon thirteen miles northwest of

Rushville, on the road to Pine Ridge Agency. The racemes are less developed than in moister climes, otherwise they are splendid specimens. Other less notable discoveries might be enumerated, but I fear to trespass upon valuable space. I have but one explanation for these rarities, viz.: that we lack trained observers to see, identify and report. From what I have found I have reason to believe that I have only made a good beginning of what is to be found, and that such plants as I have here reported are scattered here and there all over our wide domain, waiting for those who have eyes to see.—J. M. Bates, Callaway, Neb.

Struggle for Existence among Plants.

The study of those plant-formations that owe their origin to the disturbances set up by man incident upon his cultivation of the soil, affords an interesting field for observation. The breaking of the soil and destruction of native species opens the way for the introduction of new species particularly suited to the prevailing conditions. A waste-formation is the result, and the composition and character of such formations vary with local conditions.

On the vacant lots in Stillwater, Oklahoma, it is not unusual to find very compact waste-formations composed entirely, in some cases, of *Prionopsis ciliata*, one of the Compositae. This is a rather widely distributed plant throughout Oklahoma and the Southwest, and assumes in many localities the character of a rather important weed. A vacant lot was selected, on which the plant covering was composed almost entirely of this species, for the purpose of determining by accurate counts the number of plants per square meter of area. A total of 4038 plants were found on an area of exactly 100 square meters, the average number of individuals per square meter was therefore found to be 40!

Counts were made to determine the average number of heads per plant, and this average was found to be 7.5 on the 100 square meters; therefore there were 30,225 heads, or an average of 302 heads per square meter! On the entire area not to exceed a dozen live plants of other species were found on September 1st, distributed among the following species: *Panicum capillare*, *Ambrosia artemisiaefolia*, and an undetermined *Polygonum*. Surely this may be considered a typical example of a "closed" formation. The perfect adaptation of this plant to the extremely arid conditions prevailing in the region throughout the summer, had enabled it to outlive the few plants even that had survived the severe struggle for existence that occurred early in the season.—E. Mead Wilcox, Alabama Polytechnic Institute, Auburn, Alabama.

GENERAL ITEMS.

The seventh annual winter meeting of the Vermont Botanical Club will be held at Burlington on January 24th and 25th, on which occasion they will be addressed by Dr. B. L. Robinson, of the Gray Herbarium, who will speak npon "Some Recent Advances in the Classification of Flowering Plants." This organization is one of the best in the country, and is doing excellent work, which we could wish to see emulated elsewhere.

While spending a few days with a botanical friend in Connecticut, my attention was called to a peculiar exudation on the berries of the staghorn sumach (*Rhusihirta*). It looked like salt. I was told that an excellent drink could be made from the same. On tasting, I had my doubts as to the excellence. Several branches of berries were steeped in water for some hours, the water strained and sweetened, the result being a splendid lemonade—or should one say sumachade—with a more refined taste than that made with either limes or lemons.—*Pauline Kaufman, New York City.*

Some time ago we mentioned the fact that the Bureau of Forestry of the U. S. Department of Agriculture had offered to prepare plans for the scientific management of private forest tracts in various parts of the country. The quickness with which this offer was accepted is well shown by the fact that within two years they have been given the management of more than a million and a half of acres of private forest land in the South alone, and have in hand requests for the handling of more than 2,500,000 in other sections. The Baltimore & Ohio Railroad Company has asked for a working plan for a tract of 125,000 acres of their forest land in southeastern West Virginia, and other corporations are doing likewise. All this shows better than anything else can the marvelous advance made by scientific forestry within the past decade, and it may be accepted as a sure indication that public sentiment has at last been thoroughly aroused. It now really seems that something will be done before it is too late, to save our priceless forests.

NOTES ON CURRENT LITERATURE

Captain George P. Ahern, U. S. A., who is in charge of the Forestry Bureau at Manilla, has compiled a small work on the important woods of the Philippines, containing a number of colored plates taken mainly from Blanco's and Vidal's classical treatises. It appears that there are over 600 species of trees on the islands, yielding besides timber other important economic products, such as gums, rubber, oils, etc.

No 8 of Mr. C. G. Lloyd's series of mycological notes has been distributed. It contains interesting and valuable notes on several species of puffballs, especially Geasters, and is illustrated with reproductions of Mr. Lloyd's excellent photographs. It is greatly to be regretted that the usefulness of the author's work is so largely decreased by his peculiar ideas of nomenclature. Neither priority nor authority being recognized, confusion rather than clearness frequently follows a study of his notes.

"Ten Common Trees," by Susan Stokes, of the High School in Salt Lake City, published by the American Book Company, is the latest addition to the well-known series of Eclectic School readings. In the form of interesting stories it presents a series of simple nature lessons dealing with ten of the trees most familiar to children. These lessons describe the life of the tree and its relations with the soil, moisture, winds, and insects. The topics are so arranged that the teacher can readily accompany each lesson with actual nature work. The book is illustrated by carefully made and accurate drawings, and contains a list of articles, in both prose and poetry, referring to the tree-families described, and suitable for reading and recitation.

Dr. W. J. Beal of the Michigan Agricultural College, has an article in the November number of *School Science* entitled "The Study of Botany 36 Years Ago with Asa Gray." Dr. Beal is one of the few links connecting the older school of botanists in this country with the present day. He relates in a very interesting manner his studies under Dr. Gray at Harvard in 1865, and contrasts the condition of the science of

botany at that time, and the methods pursued in its study with those of to-day. The contrast is, of course, striking, and brings very forceably to mind the rapid strides which have been taken in the various lines of botanical investigation. At that time there were but two persons in America who were following botany as a profession and securing a livelihood by this means. These were Asa Gray, of Harvard, and D. C. Eaton, of Yale. The teaching was almost entirely from textbooks, and limited mostly to systematic botany, which was restricted chiefly to flowering plants. Graduate students read Mohl on the "Vegetable Cell," and Lindley's "Vegetable Kingdom." We should remember, however, in noting the work done at that time, that the science of botany was in its infancy almost, so far as teaching was concerned, and that modern facilities, methods and appliances were largely unknown.

The January *Country Life in America* is a California number with superb pictures characteristic of this unique and beautiful magazine, and wholly devoted to the out-door world on the Pacific coast. The special covers show big trees of the Sierras, and a magnificent frontispiece the blooming orchards at the foot of snow-capped mountains. The leading article, by L. H. Bailey, tells of the diversified beauties and peculiarities of the land that flowers in winter and sleeps in summer, where thunder storms are not, and where the sun shines everlastingly. Pioneer days are recalled by "The Heroes of the Firing Line," a poem by Joaquin Miller; the trend of wonderful development is the theme of "Country Life in California," by A. J. Wells: and "The Story of a Great California Estate," by Charles Howard Shinn, naturally follows. Throughout, the unusual opportunities for illustrating California at its best have been well taken, but of particularly striking beauty are several series of photographs. Of these, "The Cypresses of Monterey" show a picturesque feature of the southern coast; the Yucca palms and Gila monsters, the weird life of the Mojave desert; and the poppies and poppyworts furnish the color that gives California its fame as a land of flowers. Then, in a practical way, a portion of the number is devoted to the making of homes and gardens, the culture and commercial handling of fruits, and to many aspects of the soil. Certainly *Country Life in America* grows better with every number, and proves the grip that life under the open skies has upon us Americans.

EDITORIAL.

On another page of this issue will be found an announcement of the New York Botanical Garden with respect to a prize competition in which we think all of our readers will be interested. Several months ago the sum of $3,000 was offered to the Garden to be used in such manner as might be approved for the maintenance and preservation of native plants. This munificent gift, made to an influential and powerful institution, and supplementing the educational and missionary work now being carried on by the Boston Society for the Preservation of Native Plants, is sure to go far in the solution of the problem. The Scientific Directors of the Garden have wisely decided to use, for the present, only the income of this sum; and as a means of gaining valuable suggestions from plant-lovers and botanists throughout the country, they offer three prizes for the best essay on any phase of the subject of plant preservation. The conditions of the competition will be found enumerated in the official announcement; and we trust that some, at least, of our subscribers will decide to make a trial.

The latest leaflets issued by the Boston Society for the Preservation of Native Plants contain interesting articles by Professor G. L. Goodale and Mr. Geo. E. Davenport, and will be sent to anyone upon application. It is gratifying to learn that the American botanical press is united in its support of the objects which the Society strives to attain, and it gives us pleasure to note that the journal in which is appearing the railroad advertisement criticised by us editorially in the September issue of THE PLANT WORLD has published an explanation of the advertisement which eliminates the worst features of the latter.

We desire to testify to our appreciation of the letters we have received commending the neat appearance of our reprint of volume I No. 1 of the *Asa Gray Bulletin*. We trust that those who have received copies will not be remiss in forwarding payment promptly. The close of a year, with the necessary indexing, purchase of supplies, etc., brings heavy expenses to all publishers; and this year we are planning something in the way of a New Year's gift to our subscribers to signalize the opening of our fifth year.

The editors of this journal desire to enter a respectful but vigorous protest against the use, by plant ecologists, of the term "plant-formation." This term has become so firmly fixed in geology and paleontology that it is an integral part of its literature, and ought not to be displaced or rendered ambiguous. A plant-formation, therefore, is properly a geological horizon which is marked or characterized by the presence of fossil plants. A "plant-formation" of the ecologist is simply a plant society or association characterized by the presence of certain living plants growing under similar conditions.

BOOK REVIEWS.

A MANUAL OF DETERMINATIVE BACTERIOLOGY. By Fred. D. Chester. Octavo, pages vi–401, figs. 13. New York, MacMillan & Co., 1901. Price $2.60.

The author informs us in the preface that this work was the outcome of a study of the bacterial flora of cultivated soils. On account of the great amount of labor involved in compiling and collating the

information required for that work he decided to embody the results in a more permanent form which might prove useful to other workers. Professor Chester has already published in the Annual Report of the Delaware Experiment Station for 1897, a preliminary arrangement of the species of *Bacterium*. The present work contains descriptions of 780 forms. The system of classification is chiefly that of Migula, whose great work on systematic bacteriology covers the whole ground in a very thorough manner, and is based upon actual investigations and cultivation of the species described. The present work will no doubt be found useful to students who do not have access to Migula's work.

A portion of the book is devoted to terminology, which contains an illustrated series of simple terms which much facilitate the description of various characteristics of cultures. The typography of the book is excellent, and it will no doubt find a place among the reference books of most bacteriological laboratories.—C. L. S.

SOUTHERN WILD FLOWERS AND TREES. By Alice Lounsberry. Illustrated by Mrs. Ellis Rowan. 12mo, pp. xxxi, 570. With 176 plates and numerous text figures. New York, Frederick A. Stokes Company.

This book is of more than passing importance to plant lovers or to botanists in general. It is the first work of a popular character devoted entirely to our southern wild flowers. We have had a long procession of non-technical floras, each following some distinct and remarkable classification, but the southern limit of all of them has apparently been Mason and Dixon's line. Now we are taken by Miss Lounsberry to the very crest of the southern Alleghenies, and down to the broad expanse of pine barrens, while the familiar flowers of Dixieland smile at us from drawing or from painting on almost every page.

That Miss Lounsberry's work has been well done everyone who has read her earlier books will be ready to believe. Her style is attractive, and the scientific information which she presents is accurate, something that cannot be said of many popular floras. In order to familiarize herself with southern plant life, the author has traveled extensively in the South, and spent some weeks at the Biltmore Herbarium carrying on studies with Mr. C. D. Beadle, its Curator, who contributes an introduction to the book.

Mrs. Rowan's beautiful drawings are so well known that they require little further commendation. In the simpler studies of blossom and branch she is at her best, a certain faulty perspective becoming

manifest in those pictures containing suggestions of landscape. The plants chosen as subjects for the sixteen colored plates have in many cases never been figured, and so possess an added interest. Among the best of the plates may be mentioned the flame-colored Azalea and the American Wistaria. The treatment of text is uniformly excellent. Each popular account is preceded by a brief description, which, though scientific, is readily to be understood. The nomenclature throughout is that of the Rochester Code, which in spite of some attempts to prove the contrary, seems to be finally establishing itself in the literature of popular botany. Altogether, Miss Lounsberry's latest book is an admirable piece of work, and cannot be too highly commended to everyone interested in the science.—C. L. P.

OLD-TIME GARDENS. Newly Set Forth by Alice Morse Earle. A Book of the Sweet of the Year. Octavo, pp. xix, 489. The Macmillan Company,

Mrs. Earle has written with authority and charm of many things pertaining to colonial days, and her delightful recent book on Old-Time Gardens is most welcome to flower-lovers. It is pleasant to read of our colonial ancestors engaged in the genial pursuit of garden-making, and the chapter describing these first American gardens is one of the best in the book.

Fifty years after the Pilgrims landed at Plymouth, a traveler named Josselyn published lists of plants then in cultivation in New England. These showed the gardens to be well stocked with vegetables and medicinal herbs, and though ornamental plants were fewer, still they made a brave showing. The Dutch settlers, Mrs. Earle says, brought to America their love of flowering bulbs and the bulbs themselves; and the kitchens and flower gardens of the Netherland dames were proudly-kept possessions. In the Southern colonies there were fine gardens on the large estates, but less care for flowers in the humbler homes.

The front door-yards, Mrs. Earle tells us, was derived from the English fore-court, and she writes sympathetically of New England front door-yards, establishing the pedigree of some door-yard favorites, such as the peony, which is of unquestioned antiquity, dating back to the Greeks. Lilacs have a chapter all to themselves, and the apple tree, with its historic and legendary lore, is not neglected. The author also discourses pleasantly of plant names, garden boundaries, herb gardens, formal gardens with their indispensable adjuncts of box border and sun dial, and closes the book with a chapter on the roses of yesterday. The illustrations are excellent, including half-tones of the gardens at Mt. Vernon, Van Cortlandt Manor, and the Bartram garden in Philadelphia.—E. M. P.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XVII.

Orders Polygonales and Centrospermae.

The order Polygonales comprises the single family Polygonaceae, and its characters are those of the family. The Centrospermae, on the other hand, form a group of considerable size, embracing no less than ten families, of more or less economic or ornamental interest. This order is distinguished from the Polygonales by the variously curved or coiled embryo* in the seed, and by the fruit, which is not an achene. The flowers are mostly perfect, rarely monoecious or dioecious, and the ovary is entirely superior or free from the calyx in both groups.

Family Polygonaceae. Buckwheat family. Contains about 30 genera and 800 species, of very wide geographic distribution. They are herbs, frequently of twining habit, shrubs or even trees, their most conspicuous feature being the sheathing united stipules around the bases of the leaves. This sheath is so distinct in appearance from the ordinary type of stipule, that it is known by a special name, ocrea. The leaves are simple, mostly entire; the flowers are small and regular, variously clustered, with a perianth consisting of calyx alone, which, however, is frequently colored like a corolla. The stamens are 2 to 9 in number, the ovary 1-celled, becoming in fruit a shining angled or lenticular (prune-shaped) achene.

The Polygonaceae are well represented in our country, not only by numerous species of smartweed (*Polygonum*) and of dock (*Rumex*), but in the western States by many species of the genus *Eriogonum*, which may be known by the umbelled or capitate flower-clusters, each group springing from a bell-shaped or cup-like involucre. *Polygonum* is the largest genus of the family, however, and has also the widest distribution, being found from the far north all the way to the tropics, the species usually of rank growth and weedy appearance.

Buckwheat, an important article in the daily dietary of many per-

*This can be seen very plainly by cross-sectioning the seeds of some one of the common goosefoots (*Chenopodium*).

sons, is the product of *Fagopyrum Fagopyrum*, a member of this family, illustrated in Fig. 76. The plant, originally a native of Asia, is grown extensively in some parts of the United States and on the continent of Europe, whence it has escaped frequently and become established in a half-wild state. Buckwheat flour, although less nutritious than wheat, is greatly superior in this respect to rice. Another polygonaceous food-plant of considerable importance is the rhubarb (*Rheum Rhaponticum*). As we are familiar with it in gardens, it is a tall herb with enormous basal leaves, whose thick juicy stems furnish a most appetizing sauce, and filling for pies. Like *Rumex*, it contains a very powerful acid principle, upon which its value as an article of food chiefly depends. The genus *Rheum* is native of eastern Europe and Asia, several of the species being described by travelers as very imposing features of the landscape, particularly in dry waste regions of the Himalayas.

Fig. 76. Flowering branch of buckwheat (*Fagopyrum Fagopyrum*), with enlarged flower and fruit. Original.

There are several ornamental plants of the family, the most familiar in greenhouses being the vine *Antigonon leptopus*, the large inflated calyces of which are bright red in color, and retain their beauty on the plant for some time. *Brunnichia*, a native shrubby vine of the southern States is also worthy of cultivation, although the flowers are not brilliantly colored. The prince's feather (*Polygonum orientale*) is a favorite in gardens.

Family Chenopodiaceae. Goosefoot Family. Contains about 75 genera and 550 species, of wide geographic distribution. The goosefoots, or pigweeds, as they are often called, are herbs or rarely shrubs, having simple leaves entirely without stipules. The flowers are perfect or bisexual, usually greenish in color, variously clustered. The perianth consists only of a calyx, which is persistent, investing the fruit. The latter is known as a utricle, being a grain with several enveloping papery coatings. The two uppermost drawings in Fig. 77 will

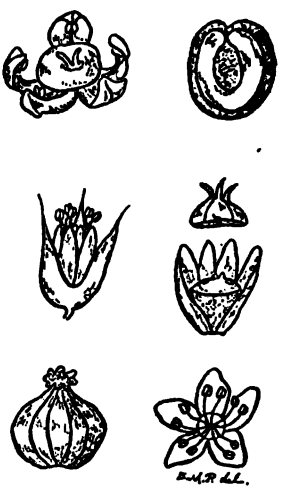


Fig. 77. Uppermost line, enlarged flower and section of fruit of *Chenopodium*; second line, flower and fruit of *Amaranthus*, showing the circumscissile utricle; lowermost line, flower and fruit of *Phytolacca*. Original.

give a good idea of the floral structure in this family, and of the curved embryo shown in the cross-section of the fruit.

With the exception of *Chenopodium*, the species of which are mostly distributed over the country as weeds, the American Chenopodiaceae are largely natives of the western States, where they form the predominant vegetation of the so-called "alkali" plains, and are known as saltbushes (*Atriplex* and *Suaeda*). Farther south one meets the shrubs known as "greasewoods" (*Sarcobatus*), which are abundant in the desert regions of the lower Colorado watershed. When growing in saline soils, either in the interior, or along the coast, the plants are usually extremely fleshy and succulent, like other halophytes. (See Fig. 78.)

As potherbs many of the members of this family are highly esteemed. The leaves of spinach (*Spinacia*), of the beet (*Beta*), and of the common lamb's quarters (*Chenopodium album*) are used for this purpose. The beet, moreover, is of commercial importance, aside from its value as a vegetable, on account of the sugar extracted from it. The sugar-beet industry, particularly in France, has assumed large proportions in recent years, and the product is in many respects superior to cane sugar. Soda and potash are obtained from some species of *Salsola*, while many of the genera yield essential oils valuable in medicine as antispasmodics.

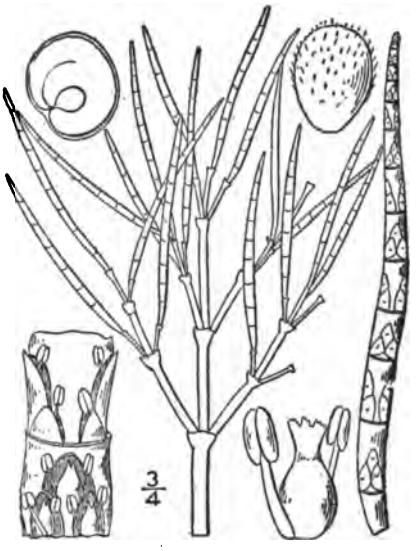


Fig. 78. The common saltwort (*Salicornia herbacea*), showing the fleshy cylindrical leaf. After Britton & Brown, Ill. Fl. Northeast. U. S.

Family Amaranthaceae. Amaranth family. Contains about 40 genera and 450 species, widely distributed, but most abundant in the tropics. They are herbs or undershrubs, with simple leaves and small perfect monoecious or dioecious flowers, usually borne in dense clusters. The perianth may be in one or two series, but there are no true petals. Like other families in the order Centrospermae, the Amaranth fruit is utricular, but it splits in a transverse ring at about the middle; this is called by botanists a circumscissile dehiscence. The flower and fruit are shown in the middle line of Fig. 77.

The genus *Amaranthus*, which shares with *Chenopodium* the name of "pig-weed," is one of the largest representatives of the family, and includes a number of familiar weeds of the eastern United States. The

flower-clusters in some species are bright red, and these types are cultivated in gardens, together with *Celosia*, the cockscomb, and *Gomphrena*, the globe amaranth.

Family Nyctaginaceae. Four-o-clock Family. Contains about 17 genera and 250 species of wide distribution, most of them American. They are herbs, shrubs or trees, with simple entire leaves, and perfect clustered flowers, often subtended by an involucre simulating a calyx, the latter in its turn usually colored like a corolla, which is always wanting. The sepals are united, and the calyx is thus called gamosepalous. The ovary is one celled, becoming a grooved or winged fruit.

Fig. 79. The pink Abronia (*Abronia micrantha*) showing flowers and wing-margined fruit. Original.

Probably the most familiar example of this family is the common four-o-clock or marvel-of-Peru (*Mirabilis Jalapa*). The flower has a funnel-shaped calyx of various colors, exactly imitating a corolla, while the green involucral bracts at the base of the calyx tube are usually taken by the student for a true calyx. *Mirabilis* is represented by several species in the southwestern States. *Abronia*, also a western genus, is commonly cultivated for its verbena-like clusters of variously colored flowers. (See Fig, 79.

Family Batidaceae. Batis Family. This consists of a single genus and species, *Batis maritima*, a fleshy maritime shrub of the West Indies and the Gulf coast.

Family Cynocrambaceae. Cynocrambe Family. Likewise restricted to a single type, *Cynocrambe prostrata*, a low shrub native of the Mediterranean region.

Family Phytolaccaceae. Pokeweed Family. Contains about 22 genera and 90 species, mainly tropical. They are herbs or shrubs, with entire leaves destitute of stipules, and regular, polygamous or monoecious flowers, the perianth consisting of calyx alone; the structure of the flower may be seen in the lowermost drawings of Fig. 77. The fruit is either berry-like or capsular. The ovary contains several cells.

Most of the pokeweeds possess bitter emetic or purgative properties, and some are violent poisons. On the other hand, the herbage of

our common North American representative of the family (*Phytolacca decandra*), furnish a most palatable dish when the young shoots are boiled like Asparagus. The berries yield a dark red dye.

Fig. 80. The carpetweed (*Mollugo verticillata*) showing enlarged flower and section of fruit. After Britton & Brown, Ill. Fl. Northeast. U. S.

Family Aizoaceae. Carpetweed Family. Consists of 22 genera and about 500 species, natives chiefly of warm regions. They are nearly all herbs of insignificant aspect, usually prostrate and diffusely branched, with opposite or whorled leaves and small perfect flowers, mostly destitute of petals. The ovary is free from the calyx and several-celled, becoming a capsule in fruit. The common carpetweed (*Mollugo verticillata*) is shown in Fig. 80. *Sesuvium Portulacastrum*, the sea purslane, is a familiar plant along the southern seacoast. By far the largest genus is *Mesembryanthemum*, various species of which are cultivated in gardens, *M. crystallinum* being the well known "ice plant." It is a curious feature of distribution that two species of this genus occur on the islands off the coast of California, while the remainder are confined almost exclusively to the Old World. The family is also known by the name Ficoideae.

Fig. 81. *Lewisia rediviva*, a plant of the Family Portulacaceae, nearly natural size. Original.

Family Portulacaceae. Portulaca Family. Contains about 20 genera and 175 species, largely American, and always showing an affinity for dry and arid regions, their succulent and fleshy herbage enabling them to withstand any amount of drought. They are

closely related to the Pink family (Caryophyllaceae) but differ in the calyx, which consists commonly of only two sepals. The petals are frequently large and showy, but always evanescent; they are four or five in number, and like the stamens are hypogynous, that is, they are inserted on the axis beneath the pistil. The ovary is 1-celled, becoming in fruit a capsule which opens either by three valves, or is circumscissile (see above).

Our familiar garden representative of this family is the portulaca (*Portulaca* sp.), which is remarkable for the brilliancy and variety of coloration displayed by its flowers. The common purslane or "pusley" is also a species of *Portulaca*, though scarcely so highly esteemed. *Claytonia*, the spring beauty, is one of the daintiest of our wild flowers in the eastern States; in the west the species are much more numercus, although none of them surpass *C. Virginica* in beauty. *Lewisia*, a genus of the western plains, has large pink flowers and very fleshy leaves. An entire plant, only slightly reduced, is shown in Fig. 81.

Family Basellaceae. Basella Family. Six genera and about 16 species, mostly tropical American fleshy twining vines. They have been frequently united with the Chenopodiaceae, but differ in the position of the stamens and in the bracts around the base of the calyx. *Boussingaultia*, the Madeira-vine, is common in cultivation.

Fig. 82. The white campion (*Silene alba*), the detached calyx natural size. Original.

Fig. 83. Long-leaved stitchwort (*Alsine longifolia*), with enlarged flower. Original.

Family Caryophyllaceae. Pink Family. Contains about 70 genera and over 1500 species, widely distributed, but most abundant in the northern hemisphere. They are all herbaceous plants, the stems frequently swollen at the joints, the leaves opposite and with or without stipules. The flowers are perfect, provided with both calyx and corolla, the former either composed of distinct sepals or united into a tube. The ovary is one-celled, becoming a utricle or capsule in fruit. Owing to the fact that a uumber of genera of very diverse habit and structure are included in this family, it is difficult to give more than very general characters.

The Caryophyllaceae are of interest only as ornamental plants. Various species of *Dianthus* are represented in cultivation by innumerable horticultural varieties, including all the pinks, picotees, carnations, etc. *Lychnis*, *Silene* and *Gypsophila* are also cultivated. In Fig. 82, a wild white-flowered species of the latter genus (*Silene alba*) is shown. A number of small herbs with white or greenish flowers, known collectively as "chickweeds," are comprised in the genera *Arenaria*, *Alsine*, *Spergula*, *Tissa* and *Cerastium*. These are all distinguished from the true pinks by having the sepals distinct and not united into a tube. (See Fig. 83.) One of the familiar weeds of waste places is the "Bouncing Bet," *Saponaria officinalis*, also a member of the Pink Family.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XVIII.

Order Ranales.

The representatives of this order include many of our most familiar native plants, and some of them are among the first to appear in early spring. The order is a large one, comprising sixteen families, of which the Nymphaeaceae, Ranunculaceae, Berberidaceae, Magnoliaceae and Lauraceae are the most important. As a rule, the flowers have a corolla composed of distinct petals, but there are often cases of apetalous flowers, particularly in many Ranunculaceae and in practically all the Lauraceae. The ovary is always superior and free from the calyx; it may be composed of one or many carpels. The stamens are numerous and hypogynous (inserted beneath the ovary).

Fig. 84. The water-shield (*Brasenia purpurea*). After Britton & Brown, Ill. Fl. North. U. S.

Family Nymphaeaceae. Water-lily Family. Contains eight genera and about 30 species, all aquatic herbs, denizens of fresh water ponds and streams in temperate and tropical regions. They furnish by far the finest and most ornamental examples of cultivated aquatics. The plants produce solitary axillary flowers, whose structure differs remarkably among the different genera. In the water-shields (*Cabomba* and *Brasenia*) the sepals and petals are 3 and the stamens 6; in the true water-lilies (*Castalia*), the lotuses (*Nelumbo*), and the spatter-dock (*Nymphaea*), the petals and stamens are numerous, and there is often a tendency for the stamens to become petaloid and to lose their function as pollen-bearers.

All the transition stages of this process may be observed in the flower of the common water-lily. This genus (*Castalia*) is represented in the United States by several species. The flowers of *C. odorata* are the most fragrant; in southern species the fragrance partially or wholly disappears. On the coast of New England, particularly on Cape Cod, occurs a beautiful pink-flowered variety. The exotic Castalias, usually cultivated as Nymphaeas, exhibit a wide diversity of coloration, including all shades of blue, purple and red. The yellow lotus (*Nelumbo lutea*) is common in certain parts of the country, while the pink lotus (*N. Nelumbo*) has become naturalized in ponds about Bordentown, New Jersey. The giant water-lily of the Amazon (*Victoria regia*) is too well known by description to require comment.

Fig. 85. The marsh marigold (*Caltha palustris*). After Britton & Brown, Ill. Fl. North. U. S.

Family Ceratophyllaceae. Hornwort family. Contains a single genus, *Ceratophyllum*, with three widely distributed species, the most familiar of which is *C. demersum*. It is a submerged aquatic, with capillary or thread-like stems and leaves, found frequently in slow-moving streams. The flowers are without a corolla, and the calyx is many-parted. The fruit is an achene with a long beak, and usually covered with tubercles or provided with spiny appendages.

Family Trochodendraceae. Trochodendron Family. Contains two genera, *Cercidiphyllum*, with two species, and *Trochodendron*, which is monotypic. They are Japanese trees, formerly included in the Magnoliaceae, but distinguishable on account of their peculiar flowers, which are entirely destitute of perianth. The numerous stamens are deciduous, surrounding the 5-8-celled ovary. The leaves are borne in whorls, a character from which the names of both genera are derived.

Family Ranunculaceae. Crowfoot or Buttercup Family. Contains about 40 genera and over 1000 species, natives of temperate or even arctic regions, remarkably scarce in the tropics. They are herbs or rarely climbing shrubs, with watery and acrid juice, simple or compound leaves, and flowers usually with both calyx and corolla, the

sepals and petals distinct. The stamens vary from few to many, and are hypogynous, or inserted on the receptacle beneath the pistils.

On account of the ease with which the floral parts of most Ranunculaceae can be examined, this family has long been a favorite with amateur students, and in the old sequence established by Bentham and Hooker, the Ranunculaceae were placed at the head, chiefly on account of their simplicity of structure. In many respects the group as it stands is an artificial one, for it includes plants with berry-like fruit, as in *Actaea* and its relatives; plants bearing achenes, like the crowfoots; and plants with small capsules or follicles like the columbine and larkspur. But while the genera have of late years been frequently divided, *Hepatica* being removed from *Anemone*, and *Atragene* from *Clematis*, for example, the family has been treated as an aggregate.

Fig. 86. The early meadow-rue (*Thalictrum dioicum*). After Britton & Brown, Ill. Fl. North. U. S.

Members of the Ranunculaceae are among the first flowers to welcome us in early spring. The hepatica, well shown in the beautiful accompanying photograph, unfolds its fuzzy flower buds on rocky slopes with the first balmy breath of spring, often when crevices of the adjacent cliffs are still sealed with snow. A little later, various species of *Ranunculus* brighten the open woodlands and pastures with flecks of golden yellow, a color reflected from the near-by swamps in the flowers of the marsh-marigold (*Caltha palustris*). The anemone and the rue-anemone help to carpet the ground, while the feathery, grayish-white masses of meadow-rue (*Thalictrum dioicum*) give a ghostly suggestion to the woods. In midsummer various forms of clematis serve as a reminder of the family.

The beauty of most ranunculaceous flowers in the wild state has rendered it unnecessary to develop them to a marked degree in cultivation, but the larkspurs have been greatly improved, while the genus *Paeonia*, which has its headquarters in eastern Asia, has attained a wonderful prominence in the hands of the horticulturists. Many of the large double paeonies are fully equal to roses in the beauty of their coloring, and in delicacy of texture. The columbines, moreover, being

a group in which there is naturally a wide range of color, have responded well to hybridization, and may now be found in almost all shades of yellow, red, blue and white.

Owing to the acrid and caustic principle that pervades the herbage and more particularly the roots of many members of the Ranunculaceae, several important drugs and poisons, such as aconite and hellebore, are derived from them.

Family Lardizabalaceae. Lardizabala Family. A small Asiatic family of seven genera and eleven species, interesting chiefly as ornamental shrubs. *Akebia quinata*, a Japanese woody vine with lurid purple flowers, palmately lobed leaves, and odd green fruit, is now commonly cultivated in this country.

Family Berberidaceae. Barberry Family. Consists of eight genera and about 140 species, most of which belong to *Berberis*. The group consists of herbs or shrubs, which may be known by the flowers having imbricated petals, and stamens of the same number as the petals, and placed opposite them. The pistil is simple, becoming in fruit a berry or a capsule.

The Berberidaceae was made by older systematists to include the Lardizabalaceae. Its relationship to the other families discussed in this chapter may be traced by means of the hypogynous petals and stamens. *Berberis*, the most important genus, is represented by a number of pinnate-leaved species native in western North America, and by many exotics of the simple-leaved group in cultivation. The pendent racemes of variously colored flowers, succeeded by the showy berries, are highly ornamental. The fruit of the common barberry (*B. vulgaris*) makes an excellent preserve, while the bark of several species is used in the manufacture of dyes.

The mandrake or may-apple (*Podophyllum peltatum*)) one of our familiar eastern wild flowers, belongs to this family, as does also the twin-leaf (*Jeffersonia diphylla*), and the blue cohosh (*Caulophyllum thalictroides*). The large leaves of the mandrake, curiously suggestive of umbrellas, conceal beneath their ample expanse a handsome waxy white flower, possessing a peculiar pineapple-like fragrance. This is succeeded by a lemon-shaped fruit of a disgustingly mawkish flavor, which, as Dr. Gray once observed, is "eaten by pigs and boys." The Berberidaceae as a group are confined to temperate regions, and find the center of their distribution in the Chino-Japanese region.

Family Menispermaceae. Moonseed Family. A group of twining herbaceous or woody vines, comprised in about 55 genera and 150 species, natives mostly of tropical regions, with only a few representatives in the temperate zone. The family is at once distinguished by the peculiar curved embryo in the seed, which may be plainly seen in cross-

Fig. 87. The hepatica, *Hepatica Hepatica*. After photograph by Mr. Carl Krebs, Cleveland, Ohio.

Fig. 88. The bugbane, *Cimicifuga*. After photograph by Mr. Carl Krebs, Cleveland, Ohio.

section. The flowers are small and dioecious, borne in clusters, and have from 4 to 6 sepals, 6 petals, an equal number of stamens, and from 3 to many pistils. The fruit is a berry.

In the northern States we have only the common moonseed (*Menispermum Canadense*); this is reinforced in the South by the cupseed (*Calycocarpum Lyoni*), a handsome vine with large grape-like fruits; and by the Carolina moonseed (*Cebatha Carolina*). The family as a whole has bitter and narcotic properties, and some plants belonging to it are extremely poisonous. The tropical *Cissampelos Pareira* yields the well known tonic, Pareira brava.

Fig. 89. The dwarf barberry (*Berberis nana*), one-third natural size. Original.

Family Magnoliaceae. Magnolia Family. Contains about ten genera and 70 species, of very wide geographic distribution. All are trees or shrubs with alternate, entire leaves, and large flowers having 3 sepals and 3 petals, innumerable stamens, and very numerous carpels borne on an enlarged base or receptacle, and ripening into one- or two-seeded follicles or achenes, still coherent in a mass. The tulip-tree or white poplar (*Liriodendron tulipifera*), a flower of which is shown in the accompanying figure, is of immense value not only as a timber tree, but as an ornamental shade tree when growing singly near a dwelling. The native species of *Magnolia*, while all handsome when in flower, are ex-

celled in this respect by numerous Asiatic species, most of which differ from our forms in flowering before the leaves appear in early spring. Probably the handsomest of our native Magnolias is *M. foetida*, which is evergreen-leaved, and which in the extreme South attains very lofty proportions. In this region grows also *Illicium Floridanum*, a shrub with dark green leaves and reddish-purple flowers, suggestive of a

Fig. 90. Flowering branch of moonseed (*Menispermum Canadense*) one-third natural size. Original.

diminutive Magnolia. Like all the plants belonging to this family, it possesses bitter and aromatic properties.

Family Calycanthaceae. Calycanthus Family. Contains the two genera *Butneria*, formerly known as *Calycanthus*, and *Chimonanthus*. They are shrubs having very fragrant flowers, which in the former genus exhale the odor of strawberries, whence the name "strawberry shrub." The sepals and petals are very numerous and imbricated; the stamens innumerable; the pistils also innumerable, and enclosed in the hollow, calyx-like receptacle; from this peculiar character is derived

Fig. 91. Flowering branch of the tulip-tree (*Liriodendron tulipifera*). From Bulletin 73, Vermont Agricultural Experiment Station, by Miss Anna Clark. Loaned by the University of Vermont.

the name "calycanthus," meaning "calyx-flower." There are three species of *Butneria*, all natives of this country, and two of *Chionanthus*, a Chino-Japanese shrub frequently cultivated in gardens, where it often blooms in midwinter. The family possesses no economic value, so far as I am aware.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XVIII.—*Continued.*

Family Lactoridaceae. Lactoris family. Consists of a single genus, which in turn is monotypic, the species being *Lactoris Fernandeziana*, native of the island of Juan Fernandez. It is a low shrub with jointed branches, fleshy leaves and axillary inflorescence.

Family Anonaceae. Custard-apple Family. Contains 46 genera and about 600 species, widely distributed throughout the tropics, but very few extending into the temperate zone. The plants are trees or

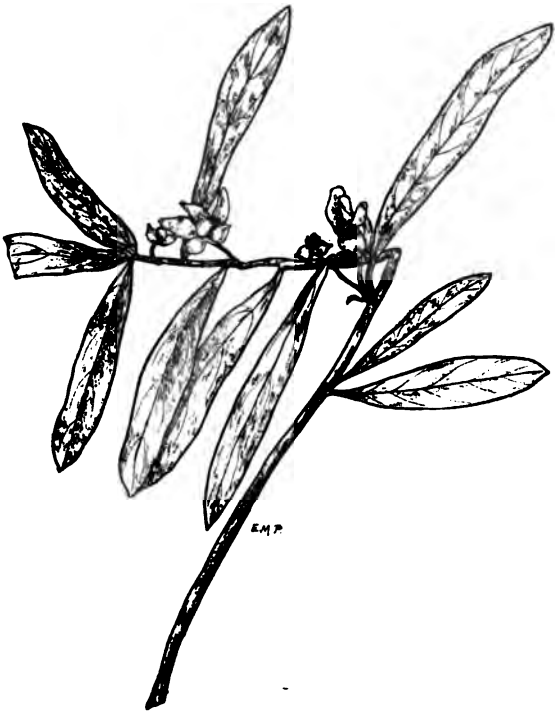


Fig. 92. The pygmy papaw (*Asimina pygmaea*), one-third natural size. Original.

shrub possessing more or less aromatic properties; they have alternate entire leaves and rather large solitary flowers, with 3 sepals and about 6 petals, thus presenting an anthotaxy or floral arrangement somewhat unusual among exogenous plants. The stamens and carpels are variable, the latter usually fleshy in fruit.

Fig. 93. Fruiting branch of nutmeg (*Myristica fragrans*), one-half natural size. Original.

The common papaw, *Asimina triloba*, is familiar to residents of the southern States and of the Ohio and Mississippi valley regions. The lurid purple flowers of this tree, appearing with the leaves in early spring, are quite ornamental, while the oblong yellowish fruits have a rich flavor when ripe, superior in the writer's opinion to that of the banana. There are other species of *Asimina* in the far South. None of them attain the dignity of arborescence, but some have very large and handsome flowers (see Fig. 92.) In the West Indies the related genus *Anona* yields several much-prized tropical fruits. The soursop is the product of *A. muricata;* it has a white pulp and a pleasant subacid flavor, the outer rind being greenish and covered with prickles. The sweetsop is the fruit of *A. squamosa;* it is sweeter but also more tasteless. *Uvaria*, which is common throughout the Indo-Malayan region, consists wholly of climbing shrubs; the fruit is occasionally edible, but the genus is chiefly valuable on account of the variety of medicinal substances extracted from roots, bark, flowers and seeds in the different species. The South American genus *Xylopia* is similarly useful.

Fig. 94. California nutmeg (*Umbellularia Californica*) shawing fruit and detached flower, the former reduced, the latter enlarged one-half. Original.

Family Myristicaceae. Nutmeg Family. Consists of the single genus *Myristica*, including about 80 species, natives of the tropics of

both hemispheres, but particularly abundant in southern Asia. They are lofty trees having alternate simple leaves and small monoecious or dioecious flowers destitute of corollas; the stamens are from 3 to 12, the ovary with one to several carpels. The fruit is succulent, enclosing a single nut-like seed, closely invested with a membrane known technically as an aril. This false membrane, when dried and ground, constitutes the spice called mace. It is of a bright red color when fresh, but later turns dark brown. The nutmeg is also sun-dried before being packed for shipment, and the outer shell is usually removed. Commercial nutmegs are yielded by several species of *Myristica*, but the best, known as the Penang nutmeg, is the fruit of *M. fragrans*. (See Fig. 93.)

Family Gomortegaceae. Gomortega Family. This group resembles the Lactoridaceae in being monotypic, consisting of a single genus and species, *Gomortega nitida*, a Chilean evergreen shrub.

Family Monimiaceae. Monimia Family. Contains about 23 genera and 150 species, natives of South America and Australasia. They are trees or shrubs with opposite leaves and monoecious flowers. The divisions of the perianth are all similar, and are borne in several rows; stamens indefinite; carpels several, becoming achenes in fruit, enclosed within the persistent perianth. The herbage, as well as the bark, is fragrant and aromatic, indicating a relationship to the succeeding family; the plants possess little economic value, except that the fruits of a few species are edible.

Fig. 95. The bloodroot (*Sanguinaria Canadensis*). After Britton & Brown, Ill. Fl. Northeast. U. S.

Family Lauraceae. Laurel Family. The highly aromatic trees and shrubs of this important group, are distributed in about 40 genera and over 900 species, common in tropical, but rather scarce in temperate regions. They have simple, usually alternate leaves, and small perfect, monoecious or dioecious clustered flowers. The corolla is wanting; the calyx is 4-6 parted, bearing the stamens inserted in groups of three; ovary 1-celled, becoming in fruit a 1-seeded berry or drupe.

One of the earliest shrubs to indicate the approach of spring in the eastern States is the spice-bush (*Benzoin Benzoin*); its tiny honey-yellow

flowers are borne in such profusion on the leafless branches, that the swamp at a little distance has a distinctly yellowish cast. The sassafras blooms somewhat later, its green twigs and peculiarly shaped leaves rendering it conspicuous at any season of the year. On the Pacific coast the California nutmeg (*Umbellularia Californica*) is a handsome evergreen-leaved tree with plum-like fruit. (See Fig. 94.) In the South several species of *Persea* occur, a genus represented in the tropics by the avocado or Alligator pear (*P. gratissima*). In Europe the bay laurel (*Laurus nobilis*) possesses historical interest from the fact that it furnishes the original "laurel" used to crown the heads of heroes of antiquity. Bay leaves are extensively used as a flavoring herb in soups, stews, etc.

Fig. 96. The yellow water-cress (*Roripa palustris*), showing an enlarged pod. After Britton & Brown, Ill. Fl. Northeast. U. S.

In Asia there are two lauraceous trees of economic interest, the cinnamon (*Cinnamomum Zeylanicam*) and the camphor (*C. Camphora*). Recently some experiments in the cultivation of the camphor tree have been made under the auspices of the Department of Agriculture along the southern Atlantic seaboard, with a fair degree of success. In British Guiana occurs the greenheart (*Nectandra Rodiaei*), which yields an ash-colored bark known as bebeeru; it is used medicinally as a tonic and febrifuge. Another species of *Nectandra* grows in south Florida, and is handsome on account of its panicles of creamy-white flowers.

Mention should also be made of a peculiar genus (*Cassytha*), usually classed with this family, although it should be more properly separated as a distinct group. The species are leafless twining parasitic vines.

Family Hernandiaceae. Hernandia Family. Contains 4 genera and about 20 species, natives of tropical regions, and formerly included in the Lauraceae, which they resemble in structure. They possess no especial economic interest.

CHAPTER XIX.

Order Rhoedales or Papaverales

This group is characterized by the regular flowers, usually with both calyx and corolla. The stamens are hypogynous; the carpels two or more, united into a compound ovary. The plants are almost all herbs, with a watery or milky and often pungent juice. The order includes six families, the Papaveraceae, Cruciferae, Tovariaceae, Capparidaceae, Resedaceae and Moringaceae.

Family Papaveraceae. Poppy Family. Contains about 25 genera and 200 species, of wide distribution, but most abundant in the north temperate zone. They are herbs or rarely shrubs, with milky juice, alternate leaves, and solitary or clustered flowers. The sepals ore usually only two, and caducous, that is, they fall as soon as the blossom expands. The petals are from 4 to 6; stamens few [to many; ovary one-celled, capsular in fruit.

Fig. 97. The lace-pod (*Thysanocarpus curvipes*) about two-thirds natural size. Original.

The Poppy family furnishes us with a number of highly ornamental plants. The true poppies (*Papaver*) are natives of the Old World, and have been so much improved by long cultivation that we now have varieties in all shades of red, white and yellow, with single, semi-double or very double flowers, in both annuals and perennials. The California poppies, which are the delight of every visitor to the Pacific coast, belong to the genus *Eschscholtzia;* they have finely dissected leaves and yellow or orange flowers. In this region also occur several shrubby genera, like *Romneya* and *Dendromecon.* The prickly poppy (*Argemone*) is introduced from the tropics as a weed in certain parts of the country, while the bloodroot (*Sanguinaria Canadensis*), shown in Fig. 95, is familiar to everyone.

A group of closely related genera, comprising the Fumariaceae or Fumitory Family, has been included by recent authors among the poppyworts. They may be known by the irregular flowers, having one or

more of the petals spurred at the base. Our common "Dutchman's breeches," species of *Bikukulla*, are good examples of this division of the family.

A narcotic property is present in the milky juice of most Papaveraceae, but is particularly prominent in *Papaver*, and it is from the juice of *P. somniferum* that the drug opium is obtained.

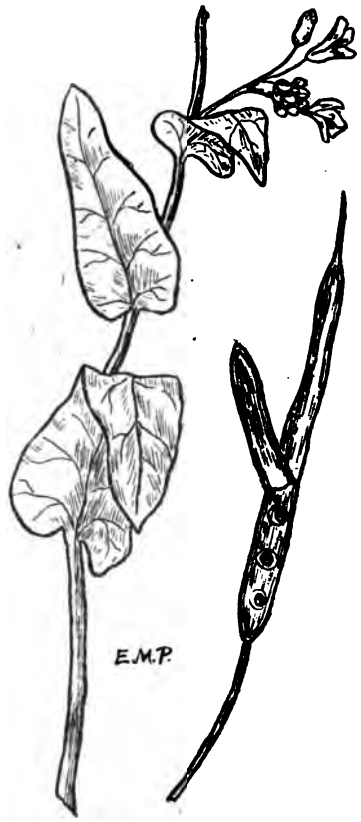


Fig. 98. Flowering branch and separate pod of *Brassica campestris*, the latter with one valve turned back showing seeds; all natural size. Original.

Family Cruciferae. Mustard or Cress Family. The Cruciferae are distinguished easily from related groups by the peculiarity of their stamens, two of which are shorter than the other four; this condition is called *tetradynamous* by botanists. The plants are herbs, with a watery pungent juice, the flowers having 4 petals and 4 sepals after the pattern of a cross, whence the name Cruciferae is derived. The ovary consists of two united carpels, separated by a thin partition; in fruit it becomes a 2-celled pod-like fruit known as a silique; in a few exceptional cases it is indehiscent (not splitting open at maturity), and is then called a loment. While the flowers are very much alike in most of the genera, being white, yellow or pink in color, the differences in the fruit and seeds are very considerable. It is this fact that renders the Cruciferae a very difficult one for the beginner.

The family contains about 190 genera and 1500 species, of very wide distribution, but most abundant in temperate regions. Many of them are common weeds of early spring; others are exclusively alpine; a few are garden vegetables, and some are even cultivated for ornament. Figure 96 shows one of the yellow marsh cresses of the genus *Rorippa*, which also includes the common water-cress. Another type of fruit may be seen in the next illustration (Fig. 97), which represents a delicate little Californian annual known as lace-pod (*Thysanocarpus curvipes*).

The cabbage and turnip belong to the genus *Brassica*, the former vegetable consisting of the mass of young leaves compacted into a

"head," the latter of the enlarged root. Mustard is derived from the seeds of another species of *Brassica;* the genus is illustrated in Fig. 98. The radish is the root of *Raphanus sativus;* while horse-radish is the dried and pulverized root of *Rorippa Armoracia.* Among ornamental crucifers may be mentioned the stock (*Matthiola*), the rocket (*Hesperis*), the candytuft (*Iberis*), and the sweet alyssum (*Konig maritimum*).*

Family Tovariaceae. Tovaria Family. Consists of a single genus and species, *Tovaria pendula,* a tropical American herb with an odor resembling that of celery, and structurally similar to the caperworts.

Family Capparidaceae. Caper Family. Contains about 35 genera and 400 species, natives chiefly of warm regions, and comprising both herbs and shrubs. They have simple or palmate leaves and variously clustered flowers. The sepals are from 4 to 8, the petals usually 4, often borne on long claws; the stamens are from 6 to many, all of equal length. The ovary is frequently long-stalked, and becomes in fruit either a capsule or a berry.

Fig. 99. The clammy-weed (*Polanisia graveolens*). After Britton & Brown, Ill. Fl. Northeast. U. S.

Several species of *Cleome* are prominent among the flowers of the western plains, as also two species of *Polanisia,* the "clammy-weed," so called on account of its viscid pubescence (see Fig. 99.) Capers are the preserved flower-buds of a species of *Capparis,* and the industry is an important one in some parts of Europe.

Family Resedaceae. Mignonette Family. Contains 6 genera and about 55 species, belonging mostly to the Old World. They are herbs with alternate leaves and unsymmetrical flowers, borne in spikes or racemes. The calyx is 4-7 parted, the petals similar; stamens usually numerous; ovary compound, becoming in fruit a many-seeded capsule.

* Odd as this name may appear to the uninitiated, the genus was first published by Adanson with this designation, and by a consistent application of the rule of priority in nomenclature, must remain with unchanged orthography. The plea that such a name is not correctly Latinized is without force when one considers the numerous etymological barbarities now in use.

(See Fig. 100.) *Reseda* is the most important genus, and includes the fragrant garden mignonette (*R. odorata*). A yellow dye and paint is obtained from the yellow-weed or dyers'-weed of Europe, *R. Luteola*.

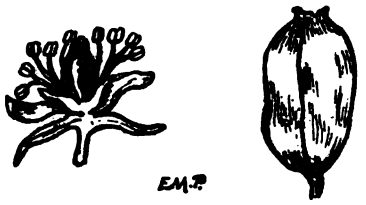


Fig. 100. Flower and fruit of dyer's weed (*Reseda Luteola*) twice natural size. Original.

Family Moringaceae. Moringa Family. Consists of a single genus, *Moringa*, with 3 species, natives of southern Asia. They are trees with pinnate leaves and clusters of rather conspicuous flowers, the calyx and corolla each with five divisions; stamens 8 or 10; ovary simple, stalked, becoming in fruit a 3-valved spongy capsule. The winged seeds of *M. pterygosperma* are called ben-nuts, and yield a clear fluid oil much used by watchmakers; the roots are pungent, like those of the horseradish.

Fig. 102. The huntsman's cup in its natural haunts. From MacMillan's "Minnesota Plant Life," by courtesy of the author.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XX.

Order Sarraceniales.

This interesting group of three families, Sarraceniaceae, Nepenthaceae and Droseraceae, is justly celebrated on account of the wonderful adaptability of the leaves as insect traps. The plants are all herbs, frequently of scapose or stemless habit, with solitary or racemose flowers having the ovary free from the calyx, becoming a capsule in fruit. The leaves vary in the different families; in Sarraceniaceae and Nepenthaceae they form hollow receptacles which serve to catch and retain water; numerous insects crawl into the "pitchers," and being unable to escape, fall to the bottom, where they are gradually macerated, the liquid being ultimately absorbed. In Droseraceae the leaf surface, as will be explained later, acts as a trap for small insects. The group as a whole is tropical, although with some representatives in temperate regions.

Fig. 101. The huntsman's cup or purple pitcher-plant (*Sarracenia purpurea*.) After Britton & Brown, Ill. Fl. Northeast. U. S.

Family Sarraceniaceae. Pitcher-plant Family. Consists of three genera, *Sarracenia*, *Chrysamphora*, and *Heliamphora*, the last two monotypic, the first containing about 8 species. They are marsh plants with tubular leaves, and large scapose nodding flowers. The sepals are 4 or 5, persistent; the petals 5, or sometimes wanting; stamens numerous; ovary several-celled, with a peculiar peltate (umbrella-shaped) style. (See Fig. 101.)

The distribution of the family is rather remarkable. *Chrysamphora*, the Californian pitcher-plant, belongs only to the Pacific coast, and is remarkable on account of the large, bifurcated hood to the pitchers, suggestive of a fish's tail. *Heliamphora* is confined to the mountains of Venezuela; while the species of *Sarracenia* are among the most conspicuous plants of the southern savannahs and pine barrens, one (*S. purpurea*) extending northward into Canada. The photograph reproduced in Fig. 102 gives an excellent idea of the plant in its natural habitat; its leaves are more graceful in shape than those of any other species. In the South *S. psittacina*, with small red flowers, and leaves curiously resembling the outline of a parrot's head and body, replaces *S. purpurea;* while *S. flava*, *S. Drummondii* and *S. variolaris* have very large, erect, funnel-shaped leaves, often handsomely variegated.

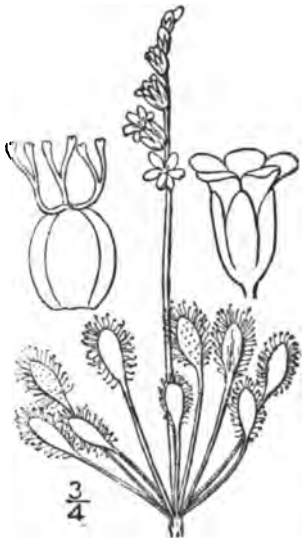


Fig. 103. Spatulate-leaved sundew (*Drosera intermedia*) showing enlarged flower and fruit. After Britton & Brown, Ill. Fl. Northeast. U. S.

The mode in which insects are attracted to these death traps is very ingenious. In most species there is a sweet exudation on the inner surface of the tubular leaf just beneath the protective flaps or hood. Insects crawl down to feed upon this, and soon come upon a smooth polished area, which causes them to slip farther down; a succession of slender hairs, all pointing the same way, renders the remainder of the descent easy, and effectually precludes all attempts of the struggling insects to climb out by the same path.

Family Nepenthaceae. East Indian Pitcher-plant Family. Consists of the single genus *Nepenthes*, embracing about 40 species, natives principally of the Indo-Malayan region, one in Madagascar. They are herbs or somewhat shrubby plants, with dioecious flowers, the sterile containing about 16 anthers united in a head, the fertile with a single 4-celled free ovary; calyx 4-parted, petals none. The leaves are even more remarkable than those of the Sarraceniaceae, for in addition to the pitchers or traps, the petiole develops, in one portion, to a broad expanded blade, fulfilling the functions of an ordinary leaf, and in another portion is tough and wiry, acting as a tendril to support the whole leaf and its contents. The size and shape of the pitchers differ considerably. In many of them the hood forms a perfect lid, closing the mouth of the pitcher completely. Several are in greenhouse cultivation, the most common being probably *N. Rafflesiana.*

Family Droseraceae. Sundew Family. Another interesting family, with a somewhat peculiar geographical distribution. There are six genera; *Drosera*, with about 110 species, occurs in temperate and subtropical regions of both hemispheres, being particularly abundant in Australia; *Dionœa* is a monotypic genus, restricted to a limited area along the coast of North and South Carolina; *Aldrovandra*, another monotypic genus of south Europe and Asia; *Byblis*, with two Australian

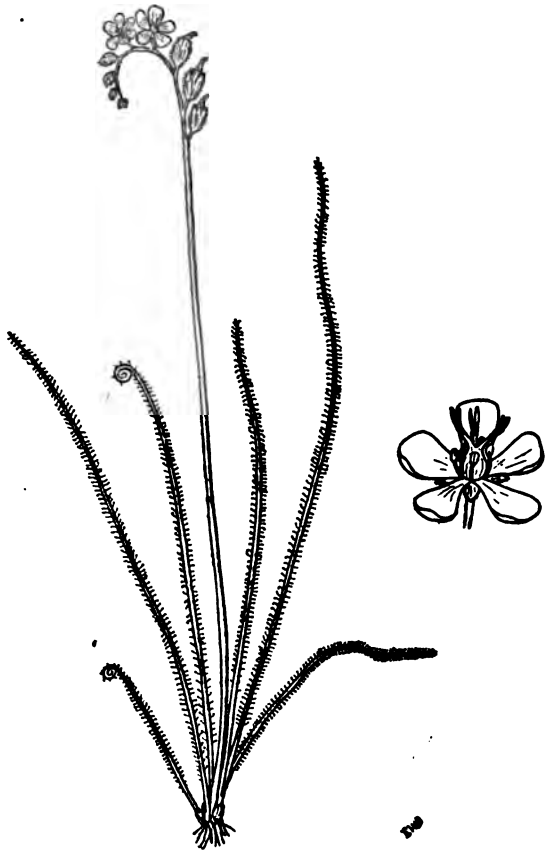


Fig. 104. Thread-leaved sundew (*D. filiformis*). After Berry in Asa Gray Bulletin, Vol. V. No. 5.

species; *Roridula*, with two South African species; and *Drosophyllum*, a monotypic half-shrubby genus of Portugal. With the latter exception, the plants are marsh or aquatic herbs, glandular-pubescent, and exuding a viscid secretion; they are mostly scapose, the leaves in a tuft or cluster at base. The flowers are solitary or racemose, with a 4-5-parted persistent calyx and 5 hypogynous petals; stamens 5-20; ovary 1-3-celled, the style often cleft or divided (see Fig. 103).

Everyone who has penetrated a bog filled with sphagnum moss has noticed the glistening reddish-hued leaves of the round-leaved sundew (*Drosera rotundifolia*), which is our commonest species. Its tiny white flowers open singly, and the curved one-sided raceme elongates just sufficiently to enable the flower of the day to point skyward. *D. filiformis*, with long slender leaves and rose-purple flowers, common in the New Jersey pine barrens and southward, is a more handsome plant (see Fig. 104). An examination of the leaves of *Drosera* under a lens will show a minute drop of viscid fluid at the tip of each hair; this serves to entangle small flies, gnats, etc. In *Dionaea*, however, the process of specialization has gone even farther, and the leaf, which is divided at the midrib into two nearly semicircular fringed lobes, closes like a steel trap the moment any foreign object comes in contact with the slender sensitive hairs of its inner surface. After the imprisoned object is thoroughly digested, the leaves again expand; if a bit of wood or other useless material has been imprisoned, they will open in a few hours.

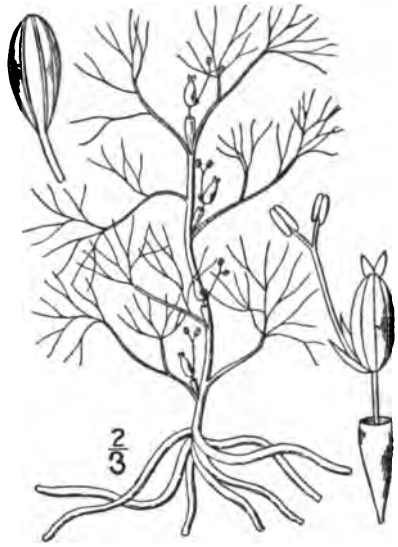


Fig. 105. The common river-weed (*Podostemon Ceratophyllum*). After Britton & Brown, Ill. Fl. Northeast U. S.

CHAPTER XXI.

Order Rosales.

This large and important order, of which the Rose family (Rosaceae) is the type, contains seventeen other families, including the Papilionaceae, Mimosaceae, and Caesalpiniaceae, three groups which collectively comprised the old order Leguminosae, and which include the most valuable of our economic plants. In so large a group as the Rosales, it is difficult to find distinguishing characters which will apply equally well to all the members; but in general the roseworts may be known by the insertion of the stamens, which may be either *hypogynous* (on the axil below the pistil) or *epigynous* (on the pistil itself); by the sepals, which are more or less united or confluent with the receptacle; and by the simple ovary, consisting of one or many distinct or united carpels.

Family Podostemaceae. River-weed Family. Contains about 21 genera and 175 species, all tropical except *Podostemon*, which is repre-

sented by a single species extending throughout the eastern half of the United States. The plants are fresh-water aquatic herbs, exhibiting a primitive type of structure, with little differentiation between leaf and stem. The flowers are without any perianth, and are enveloped at first in a spathe-like involucre. The ovary is frequently stipitate (stalked), becoming a capsule in fruit (see Fig. 105).

Family Hydrostachydaceae. Hydrostachys Family. A group of aquatic plants, consisting of the single genus *Hydrostachys*, closely related to the preceding family.

Family Crassulaceae. Orpine Family. This interesting group of plants, of wide geographic distribution, comprises about 15 genera and over 500 species. They are herbs or half-shrubs, remarkable for their fleshy or succulent herbage, the result of adaptation to the arid situations in which many of them are found. The persistent calyx is 4-5-parted; the petals, equal in number, are also persistent; stamens and carpels equalling the petals; the carpels either wholly distinct or slightly united below, becoming small follicles in fruit.

Fig. 106. The American orpine (*Sedum telephioides*) with detached flower enlarged. Original.

Sedum, the stone-crops, includes many North American species. The American orpine or live-for-ever (*Sedum telephioides*) is one of the most attractive, with the light green foliage and clusters of pink flowers (see Fig. 106). A European species (*Sedum acre*) having bright yellow flowers, is frequently seen in cultivation. In southern Europe and northern Africa species of *Echeveria* and *Sempervivum* are very common, growing frequently on the roofs of houses and on old walls.

Family Saxifragaceae. Saxifrage Family. Contains about 70 genera and 600 species, natives mainly of temperate regions, many being alpine. They are herbs, shrubs, or even trees, with solitary or vari-

ously clustered flowers. Sepals and petals usually 5, the stamens equal or twice as many in number; carpels one or more, generally 2, distinct or partly united; fruit a capsule, follicle, or berry.

Saxifraga is by far the largest genus, comprising over 200 species, all of which are perennial herbs. While the group is quite a natural one, its subgenera are strongly marked. Thus some species have solitary yellow flowers; others dense panicles of creamy white blossoms; in still others the flowers are pink.* Numerous other genera are represented in the United States, one of the most interesting being *Heuchera*, which is characterized by large simple basal leaves and scapes terminated by panicles of delicate flowers, white or variously-colored (see Fig. 107). The various hydrangeas, several of which may be ranked among our most desirable hardy shrubs for lawn planting, belong to this family. The conspicuous florets in a cluster of hydrangea blossoms are "neutral," that is, they are without stamens or pistils. Sometimes the whole cluster is sterile in this manner. *Philadelphus*, the mock-orange, or, as it is altogether falsely called, "syringa," belongs here, as does also the

Fig. 107. Alum-root (*Heuchera Americana*). After Britton & Brown, Ill. Fl. Northeast. U. S.

Fig. 108. Grass-of-Parnassus (*Parnassia palustris*). After Britton & Brown, Ill. Fl. Northeast. U. S.

*See article "Concerning Saxifrages," by T. H. Kearney, Jr., THE PLANT WORLD, 3: 37. 1900.

handsome climbing shrub of our southern States, *Decumaria*. Mention should also be made of the anomalous genus *Parnassia*, the "grass-of-Parnassus," which is now very generally referred here, though it might better be made the type of a distinct family. The flowers are remarkable for the clusters of staminodia (imperfect stamens) borne at the base of each petal (see Fig. 108).

Family Grossulariaceae. Gooseberry Family. Contains only the genus *Ribes*, with about 75 spacies, natives of the north temperate zone. Besides the garden gooseberry (*R. Uva-crispa*) and the currant (*R. rubrum*), the genus contains several species ornamental in cultivation. All are shrubs, with alternate leaves and flowers having the tube of the calyx entirely united with the ovary, and the 4 or 5 small petals borne on the calyx. The ovary has 2 distinct or united styles, and becomes in fruit a pulpy berry, crowned by the persistent calyx.

Fig. 109. The southern witch-hazel (*Fothergilla Carolina*); a flowering branch with detached enlarged capsule. Original.

Family Cephalotaceae. Cephalotus family. A monotypic family, consisting of the Australian plant *Cephalotus follicularis*, which calls to recollection the pitcher-plants. It is a very short-stemmed herb, with spoon-shaped or stalked leaves; the "pitchers" are short and thick, with a lid like those of the Nepenthaceae, the rim being fringed with hairs. The singular feature about these pitcher-like bodies, however, is that they are entirely distinct from the true leaves, being borne on separate stalks. The flowers are borne in a long spike, and are destitute of corolla.

Family Pittosporaceae. Pittosporum Family. Contains 9 genera and about 100 species, chiefly confined to Australasia. They are shrubs or trees, with regular 5-merous flowers and a 2-5-celled ovary which becomes in fruit a berry, frequently edible. Some of the trees yield resins and gums; they are usually called maple or mapau in New Zealand.

Family Brunelliaceae. Brunellia family. Consists only of *Bru-*

nellia, a genus of South American and Hawaiian trees, resembling the prickly-ash (*Xanthoxylum*) in structure and appearance.

Family Cunoniaceae. Cunonia Family. Contains about 20 genera and 120 species, natives of the southern hemisphere. They are shrubs or trees with opposite leaves, differing from related groups by the presence of stipules. The trees of the large genus *Weinmannia* afford a light wood suitable for cabinet-making, and the astringent bark is used for tanning.

Family Myrothamnaceae. Myrothamnus Family. Consists of one genus, *Myrothamnus*, with several South African species.

Family Bruniaceae. Brunia Family. Contains 5 genera and about 50 species, all low, heath-like shrubs of South Africa and Madagascar. Though differing very much from the following family, they are not materially distinct in structure, except that the leaves are without stipules.

Family Hamamelidaceae. Witch-hazel family. Includes 15 genera and 35 species, natives of North America, South Africa and Asia. They are trees or shrubs with simple, alternate leaves, and perfect or polygamous flowers, often lacking a perianth. The ovary consists of 2 carpels, becoming in fruit a 2-valved woody capsule. *Hamamelis*, the witch-hazel, is well known in our eastern States, through its peculiarity of blooming in the late fall when the leaves are dropping. *Fothergilla*, a closely allied genus of the southern States is shown in Fig. 109. *Liquidambar*, the sweetgum, is a handsome forest tree.

Family Platanaceae. Plane-tree Family. Comprises only the genus *Platanus*, with about 7 species, the best known of which is the common plane-tree, button-wood or sycamore (*P. occidentalis*). The flowers are monoecious, in dense globular heads. The hollowed petiole-bases of the leaves fit over the bud for the ensuing year like a cap. This family is obviously related to the Hamamelidaceae, and is now placed next to it, although widely separated in the old sequence of Bentham & Hooker.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XXI—*Continued.*

Family Crossosomataceae. Crossosoma Family. Consists of the genus *Crossosoma*, with two species, natives of our southwestern border, extending into Mexico. They are shrubs with small coriaceous leaves and white flowers with a superior ovary composed of a number of separate carpels (see Fig. 110). The genus is an anomalous one, and has been placed by some botanists in the Ranunculaceae, by others in the Dilleniaceae, but it is best regarded as the type of a distinct group.

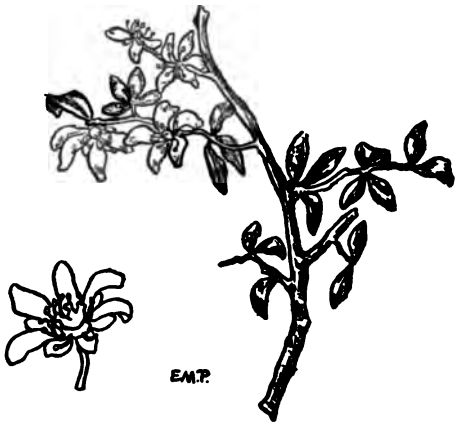


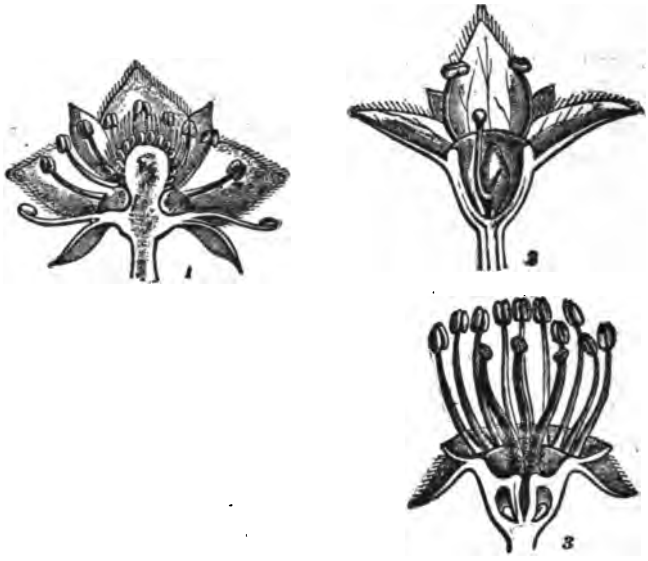
Fig. 110. Flowering branch and enlarged flower of the southwestern desert shrub, *Crossosoma Bigelovii*. Original.

Family Rosaceae. Rose Family. The modern tendency toward the recognition of smaller and more sharply defined natural families of plants is well exemplified in the Rosaceae as they now appear in our text-books. The old family included pears, plums, apples and their allies, together with spiraea, cinquefoil, blackberry and strawberry. The apples and pears are now separated as the family Pomaceae, while the plums, cherries, etc., constitute the family Drupaceae. The Rosaceae proper, containing all other genera of the group, are characterized by the regular flowers with 5 sepals, 5 petals, numerous stamens, and 1 to many carpels, distinct or united to the calyx. The fruit is usually an achene; the plants themselves are herbs, shrubs, or rarely trees. There are 65 genera and over 1200 species, of very wide geographic distribution. In Fig. 111 the two uppermost flowers exhibit two distinct types of structure found in this family: the *hypogynous* flower, in which the stamens are borne on the receptacle *beneath* the

carpels, and the *perigynous* flower, in which they are borne on the rim of the receptacle *around* the carpels.

Owing to the vast extent of the family, and the large number of noteworthy plants it contains, we shall find it advantageous to discuss the various subfamilies or general groups in some detail.

The Spiraeoideae are typified by the genus *Spiraea*, represented by numerous wild species throughout the United States, and by several ornamental exotics in cultivation. The spiraeas are mostly under-shrubs, with large, dense clusters of small red, pink or white flowers. The petals are borne on the calyx in this group, and the carpels are



From Coulter's Plant Structures. Copyright, 1900, by D. Appleton & Co.

Fig. 111. Flowers of Rose and Apple Families; (1), hypogynous flower of *Potentilla*, the sepals, petals and stamens borne on the receptacle beneath the carpels; (2), perigynous flower of *Alchemilla*, these organs borne on the rim of the receptacle above the carpel; (3), epigynous flower of the apple, the parts arising from the summit of the ovary. After Focke.

comparatively few in number, not exceeding 5. The two species of *Porteranthus*, known as "Indian physic" possess medicinal properties; they are herbs, with graceful foliage and delicate white flowers. *Quillaja Saponaria*, a Chilean tree, has bark which yields saponin in abundance from which a very good quality of soap is manufactured.

In the subfamily Rosoideae, we note a handsome Asiatic shrub (*Kerria Japonica*), whose golden-yellow double flowers have been conspicuous in the Washington parks during the past few weeks. *Potentilla* may be ranked as the largest of the few rosaceous weed genera in this country; it includes about 150 species, natives of the north temperate zone, and with very few exceptions herbaceous in habit. They have

yellow, rarely purple or white flowers, and either palmate or pinnate compound leaves, those of the palmate type being frequently composed of five leaflets, so that the plants have received the name of cinquefoil or five-finger. The closely allied genus *Comarum* illustrates practically the same type (see Fig. 112). The tormentil (*P. Tormentilla*) is the only species possessing marked medicinal properties. *Fragaria*, the strawberry, is another genus whose members are mainly of northern distribution. Wild strawberries, of one sort or another, occur throughout the country; and we are all familiar with the advances made by horticultural science in the domestic strawberry. It should be pointed out that the edible portion of this fruit consists of the enlarged pulpy axis or receptacle, while the so-called "seeds" embedded on its surface are the real fruits, each being a small one-seeded achene. In the raspberry and blackberry, members of the genus *Rubus*, the fruit is of wholly different structure, consisting of a coherent mass of little stone-fruits or *drupes*, which when ripe pull easily away from the dry columnar receptacle. *Rubus* is likewise of temperate distribution, but its species are found in several continents; they are especially numerous and very difficult to identify in Europe. The little Arctic and alpine herbs belonging to the genus *Dryas* are somewhat similar to the preceding in the appearance of their flowers, but the numerous achenes, when ripe, are tipped with long plumose styles like those of a clematis. In *Geum*, a genus which furnishes some ornamental species, the styles are also persistent, but not always plumose. The same floral structure may be seen in the mountain mahogany (*Cercocarpus*) and several allied trees of the western States. The herb known as agrimony (*Agrimonia Eupatoria*) was formerly of much repute in medicine. Its leaves and rootstocks are astringent, the latter yielding a yellow dye. Several species of this genus occur in the United States; the calyx of the small yellowish flowers is beset with bristly hooks, which furnish a means of artificial transportation for the ripe fruit along with other "stick-tights." The burnets belong to the genus *Sanguisorba;* they are tall herbs with spikes of small white flowers. In this

Fig. 112. The marsh cinquefoil or cowberry (*Comarum palustre*). After Britton & Brown, Ill. Fl. Northeast. U. S.

neighborhood also belongs *Cliffordia*, a genus of South African shrubs comprising about 40 species.

The rose (*Rosa*) is naturally the type and most important genus of the Rosaceae. There are very diverse views among botanists as to the number of wild species that should properly be recognized; over 600 have been described, but this number can probably be reduced to 200 or 300. The rose flower has an urn-shaped calyx, five petals, and very numerous stamens and carpels; the latter, when ripe, form 1-seeded

Fig. 113. The common pear (*Pyrus communis*) showing flowering branch (1), section of flower (2), section of fruit (3), and diagram of flower (4). After Wossidlo.

achenes enclosed in the fleshy fruiting calyx, known as the *hip* or *hep*. In cultivation the number of the stamens becomes greatly reduced, and the petals correspondingly increased. No flower responds more readily to the methods of the horticulturalist than does the rose, and hundreds of distinct garden varieties, belonging to many distinct types, are known. The two important economic uses of the rose are in the manufacture of rose water and attar of roses.

Next in the systematic arrangement of the family we find the subfamily Neuradoideae, containing two North African desert shrubs (*Neurada* and *Grielum*).

Family Pomaceae. Apple Family. As above explained, this and the succeeding were formerly regarded as sections of the rose family

Fig. 114. Two views of the shad-bush, *Amelanchier Canadensis*, in full bloom. After photogra; hs by Ca l Krebs.

proper. The apples and their allies may be easily distinguished by the fruit, which consists of the enlarged fleshy calyx-tube, enclosing from one to five thin-walled or papery carpels, each usually single-seeded. This structure may be seen in Fig. 113. A fruit of this type is known to botanists as a *pome* (from *pomum*, fruit).

Generic differences in this family are more apparent than real, and indeed the apple (*Malus*), the pear (*Pyrus*), and the mountain ash (*Sorbus*), were until recently generally placed together in the single genus *Pyrus*. But all three belong to very distinct natural types, and one who is absolutely ignorant of botany can distinguish any pear from any apple, and any quince from either.

The family contains about 20 genera and 225 species of wide distribution; all are trees or shrubs. In this country we have very few indigenous species of *Pyrus*, *Malus* or *Sorbus*, but *Amelanchier*, the shad-bush or service-berry, is represented by about 12 species in the United States, while *Crataegus*, the hawthorn, now contains over 100, and the number is rapidly on the increase. Two handsome photographs of the shad-bush (*Amelanchier Canadensis*) may be seen in the accompanying plate (Fig. 114). The cockspur thorn (*Crataegus Crus-galli*) is shown in Fig. 115. Hawthorns are extremely ornamental trees in cultivation, with their white or pink flowers and often brightly colored fruits. Most of the trees are armed with spines; their wood is very hard.

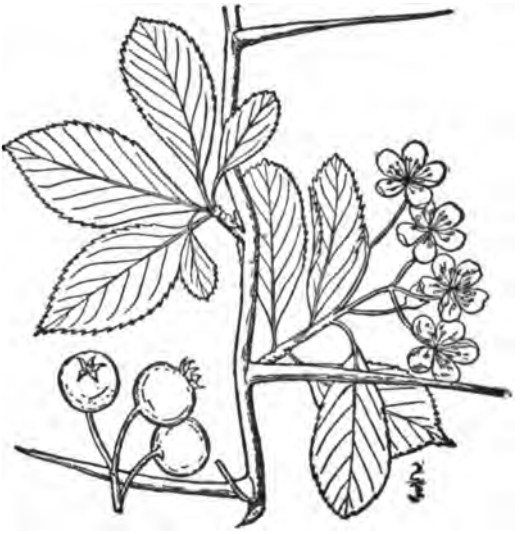


Fig. 115. The cockspur thorn (*Crataegus Crus-galli*). After Britton & Brown, Ill. Fl. Northeast. U. S.

Family Drupaceae. Plum family. Contains about 6 genera and over 100 species of wide distribution, most abundant in the north temperate zone. They are trees or shrubs with resiniferous bark, nearly all parts of the plant containing prussic acid. The flowers have five petals, borne on the calyx, which is free from the ovary; stamens numerous; ovary consisting of a single carpel, becoming what is known as a drupe in fruit, the outer coating being fleshy or pulpy, the inner hard and crustaceous, enclosing a solitary seed. The great majority of the species are comprised in *Prunus*, the plum, and *Cerasus*, the cherry,

which are often united into a single genus under the former name. *Amygdalus*, the peach, though not originally a native of our country, has become extensively naturalized as an escape from cultivation.

It will be seen that the Rosaceae and their allies form a well-defined natural group, with remarkable regularity in the appearance of their flowers (so that the term "rosaceous" is in common use) but with great diversity in fruit structure. The reverse is the case in the pea family and its allies, which we shall consider later. A remarkable feature of the Rosaceae is that the color blue seems to be entirely wanting among the flowers of the various genera.

Family Connaraceae. Connarus Family. This is a connecting link between the great groups already discussed and those which will follow. It contains about 160 species of tropical climbing shrubs, disposed in 16 genera, of which *Connarus* and *Rourea* are the most important. They have flowers of the leguminous type, but the ovary is composed of several carpels.

Fig. 117. The Royal Poinciana (*Poinciana regia*) in Porto Rico. After photograph by Mr. G. N. Collins.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XXI—*Continued.*

We have now reached one of the largest, probably the most important, and certainly one of the most distinct natural groups in the whole vegetable kingdom; the group known for many years under the name Leguminosae or Pulse Family, and still commonly so called. The name is in allusion to the fruit, which consists of a single more or less fleshy thin-walled carpel, bearing the seeds in one row. It is known technically as a legume, and popularly as a pod, and is so characteristic in appearance, that with very few exceptions any plant of this group may be recognized, when in fruit, as a "leguminous" (legume-bearing) plant.

Recent systematists, considering the remarkable differences in floral structure that obtain among various subdivisions of the Leguminosae, have treated the group as consisting of three families, and this classificatiod is generally followed in America. These families are known as the Mimosaceae, the Caesalpiniaceae, and the Papilionaceae.

Family Mimosaceae. Sensitive-plant Family. Mimosa Family. A group conspicuous in the tropics, very limited in the temperate, and wholly absent from the arctic zones. It includes about 30 genera and 1400 species, the plants being herbs, shrubs or trees. They have alternate leaves, which are nearly always pinnately compound after the pattern of those in the common greenhouse sensitive plant (*Mimosa pudica*). The small perfect and quite regular flowers are borne in heads, spikes or racemes. The calyx is cup-shaped, with from three to six teeth; the corolla with a similar number of distinct or slightly united petals. The stamens vary greatly in number in the different genera, some of them being distinguishable from each other as genera only by the number of stamens. The ovary is of course one-celled, and the fruit a legume, as above explained. Fig. 116 conveys a good idea of the flowering branch of an *Acacia*, which is a typical mimosaceous plant.

Edible fruits are yielded by many tropical trees of this group, particularly by species of *Inga* and *Prosopis*. The latter is the well-known

"mesquite" of Mexico and the southwestern States; the two species occurring within our borders differ strikingly in their fruits, one (*P. pubescens*) having the pods twisted like a corkscrew, so that it is known as screwbean. The true mesquite (*P. juliflora*), has long flattened pods containing "beans" or seeds which are an important article in the dietary of the average Mexican.

The very large genus *Acacia* is represented in all tropical countries. A peculiar feature of its morphology is that the usually decompound leaves, consisting of many leaflets, are in nearly all the Hawaiian and Australian species reduced to flat bodies known as phyllodes, which look exactly like ordinary simple leaves, though somewhat coriaceous (leathery) in texture, and standing vertical instead of horizontal. The most important economic product yielded by the genus is gum, particularly gum-arabic; also, the drug known as catechu. Both these articles are derived from the refined juice or sap. *Adenanthera pavonina*, the red sandalwood of tropical Asia, is one of the most valued timber trees of that region. Its bright scarlet seeds, oddly enough, are very uniform in weight, each being 4 grains, and they are therefore extensively used by Oriental jewelers as weights. While the shrubs and trees of this family are not extensively grown in our greenhouses, they form a very important item in tropical landscape gardening, and in congenial situations they are of great size and beauty. The group is probably more conspicuous in Australia than in any other country.

Fig. 116. A sensitive plant (*Acacia*), showing the flowers with numerous stamens, and the pinnately compound leaves. After Meyer and Schumann.

Family Caesalpiniaceae. Senna Family. Herbs, shrubs or trees, comprised in about 90 genera and 1000 species, chiefly of tropical distribution. They are distinguished by the nearly regular, often rosaceous flowers, with 5 sepals and 5 petals, the upper or odd petal enclosed by the lateral ones; stamens 10 or fewer; fruit a pod.

There are numerous ornamental plants belonging to this group, though it is a matter for regret that most of them are scarcely hardy enough to withstand our temperate climate. *Poinciana regia*, the royal Poinciana, together with many species of *Caesalpinia*, may be ranked among the most showy of tropical trees, whether in flower or fruit (see plate, Fig. 117). The large East Indian genus *Bauhinia*, consisting of climbing woody shrubs with curiously bilobed leaves, has handsome flowers, often of a delicate rose color. In our own country the redbud or Judas-tree (*Cercis*) yields a warm tone to the landscape in early spring with its masses of purple-pink flowers.

Valuable balsams are obtained from most of the species of *Copaifera*, while copal gum is derived from some species of *Hymenaea* and *Trachylobium*. A bitter bark, known as sassy-bark, is furnished by the African red-water tree, *Erythrophloeum guineense*; it is used for medicinal purposes, and by the natives, especially as an ordeal bark. Various species of *Cassia* yield the drug senna, while others are ornamental shrubs. The tamarind (*Tamarindus Indica*) affords a valuable addition to the tropical dietary, the pulp from its pods being utilized in all kinds of preserves, though somewhat unduly acid. The fruit of the carob-tree (*Ceratonia siliqua*), native of Africa, but naturalized in parts of southern Europe, is also edible. Finally, valuable timber is yielded by several trees of this group, but particularly by various species of *Swartzia*, natives of South America. The wood of these trees is very hard and of a fine grain; it is known as Brazil-wood. Fig. 118 illustrates the Kentucky coffee tree (*Gymnocladus dioica*) of our own country. At the end of this family is placed by the German systematists a somewhat anomalous genus, *Krameria*, consisting of about a dozen species, ranging from the southwestern States to Chile. The flowers are quite irregular, like those of some Cassias, and the fruit, although inde-

Fig. 118. Kentucky coffee tree (*Gymnocladus dioica*); *a*, young flowering branch, *b*, seed pod. After Chesnut, Bull. No. 20, Div. of Bot. U. S. Dep. of Agric.

hiscent (not splitting open) at maturity, is one-seeded, and structurally a pod. The genus was formerly placed with the Polygalaceae, and by many authors is now regarded as a distinct family.

Family Papilionaceae. Pea Family. This, the typical group of the Leguminosae, is at the same time the largest and most important family of the Order Rosales. The plants range in size from the smallest of herbs to the loftiest of forest trees, and are comprised in about 310 genera and 5000 species, most abundant in tropical and subtropical regions, though some extend to the Arctic zone. The character from

Fig. 119. A leguminous plant (*Lotus*) showing flowering branch; (1), detached flower; (2), clusters of 10 stamens; (3), single carpel; (4), fruit, a pod; (5), petals dissected apart; (6), consisting of standard (*a*); wings (*b*); and keel (*c*); and floral diagram (7). After Wossidlo.

which the family takes its name is found in the peculiar and very irregular shape of the flower (see Fig. 119). The upper petal, usually the largest, is known as the *banner* or *standard;* the two lateral are called *wings*, and the lowermost or forward pair jointly form the *keel*, which usually closely enfolds and protects the stamens and pistil. The latter is 1-celled, forming a pod in fruit. The stamens are usually 10, and may be distinct, diadelphous (united into two sets by their filaments, or monadelphous (similarly united into a single set).

The papilionaceous flower, as it is usually called, is in most of the genera identifiable at sight, but there are some exceptions; thus in *Amorpha* the corolla consists of only one petal, the standard, which is folded over the pistil like the keel in an ordinary flower. So also the

shape of the keel itself is found to vary; the peculiar snout-like shape of the keel in the bean flower is well known. We shall follow the systematic arrangement of the tribes in this family, taking a hasty survey of such genera as are of special importance.

In the tribe Sophoreae the yellow-wood (*Cladrastis lutea*) of our southern States, furnishes us both with a highly ornamental tree and a yellow dye. Several exotic species of *Sophora* are cultivated in gardens, while the South American genus *Myroxylon* yields a fine balsam.

Tribe Podalyrieae. This consists mostly of shrubs with simple or palmately divided leaves. It includes our various wild false indigoes (*Baptisia*) and the large Australian genus *Pultenaea.*

Tribe Genisteae. In this group are a number of well known European plants, such as the "golden shower (*Laburnum vulgare*), the Scotch whin or gorse (*Ulex*), the broom (*Cytisus scoparius*), and the woad-waxen or dyer's weed (*Genista tinctoria*). Several of these have become naturalized in the United States; but the important American genus of this tribe is *Lupinus*, the lupines, comprising a large number of species throughout the western plains and along the Pacific coast. Fig. 120 shows the only lupine of the northeastern States (*L. perennis*). In Florida occur two species with apparently simple leaves, but in reality the leaf is a compound one reduced to a single leaflet, as shown by the joint between blade and stalk. The genus *Crotalaria* is also a large one, and widely distributed through warm regions. The inner bark of *C. juncea*, the "sunn" or Bombay hemp of India, yields a valuable fiber.

Fig. 120. Wild lupine, *Lupinus perennis*. After Britton & Brown, Ill. Fl. Northeast. U. S.

Tribe Trifolieae. This includes the true clovers (*Trifolium*), the yellow hop-clover (*Chrysaspis*), the alfalfas (*Medicago*), and the sweet clovers (*Melilotus*). In Europe are found also the "rest-harrows" (*Ononis*), and the fenugreeks (*Trigonella*). All clover-like plants may be known by the close heads or spikes of small flowers, and by the usually palmate leaves. Those of cold or alpine regions are usually herbaceous, while those of the warmer temperate zone are often shrubs or

undershrubs. Their chief value is as forage or grazing plants and as honey producers.

Tribe Loteae. The genus *Lotus* exhibits considerable diversity, both in habit and in the color of its flowers. It is widely represented in the Pacific States, and also in Europe.

Tribe Galegieae. The large genus *Indigofera* is well known on account of the beautiful blue dye yielded by *I. tinctoria* and *I. Anil.* Ornamental garden plants are afforded by wisteria (*Kraunhia*) and locust (*Robinia*), the native pink flowered species of which are very beautiful. The Liberian pea tree (*Caragana*) is also ornamental, and is of considerable economic value in the regions where it occurs. The bark furnishes tough cordage, and the seeds are good food for poultry. On our western plains the traveler will notice the great abundance and variety of species of *Astragalus* and related genera. These are herbaceous plants of clover-like appearance, but decidedly opposite in the character of their herbage, since many of them are "loco" weeds, and are extremely poisonous to cattle. The licorice tree (*Glycyrrhiza*) yields the familiar sweet drug of our childhood.

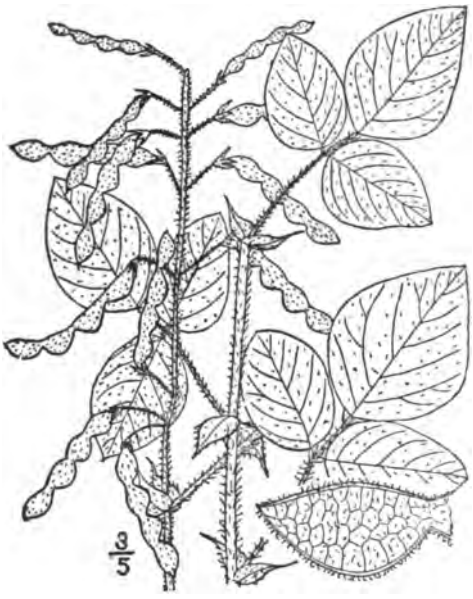


Fig. 121. The hoary tick-trefoil *Meibomia canescens.* After Britton & Brown, Ill. Fl. Northeast. U. S.

Tribe Hedysarieae. This includes some European genera valuable for forage purposes, notably *Onobrychis* and *Coronilla.* It also includes that toothsome product of our southern States, the peanut (*Arachis hypogaea*). The tick-trefoils (*Meibomia*) are common and troublesome weeds whose jointed pods are beset with fine bristles, giving them abundant opportunity to travel about and seek new abiding places through the agency of the passer-by (see Fig. 121). *M. gyrans,* of India, the telegraph-plant, is said to indicate approaching storms by the movement of its sensitive leaflets.

Tribe Dalbergieae. The tropical genera *Dalbergia, Machaerium* and *Pterocarpus,* besides being ornamental, furnish useful timber. *Dipteryx odorata* yields the tonka bean, which is extensively used by

perfumers in the manufacture of sachet powders and other perfumes. The odor is due to a principle known as *coumarin.*

Tribe Viceae. From the economic standpoint this and the following are the most important groups of the Papilionaceae. The genus *Pisum* comprises all forms and varieties of the cultivated pea, while the

Fig. 122. Hairy vetch, *Vicia villosa*, showing also enlarged flower, column of stamens and pod. After Tracy, Bull. No. 15, Div. of Agrost. U. S. Dep. Agric.

fragrant sweet pea belongs to the genus *Lathyrus*, of which there are many wild species. *Vicia*, a closely related genus, includes the wild vetches and tares, so troublesome in grain fields, but it also contains the hairy vetch (*V. villosa*), an important forage plant of the southern States (see Fig. 122). The European genus *Lens* furnishes the lentil, while *Cicer* is the gram or chick pea.

Tribe Phaseoleae. This includes most of our cultivated beans, and a number of wild beans, the important genera being *Phaseolus, Canavalia* and *Glycine. Clitoria* and *Bradburya* furnish the "butterfly peas," very ornamental in cultivation, as are also the coral-red flowers of the tropical genus *Erythrina. Cajan Cajan* furnishes the pigeon pea of the West Indies and the Florida Keys. *Dolichos Lablab* is the familiar hyacinth bean.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS.

By Charles Louis Pollard.

CHAPTER XXII.

Order Geraniales.

The large group Rosales, with which we have been dealing, was distinguished, it will be remembered, by the simple ovary, consisting either of one carpel or several separate and distinct carpels. In the order Geraniales the carpels are united, forming a compound ovary; the stamens are definite in number, rarely more than twice as many as the sepals; and the position of the ovule or immature seed in the ovary is also characteristic. The order is a large one, comprising 20 families, of which the most important are the Geraniaceae, Linaceae, Rutaceae, Burseraceae, Meliaceae, and Euphorbiaceae. The plants include herbs, shrubs and trees, many of which are of economic or ornamental value.

Fig. 123. The Alaskan cranesbill (*Geranium erianthum*) one-half natural size. Original.

Family Geraniaceae. Geranium Family. Contains about 11 genera and 475 species, of rather wide distribution, but particularly abundant in South Africa. They are herbs with solitary or clustered flowers, which in *Geranium* and *Pelargonium* are often showy and bright colored. The stamens are 5 or a multiple of 5; the ovary 5-celled, becoming a capsule in fruit. The carpels, or divisions of the ovary, bear long tails which are often elastic when ripe, causing them to curl up. This has given the name "cranesbill" to the geraniums and their allies.

The most important genus is *Geranium*, represented in this country and in the Old World by numerous species, whose flowers range in size from those of the Carolina cranesbill (*G. Carolinianum*) and the herb Robert (*G. Robertianum*), to the large-flowered Alaskan species shown in Fig. 123. The cultivated geraniums belong mostly in the genus *Pelargonium*, distinguished by the somewhat irregular corolla. They have been wonderfully developed by long cultivation and hybridization. The genus *Erodium*, widely distributed in temperate regions of the Old World, is represented by three native species on the Pacific coast which frequently become bad weeds. They are known by the Spanish name of "alfilerilla."

Fig. 124. Species of *Oxalis* or sorrel. 1. *O. versicolor*. 2. *O. commutata*. 3. *O. approximata*. 4. *O. hirta*. All one-half natural size. Original.

Family Oxalidaceae. Oxalis Family. Contains about 7 genera and 270 species, 250 of which are comprised in the single genus *Oxalis*. They are herbs of variable habit, or in a few instances shrubs. There is remarkable diversity in the leaves; while usually palmately 3-foliolate they are sometimes pinnate or even undivided and peltate (shield-shaped). The various shapes are shown in the four species of *Oxalis* represented in Fig. 124. The flowers are solitary or more often in forking cymes; sepals and petals 5, stamens 10-15; ovary 5-celled, usually capsular in fruit. The juice of the plants contains a sour principle due to oxalic acid. The various wild species of *Oxalis* are known as wood-sorrels; they have white, yellow or purple flowers. South Africa, particularly the Cape region, is the metropolis for these plants, and many varieties now in cultivation have come from there.

Family Tropaeolaceae. Tropaeolum Family. Consists of a single genus, *Tropaeolum*, including about 35 species, natives of the higher parts of Central and South America. They are herbs, erect or climbing by means of twisting leaf-stalks. The leaves are simple, and pel-

tate or palmately lobed or divided; the flowers, mostly large and showy, are quite irregular in structure, the calyx being prolonged into a nectar-bearing spur. The 5 petals are borne usually on long claws; stamens 5; ovary usually 3-celled, capsular in fruit (see Fig. 125, no. 1). It is *Tropaeolum majus* which is such a universal favorite in our gardens, and which commonly bears the name "Nasturtium." This is an inexcusable misnomer, for *Nasturtium* was known for years as the genus-name of the water-cress; and the fact that the latter is now known by another scientific name (*Rorippa*) does not excuse the misappellation of Nasturtium. The word Tropaeolum is easy to pronounce and to remember.

Family Linaceae. Flax Family. Includes 4 genera and about 150 species of wide geographic distribution in both temperate and tropical regions. The family is remarkable for the regularity and symmetry of its flowers, which have 4 or 5 sepals, 4 or 5 alternating petals, 4 or 5 stamens, and a 2-5-celled ovary (see Fig. 125 no. 2).

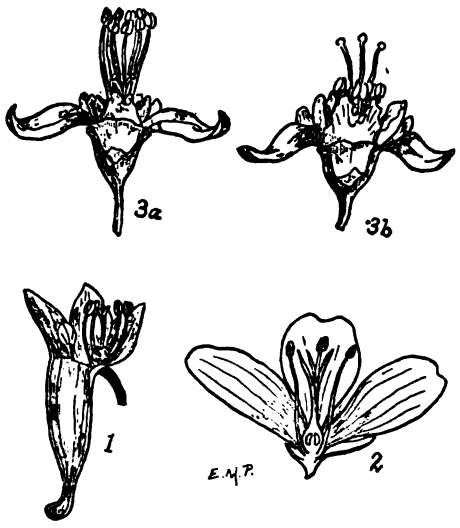


Fig. 125. Cross-sections of flowers; 1, *Tropaeolum pentaphyllum*. 2. Flax (*Linum usitatissimum*); 3a and 3b. Redwood (*Erythroxylon pulchrum*) showing two forms of stamens and pistils. All natural size. Redrawn from Engler.

The genus *Linum* is a large one, containing numerous North American, south European and African species. While several are in garden cultivation, the only one of importance is the common flax (*L. usitatissimum*). This has been in cultivation since the earliest times, and is one of those plants that is not now known to occur in the wild state. Besides the use of the fiber from its stems in the manufacture of fine linen, the seeds, when soaked in water, yield a mucilaginous substance possessing medicinal properties, and when pulverized an oil known as linseed oil is expressed from them, the resulting oil-cakes being extensively used for fattening cattle.

Family Humiriaceae. Humiria Family. A group of South American trees comprised in 3 genera and about 20 species. *Humiria balsamifera* yields a reddish balsamic juice, which when dry is burned as an incense. A medicinal ointment is also prepared from it. The structure of the flowers in this family is similar to that of the Linaceae, but the fruit is a drupe instead of a capsule.

Family Erythroxylaceae. Redwood family. Contains two genera, *Erythroxylon*, with about 90 species, natives of South America and Africa, and *Aneulophus*, with a single species, *A. Africana*, a shrub of Upper Guinea. The plants are all shrubs or trees with small flowers, having 5 sepals and petals, and 10 stamens, the latter monadelphous, as we noted those of the Leguminosae to be. The fruit is a drupe containing a single seed. The bark, as the name indicates, contains a reddish coloring matter, from which a dye is prepared. The most interesting of the Erythroxylons is undoubtedly *E. Coca*, which yields the famous drug known as cocaine (Fig. 125 no. 3).

Family Zygophyllaceae. Caltrop or Bean-caper Family. Contains about 20 genera and 150 species, of wide distribution in warm and tropical regions. They are herbs, shrubs, or trees, with leaves mostly opposite and more or less divided. The flowers are perfect, with the parts chiefly in fives; ovary 4-12 celled, capsular or baccate in fruit.

Fig. 126. Creosote bush (*Covillea Mexicana*); flowering branch, one-half natural size. Original.

Several low herbs with pinnate leaves and yellow flowers, belonging to the related genera *Tribulus* and *Kallstroemia*, are common in the southwest, as is also the interesting creosote bush (*Covillea Mexicana*). So strong is the odor of the resinous principle in this plant, that I have known herbarium specimens many years old to cause a violent attack of hay-fever in a person subject to that disease. The shrub thrives in the desert region of Arizona and New Mexico and Mexico, and is very ornamental when in full bloom, although valueless either as fuel or for forage (see Fig. 126). The genus *Guiacum* consists of trees noted for the remarkable hardness of their wood, and for the resin which they contain. *G. officinale*, which is highly ornamental in cultivation, with its blue flowers and pinnate leaves, yields the heavy wood known as lignum-vitae. The leaves of *G. sanctum* are frequently used in the West Indies as a substitute for soap.

The seeds of several Old World shrubs or herbs belonging to this family, notably *Zygophyllum Fabago*, the bean caper, and *Peganum Harmala*, are used as vermifuges.

Family Cneoraceae. Cneorum Family. Contains the single genus *Cneorum*, comprising about 12 species of maritime shrubs in the Mediterranean region and in the Canary Islands. They have yellow flowers with 3-4 petals, 3-4 stamens, and a 3-4-lobed ovary. The fruit is pecu-

liar, consisting of 3 or 4 carpels which are fleshy without and hard or bony within. The plants have no economic and little ornamental value.

Family Rutaceae. Rue Family. Contains about 110 genera and nearly 900 species, most abundant in Australia and South Africa. They are trees or shrubs, rarely herbs, with strong-scented dotted herbage, opposite or alternate usually compound leaves, and usually cymose 4-parted flowers, the fruit a berry or a capsule. There are many exceptional characters, however, and the only reliable means of distinguishing the rueworts from allied families is by the glandular-dotted foliage.

The type of the family, *Ruta*, the rue, is a genus of herbs or undershrubs, frequently cultivated for the powerful volatile oil which they

Fig. 127. The southern prickly-ash (*Xanthoxylum Clava-Herculis*); showing fruit one-half natural size. Original.

contain, and which is used medicinally as a stimulant. In the same tribe is the highly ornamental herb *Dictamnus*, known as "fire-plant," from the fact that the oil given off by the herbage is so volatile as actually to become inflammable in hot weather.

The tribe to which *Boronia* belongs contains about 20 genera, exclusively Australian, many of them shrubs with pretty, heath-like flowers. Another tribe contains the prickly ash (*Xanthoxylum*), of which there are several species in the eastern United States (Fig. 127). The

berries are pungent and aromatic, and are sometimes chewed as a remedy for toothache. The trees of the Brazilian genus *Esenbeckia* have bark possessing bitter and tonic properties.

The orange and orange-like plants have frequently been classed as a distinct family, but are now usually included in the Rutaceae. There are numerous genera in this tribe, almost exclusively East Indian in origin, but frequently cultivated. All are distinguished by the familiar pulpy fruit. The orange, lemon, lime and shaddock all belong to the genus *Citrus*. Mention should be made of one other American rutaceous tree, the hop trefoil (*Ptelea*), distinguished by its trifoliate leaves and dry, winged fruit.

Family Simarubaceae. Ailanthus Family. Contains about 27 genera and 150 species, natives of tropical regions. They are trees or shrubs with bitter bark, distinguished from the preceding family mainly by the absence of dots on the foliage. The flowers are regular, either perfect or dioecious, 3-5-parted, the petals borne on a disk. The fruit is various.

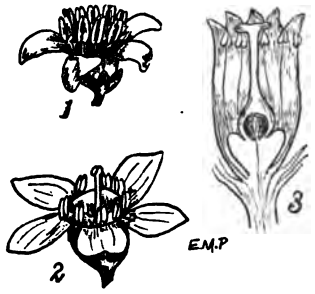


Fig. 128. Cross-section of flowers, enlarged. 1. Quassia (*Simarouba officinalis*). 2. *Boswellia Carteri*. 3. Mahogany (*Swietenia Mahogoni*). Redrawn from Engler.

Our only North American representatives of this family are the ailanthus or "tree-of-heaven," a well-known shade tree extensively naturalized from Asia, and an indigenous species of *Simarouba*, on the Keys of south Florida. Various South American species of the genus yield valuable medicines. Quassia is the product of several trees belonging to this family, but is principally derived from *Simarouba amara* (Fig. 128, no. 1).

Family Burseraceae. Terebinth Family. Contains 16 genera and about 300 species, natives exclusively of tropical Asia, Africa and America. They are forest trees of high value as resin and balsam bearing plants. Thus myrrh is the product of *Commiphora Abyssinica*, and bdellium is derived from *C. Africana*. The resin known as olibanum, which is supposed to have been the frankincense of the ancients, comes from the Arabian *Boswellia Carteri*. Various gums are yielded by *Bursera*, the only genus which penetrates the Florida peninsula. The fruits of *Canarium* are edible. The Burseraceae as a whole have no good characters distinguishing them from the two preceding families, except that the husk of the fruit splits into valve-like segments. A section of the flower of *Boswellia Carteri*, showing structure, is seen in Fig. 128, no. 2.

Family Meliaceae. Melia Family. Contains about 40 genera and 200 species. They are trees or shrubs differing from most of the fam-

ilies already discussed in having leaves without stipules.* The sepals and petals are 4 or 5; the stamens, equal in number or more numerous, are commonly united in a tube. The fruit is a berry, a drupe or a capsule. Like the Simarubaceae, most of the trees of this family have bark possessing bitter and tonic properties. The "pride-of-India" or chinaberry tree (*Melia Azederach*) is extensively cultivated in the South as a shade tree, and has now become thoroughly naturalized; it has enormous pinnate leaves and large panicles of pink flowers succeeded

Fig. 129. *Byrsonima lucida*, natural size. Original.

by small straw-colored berries. The tropical genera *Trichilia* and *Carapa* yield useful oils. *Swietenia Mahogoni* is the source of mahogany (Fig. 128, no. 3).

Family Malpighiaceae. Malpighia Family. Contains about 50 genera and 600 species, natives mainly of tropical America. They are trees or shrubs with opposite stipule-bearing leaves and regular flowers borne on jointed pedicels. Calyx 5-parted; petals 5, usually long-clawed; stamens 10, inserted with the petals on a disk; ovary 3-lobed,

* A stipule is the small leaf-like body borne at the base of an ordinary leaf.

fleshy or capsular in fruit; the carpels often very curiously and prominently winged. The fruit of *Malpighia glabra* is edible, being known in the West Indies as the Barbadoes cherry. Other species of this genus are cultivated for their peculiar flowers, as also species of *Banisteria* and *Hiraea*. This family is represented in the United States by five genera, one member of which is the undershrub *Byrsonimia lucida*, occurring in south Florida. It has racemes of rather pretty pink flowers. *B. spicata* of the West Indies has edible acid berries and bark used for medicinal purposes and for tanning.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS

By Charles Louis Pollard.

CHAPTER XXII.—*Continued.*

Family Trigoniaceae. Trigonia Family. A small group of South American trees consisting of two genera, *Trigonia*, with 26 species, and *Lightia*, with two. The plants are most anomalous in structure, and have given botanists much trouble to dispose of them properly in the systematic sequence. The flowers are very irregular, one petal being much larger than the remaining four, and placed uppermost, like the banner petal in a papilionaceous flower. One of the petals is spurred somewhat like a violet; the stamens are united in two series.

Family Vochisiaceae. Vochy Family. Contains 7 genera and about 130 species, exclusively South American. They are trees or shrubs with opposite leaves and very showy yellow, white, pink or purple flowers in large terminal racemes or panicles. The flowers are irregular, having 4 to 5 sepals, an equal number of petals, and few stamens, sometimes reduced to one; the ovary is 3-celled, becoming a winged fruit or capsule. *Vochisia* and *Qualea* are often cultivated for their beautiful flowers, and the trees frequently yield valuable timber, the well-known copaiyé wood of Guiana being the product of *Vochisia Guianensis*. A yellow dye is also obtained from certain species of *Qualea*. The popular name which I have adopted for the family is derived from the native name of some of the trees in Guiana.

Family Tremandraceae. Tremandra Family. Two genera, *Tremandra* and *Platytheca*, the former with two species, the latter with one, all confined to West Australia. They are heath-like shrubs with red, blue or white slender-pedicelled flowers; the latter are regular, with 4-5 sepals, 4-5 petals, 8-10 stamens, and a 2-celled ovary.

Family Polygalaceae. Milkwort Family. These plants are herbs, rarely shrubs or small trees, comprised in about 10 genera and 750 species, widely distributed in both temperate and tropical regions. *Polygala* is the most important genus, consisting of over 250 species, a fifth of which are found in the United States. The plants are of interest to the botanist on account of the somewhat singular structure of

their flowers; there are 5 sepals, the two lateral ones much larger than the others, often brightly colored, and known as *wings;* the petals are 3 or 5, somewhat united at their bases, the lowermost one often crested; stamens 8, monadelphous or diadelphous (united in one or two sets); ovary 2-celled, capsular in fruit, the seeds with a wart or protuberance called a *caruncle.* The flowers vary greatly in color and in the mode of arrangement, being white, yellow or purple, borne in close heads, in spikes, racemes or cymes, the latter a spreading, flat-topped form of inflorescence.

In the northern States the milkworts are mostly small, inconspicuous plants, an exception being noted, however, in the case of the beautiful little fringed polygala (*P. paucifolia*), often known as flowering wintergreen. This has leaves like the true wintergreen, with rose-purple, beautifully fringed flowers. It also produces subterranean flowers without petals, and these yield most of the fruits. In the South, particularly throughout the pine barrens, the milkworts are among the most conspicuous of the flowering plants, large masses of various species being constantly met with. Among the more handsome forms should be noted the various yellow flowered species (*P. cymosa, P. ramosa,* and *P. lutea*), and the large purple flowered *P. grandiflora* (see Fig. 130).

Fig. 130. Large-flowered milkwort (*Polygala grandiflora*), one-half natural size. Original.

Family Dichapetalaceae. Dichapetalum Family. Consists of 3 genera and about 80 species, widely distributed in the tropics, and particularly abundant in Africa and Madagascar. They are trees or shrubs with small flowers, similar in general structure to those of the following family.

Family Euphorbiaceae. Spurge Family. Contains about 210 genera and 4000 species, of wide distribution. They are herbs, shrubs or trees; with monoecious or dioecious flowers, and an acid, often milky, and frequently poisonous juice. The flowers are usually without petals, and sometimes, as in *Euphorbia,* without a calyx, the latter being replaced by an involucre or whorl of leaves resembling a calyx. The stamens vary greatly among the different genera; the ovary is usually 3-celled, with 3 styles, and the fruit a 3-lobed capsule; the latter generally serves as an easy means of identifying any member of the family.

The Euphorbiaceae are of interest in many ways; and following the practice previously adopted in these pages, we shall discuss the important genera in the order of their tribal relationship.

Phyllanthus (leaf flower) is a large tropical genus, named from the circumstance that the flowers in some of its species are borne on leaf-like, flattened branches called *phyllocladia*. Though the genus contains over 400 species, none are of any economic importance. Many are weeds of waste places in the tropics.

The genus *Croton* is represented in our country by numerous rank weeds in the South and West, often called goatweeds. The herbage in most of the species is covered with stellate hairs, giving the plants a silvery or even woolly appearance. The so-callod crotons of cultivation belong tn an entirely different genus (*Codiaeum*). The most important member of the genus is *C. Tiglium*, native of the East Indian archipelago, the seeds of which yield croton oil, a powerful purgative. Many species possess tonic and aromatic properties, like the West Indian *C. Eluteria*, from which cascarilla bark is obtained. *C. bacciferum* and *C. Draco* yield a resin used in varnish-making.

The tribe Acalypheae includes a number of genera, *Acalypha*, the type, containing the now familiar "chenille plant" of cultivation, with long drooping crimson spikes of staminate flowers. The stringwood of the island of St. Helena, now known to be quite extinct, was *A. rubra*. *Mallotus Philippinensis*, a tree of the Polynesian and Philippine regions, bears capsules covered with a red powder, from which is obtained a brilliant orange dye well known in India by the name *Kamala*. The genus *Tragia*, with several American species, has stinging hairs like those of nettles, which the plants strongly resemble. The castor oil bean (*Ricinus communis*) is too familiar an object in cultivation to require description. Its highly ornamental seeds are susceptible of a fine polish.

In the tribe Jatropheae we have the genus *Jatropha*, several species of which yield medicinal oils, also *Aleurites Moluccana*, the candleberry tree of the South Pacific islands. The seeds of this tree burn with great freedom on account of their large percentage of oil. They are also used as an article of food.

To the native in South America, manioc or cassava is as important as wheat to the northerner, as it forms his staple diet. Various species of *Manihot* yield cassava, which is obtained by grinding or pounding the root after the poisonous juice which it contains has been expelled by pressure.

The tribe Hippomaneae contains the West Indian manchineel (*Hippomane Mancinella*) one of the most poisonous trees of the family; also the sandbox tree (*Hura crepitans*), the explosive property of whose fruits has been so often described.

Finally, there is the genus *Euphorbia*, the type of the family, embracing about 600 species, distributed in all parts of the world. They

are herbs or shrubs, in some regions leafless and fleshy, like cacti, which they replace in the deserts of the Old World. Our species are mostly herbs of weedy aspect. They frequently have the upper leaves and bracts brilliantly colored, as in the familiar poinsettia, which is a Euphorbia. *E. marginata*, represented in Fig. 131, belongs to this class.

Fig. 131. The white-margined spurge (*Euphorbia marginata*). Original.

The milky juice which is found in members of this genus possesses important medicinal properties. It is also very poisonous when taken internally, though the poisonous principle may be dissipated by the action of heat. A fair article of caoutchouc is made from the juice of an East Indian species.

Family Callitrichaceae. Water Starwort Family. These are

small aquatic or sometimes terrestrial herbs, comprised in the single genus *Callitriche*, which contains about 20 widely distributed species. They have slender stems, opposite leaves, and minute perfect or monoecious axillary flowers, destitute of calyx and corolla; stamen one, ovary 4-celled, becoming a capsular fruit which splits into 4 little one-seeded carpels. The plants are inconspicuous, and without special interest.

Fig. 132. Allegheny Mountain spurge (*Pachysandra procumbens*). Original.

CHAPTER XXIII.

Order Sapindales.

This order is essentially similar to the Geraniales, although there are important differences in the structure of the seed. The families comprised in it must therefore be learned by experience. There are 20 of these, the most important being the Anacardiaceae, Aquifoliaceae, Celastraceae, Aceraceae, Hippocastanaceae, and Sapindaceae.

Family Buxaceae. Box Family. This was formerly united with the Spurge Family above described, from which it may be distinguished by the absence of milky juice. There are 6 genera and 30 species; the familiar evergreen known as box is *Buxus sempervirens*, a member of the typical genus. In the Allegheny mountains grows a curious herb, the Allegheny mountain spurge (see Fig. 132), which also belongs to the family; the spikes of staminate flowers are quite fragrant. The only other known species of *Pachysandra* is Japanese, the genus thus affording another instance of that curious analogy between the Japanese and the eastern North American flora.

Fig. 133. The crowberry (*Empetrum nigrum*). Original.

Family Empetraceae. Crowberry Family. These are low, evergreen shrubs of heath-like aspect, with small axillary or clustered dioecious flowers succeeded by berry-like drupes. Sepals 3, petals 2 or 3 or wanting; stamens usually 3. There are only three genera, *Empetrum*, *Corema* and *Corrigiola*. High up in the arctic regions, extending southward to our northern border, grows the crowberry (see Fig. 133), covering dense patches of ground, its black berries affording an abundance of food for the Arctic birds. Another species is found in Antarctic South America. Scarcely less remarkable is the distribution of *Corema*, one species of which (*C. Conradii*) occurs in a few isolated stations from Newfoundland to New Jersey, the other in southwestern Europe. The third member of this family, *Corrigiola*, is a monotypic genus of Florida.

Family Coriariaceae. Coriaria Family. Consists of the single genus *Coriaria*, with 8 species, natives principally of the Old World, although one species occurs in Peru. They are shrubs with ribbed leaves and clusters of flowers having the parts in fives. The fruit consists of 5 one-seeded carpels, surrounded by the persistent fleshy petals. The fruit of the common European species (*C. myrtifolia*) is poisonous, but some of the Oriental forms have edible fruits, though the seeds are usually poisonous.

Family Limnanthaceae. False Mermaid Family. These are delicate annual herbs of two genera. One, *Limnanthes*, is confined to the Pacific States, and contains about 6 species; the other, *Floerkea*, is a marsh plant rather widely distributed through the United States. The family is distinguished by the alternate, pinnately divided leaves, and

by the perfect flowers, which bear glands alternating with the petals; stamens twice as many as the petals; fruit capsular, the carpels nearly distinct. The delicate flowers of *Limnanthes Douglasii* are sometimes seen in cultivation, but the family is of slight importance.

Family Anacardiaceae. Cashew Family. The trees and shrubs comprising this family may nearly always be recognized by the milky, often caustic juice, inconspicuous flowers, and ovary containing a single ovule; the leaves, moreover, are without glands or dots. There are

Fig. 134. The poison sumach (*Rhus Vernix*). After Britton & Brown, Ill. Fl. Northeast. U. S.

about 50 genera and 400 species, most abundant in tropical regions. In our own area the family is represented by the sumachs (*Rhus*), some species of which are quite harmless and extremely ornamental, while others are highly poisonous. The poison oak (*R. Vernix*) or swamp sumach is the most virulent of these, while the common poison ivy (*R. radicans*) is dangerous to many people. The researches of specialists during the last few years have shown that the poisonous principle resides in a volatile oil which occurs in all parts of the plant; also that the best remedy is a solution of acetate of lead.

In the tropics there are a number of important economic trees belonging to this family. The fruits of *Anacardium occidentale*, known as cashew nuts, are edible after the acridity has been removed by roast-

Fig. 135. The poison ivy (*Rhus radicans*). After Britton & Brown, Ill. Fl. Northeast. U. S.

ing. Pistache nuts are the product of a species of *Pistacia*, native of western Asia. The mango, that most delicious of tropical fruits, is yielded by *Mangifera Indica*, a handsome tree with deep green foliage. The odor of turpentine so noticeable in the outer skin of the mango is significant of a property common to nearly all Anacardiaceous trees, and a great variety of varnishes, resins and the like are obtained from them.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS

By Charles Louis Pollard.

CHAPTER XXIII.—*Continued.*

Family Cyrillaceae. Cyrilla Family. This consists of two small trees, *Cliftonia* and *Cyrilla*, both natives of the southern United States, and a genus of tropical American shrubs, *Costaea*, with 3 species. The two first-named genera are probably both monotypic, although a second species of *Cyrilla* has been described. They are both highly ornamental, having long racemes of white, holly-like flowers. The family is indeed very closely related to the Holly Family, but differs in the fruit, which is sometimes winged.

Family Pentaphylacaceae. Pentaphylax Family. Contains the single genus *Pentaphylax*, with one species, an East Asiatic tree.

Family Corynocarpaceae. Corynocarpus Family. Also monotypic, containing the New Zealand *Corynocarpus laevigatus*. The latter is a very handsome tree with deep green foliage and small white flowers in terminal clusters. The tree is said to be valued for its fruit, which resembles a plum in appearance and taste. The seeds are poisonous when raw, but after cooking, an edible farinaceous substance is extracted from them.

Family Aquifoliaceae. Holly Family. Contains five genera and about 175 species, natives of both temperate and tropical regions. *Ilex* is the only important and by far the largest genus, containing over 160 species. This family is characterized by the usually dioecious flowers, which are regular in structure, having a 3-6-parted calyx, and corolla of 4-6, sometimes united petals (see Fig. 136). On the latter account the family has often been placed over among the gamopetalous plants, or those having the corolla in a single piece; but the joining is not very complete, appearing more like simple cohesion. The fruit is a small berry-like drupe, red, blue, or black in color, and familiar to us as the "holly berry" of Christmas-tide.

The English or European holly (*Ilex Aquifolium*) has more glossy deeper green foliage than our American holly (*I. opaca*), and hence is imported to a considerable extent for decorative purposes. There are

about a dozen other species of *Ilex* in the United States, some with deciduous and some with evergreen leaves, but none of them are very ornamental except possibly when loaded with ripe fruit. The leaves of the "yaupon" in the Southern States (*I. Cassine*) have been used for tea; but it is from the leaves of *I. Paraguayensis*, a South American species, that a beverage of really fine quality is obtained. It is known as maté or Paraguay tea, and is as important in the commerce of the country as ordinary tea is in China, the annual consumption reaching 8,000,000 pounds. The beverage is very stimulating, and when taken in excess is almost an intoxicant. The leaves of several other South American species are used for the same purpose.

Family Celastraceae. Staff-tree Family. Consists of about 40 genera and 350 species, of wide distribution, though chiefly in warm regions. They are trees or shrubs, frequently climbing, with simple leaves and small regular perfect flowers, with a conspicuous disk in the center, on which are situated the stamens and petals, which are both 4 or 5 in number, alternate with each other. The ovary is 3-5-celled, becoming in fruit either a capsule or a somewhat fleshy pod having much the appearance of a berry, the seeds with an appendage known as an *aril*. This is often brilliantly colored, whence the name of "burning bush," applied to our American species of *Euonymus*, one of which is shown in Fig. 137. The climbing false bittersweet (*Celastrus scandens*) is a familiar object in the fall, with its bright yellow fruits and red-arilled seeds. In Fig. 136 is seen a section through the fruit of *Wimmeria*, a tropical shrub belonging to this family.

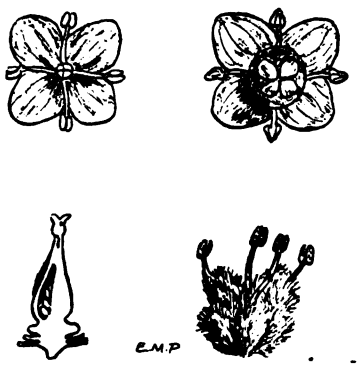


Fig. 136. The two uppermost drawings, male and female flowers of European holly. Lower left hand, capsule of *Wimmeria;* lower right hand, flower of *Phytocrene*. Redrawn from Engler.

The Celastraceae possess no very important economic feature. The Arabian *Catha edulis* furnishes from its dried leaves a beverage known as kat-tea or cafta, the flavor of which is pleasing. The Arabs also believe that a twig of the bush worn in the bosom prevents the person from danger of infection. The herbage of *Euonymus* is poisonous.

Family Hippocrateaceae. Hippocratea Family. Contains *Hippocratea*, with about 60 species, and *Salacia*, with about 70. Both are tropical shrubs or trees, distinguished from the preceding family by having flowers with 3 monadelphous stamens and 5 petals. The fruit is sometimes edible. *Hippocratea ovata*, a climbing shrub, is the sole

representative of the family in the United States, occurring in the Everglades of Florida.

Family Stackhousiaceae. Stackhousia Family. Consists of a single genus, with about 20 species, all herbs, natives of Australia and New Zealand. They have flowers with unequal stamens, and with the petals slightly united into a tube, but possess no features of especial interest.

Family Staphyleaceae. Bladdernut Family. Trees and shrubs, comprised in 5 genera and about 25 species, widely distributed. They have the leaves pinnate or in threes, with regular perfect flowers in axillary or terminal clusters, the parts in fives. The interesting structural character is found in the fruit, which is an inflated capsule in *Staphylea*, the bladdernut, a rather ornamental shrub, having creamy flowers and curious bladdery pods (see Fig. 138).

Family Icacinaceae. Icaco Family. Contains about 40 genera and nearly 100 species, tropical trees or shrubs. They are close in structure to the Aquifoliaceae, but are often remarkable for the woolly flowers, one of which, of the genus *Phytocrene*, is shown in Fig. 136. The South American *Villaresia Congonha*, belonging to this family, yields a tea similar to the true maté described above.

Family Aceraceae. Maple Family. Consists of *Acer*, the maples, with about 100 species, and *Dipteronia*, a monotypic genus of Asia, which differs in having the fruits winged on the whole circumference.

Fig. 137. The American spindle-bush (*Euonymus Americanus*). Original.

The maples are a most interesting group of trees, and the different species have a very marked individuality. They are grouped according to the flowers, which may be in dense axillary clusters, like those of the red, or soft, and silver maples, which open before the leaves; in lateral flat-topped clusters or corymbs, often drooping, like those of the sugar maple, which open with the leaves; or they may be in long spikes or racemes opening after the leaves, as in the striped maple (see Fig. 139). The petals are 5 in number, or wanting in some species; the sta-

mens are 4-12; and the 2-lobed ovary becomes in fruit a familiar "key" or *samara*, differing greatly in shape. Maple wood is hard, of variable density and color; it is ordinarily susceptible of a fine polish, and plays an important part in cabinet making.

Family Hippocastanaceae. Horse-chestnut Family. Contains two genera, *Æsculus*, with about 15 species, and *Billia*, with 2, the latter Mexican. They are trees or shrubs with palmately divided leaves and perfect, irregular flowers borne in large pyramidal panicles. The calyx is bell-shaped; petals 4 or 5, long-clawed; stamens 5-8; ovary 3-celled, becoming a leathery capsule containing 1-3 large shining seeds.

The common horse-chestnut (*Æ. Hippocastanum*) of our streets and parks is a native of Asia, but has escaped from cultivation in many places in the East. The western buckeye (*Æ. glabra*) is well shown in the accompanying photograph (Fig. 140.) There are several other ornamental native species, some with red and some with yellow flowers.

Fig. 138. The bladder-nut (*Staphylea trifolia*) showing flowering branch and detached fruit. Original.

Family Sapindaceae. Soapberry Family. Contains about 120 genera and over 1000 species, of wide distribution in tropical and semitropical regions. They are trees or shrubs with mostly pinnate or palmate leaves, and regular or irregular, perfect or sometimes dioecious flowers. Calyx 4-5 lobed or divided; petals 3-5, borne on a fleshy disk, as are the 5-10 stamens; fruit a berry or a capsule, the latter sometimes bladdery-inflated, as in the balloon vine (*Cardiospermum*) of our gardens.

Sapindus is a genus of about 10 species, one or two of which are found within our borders. They are called soapberries, from the fact that the outer covering of the fruit contains a saponaceous principle used extensively in the tropics in place of ordinary soap. The hard round seeds of some species are used for making necklaces and rosaries. *Serjania* and *Paullinia* are two very large genera of climbing shrubs, common in tropical regions. The seeds of *P. sorbilis*, the guarana, are made into compressed cakes from which a cooling beverage is prepared, and form an extensive article of trade in Brazil. Litchi nuts,

Fig. 140. Buckeye (*Æsculus glabra*). After photograph by Carl Krebs.

which are sold among the Chinese in our large cities, are the product of *Litchi Chinensis*. *Blighia sapida*, a West African tree, also furnishes edible fruit.

Family Sabiaceae. Sabia Family. Four genera and about 65 species, tropical trees and shrubs of no special interest.

Family Melianthaceae. Melianthus Family. Two genera and about 15 species, also tropical.

Family Balsaminaceae. Balsam Family. Contains the genus *Impatiens*, with about 220 species, mostly natives of the Old World, and *Hydrocero*, with one, the latter a native of India. The balsams or jewel-weeds, as we call them, are succulent herbs, with alternate single leaves and showy, very irregular flowers. Sepals 3, the two lateral ones small and green, the other large and sac-shaped, spurred, and colored like the corolla; petals 5, 3 of them cleft; stamens 5; fruit in *Impatiens* a capsule, in *Hydrocera* a berry.

Fig. 139. The striped maple (*Acer Pennsylvanicum*). After Britton & Brown, Ill. Fl. Northeast. U. S.

We have two jewel-weeds, the pale and the spotted (see Fig. 141). The flowers are dainty little things, quite in keeping with the cool, shaded swamps or brooksides where the plants usually abound. Other species are cultivated in our gardens.

Family Rhamnaceae. Buckthorn Family. Contains about 45 genera and 575 species, widely distributed in temperate and tropical regions. They are shrubs or small trees, sometimes thorny, with small, clustered, regular flowers. Calyx 4-5-toothed; petals 4-5, inserted on the throat of the calyx, or sometimes wanting; stamens 4-5; ovary 2-5-celled, becoming in fruit a small drupe or a capsule.

Rhamnus, the buckthorn, occurs in both Europe and America, and several species may be classed as ornamental trees, the dark green foliage being usually very handsome. The fruits of *R. catharticus* were formerly in some demand as a purgatfve; various pigments are derived from the fruits of this and other species. On the Pacific coast one of the conspicuous shrubs is the California lilac (*Ceanothus thyrsiflorus*), which has bluish flowers somewhat resembling those of the lilac. There are over 30 other species of this genus through California and Mexico. One of the few eastern species, *C. Americanus*, is known as

Fig. 141. The pale touch-me-not (*Impatiens aurea*). After Britton & Brown, Ill. Fl. Northeast. U. S.

New Jersey tea, from the fact that the leaves were used as tea by the troops during the Revolution.

The fruits of various species of *Zizyphus* are largely eaten in the Orient, particularly those of the jujube (*Z. Jujuba*).

Some of the woody climbers belonging to this family are responsible in the tropics for the impenetrable jungle of vegetable ropes or lianas which must be cut apart before a path can be made. In the West Indies and on the Florida Keys, *Gouania Domingensis* is an example. The photograph (Fig. 142) shows the clusters of small flowers and the tendrils by which the plant climbs. Throughout our Southern States the supplejack (*Berchemia volubilis*) is conspicuous in swamps, its slender rope-like stems possessing a wonderful degree of tenacity.

Fig. 142. Branch of chew stick (*Gouania Domingensis*), showing flower-spikes and tendrils. After photograph by G. N. Collins.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS

By Charles Louis Pollard.

CHAPTER XXIII.—*Continued.*

Characterization of the order Rhamnales was accidentally omitted from the last installment of the Supplement. It consists only of the two families Rhamnaceae and Vitaceae—the buckthorns and the grapes. Both are distinguished from the preceding group of families (comprising the order Sapindales) by having the stamens opposite instead of alternate with the petals.

Fig. 143. The wine grape of Europe (*Vitis vinifera*). Original.

Family Vitaceae. Grape Family. Consists of 10 genera and about 450 species, of wide distribution. Though not very large, containing only about 40 species, the genus *Vitis* is the most important from an economic standpoint. The common grape of Europe (*Vitis vinifera*), is among the most ancient of cultivated fruits. Vineyards are frequently mentioned in the Bible, and the references date back even to the flood: "Noah began to be an husbandman, and he planted a vineyard." Yet it is a remarkable fact that although southern Europe is the headquarters for cultivation of the vine, there is no single indigenous species on the

Continent. *V. vinifera* is native of the eastern and southern shores of the Caspian and the Black seas, and a number of species occur throughout India, China and Japan. In North America the species belong to distinct groups. The fox-grapes are characterized by dense clusters of fruit having a soft pulp and a strong, musky flavor. *V. Labrusca*, an example of this class, is our commonest northeastern species. In cultivation it gives rise to those excellent varieties of hardy grapes known as the Concord, Isabella and Catawba. The muscadine, or bullace grapes, constitute another type, represented in the Southern States by *V. rotundifolia;* this has nearly orbicular leaves, without lobes and the berries are solitary or few. The famous "scuppernong" of the South is derived from this species; its fruit, with a plum-like pulp, is excelled by no other grape unless it be by the Tokay of California.

Fig. 144. Fruiting branch of *Sloanea quadrivalvis*, a tree of the Elaeocarpus Family. Original.

Grape cultivation in Europe is almost entirely for the production of wine, the annual consumption of which, particularly in the Old World, reaches enormous proportions. In western Asia Minor grapes are grown largely for drying, in which condition they are familiarly known as raisins. Cooking currants, so-called, are not true currants, but small seedless raisins of a more acid variety.

The Vitaceae, which were formerly called Ampelidaceae,

Fig. 145. One of the jute plants (*Corchorus olitorius*) showing leaves, flower and fruit. Original.

may be distinguished very easily. They are climbing or erect shrubs with alternate leaves and watery juice. The small greenish flowers are either perfect or dioecious, and are borne in variously shaped clusters. The petals are 4-5, and fall soon after the flower expands. When tendrils are present they are borne apparently opposite the upper leaves, the inflorescence being opposite the lower leaves as shown in Fig. 143. These tendrils, however, are technically regarded as abortive shoots.

The Virginia creeper (*Parthenocissus quinquefolia*) is another member of the family, as also the Japanese ivy (*P. tricuspidata*). The very large genus *Cissus* is widely represented in tropical Asia.

Fig. 146. *Grewia orientalis* showing flowering branch and enlarged flower. Original.

Fig. 147. Flower of *Hibiscus schizopetalus* showing the monadelphous stamens. Drawn from a photograph by Mr. G. N. Collins.

CHAPTER XXIV.

Order Malvales.

This very distinct order contains eight families, the most important being the Malvaceae or Mallow Family and the Tiliaceae or Linden Family. Like the preceding order they are distinguished mainly by floral characters. The sepals are called by botanists *valvate*, which means that in the bud before unfolding their edges just meet without overlapping, in which case they would have been *imbricated*. The valvate sepals may be easily observed in the flower of any common mallow. The ovule-bearing walls within the ovary are

also united in the center throughout the order.

Family Elaeocarpaceae. Elaeocarpus Family. Contains 7 genera and about 120 species, which formerly constituted one or more sections of the Linden Family (Tiliaceae), from which they may be distinguished by the fringed or laciniate petals. The plants are shrubs or trees, native of the tropics of both hemispheres. *Elaeocarpus*, named for the resemblance which its fruit bears to an olive, contains about 60 species, some of which are valuable timber trees. The pulp of the fruit is edible, and the seeds are polished and sold as ornaments. *Sloanea*, another large genus, has hard capsular fruits, splitting into four or five valves; a fruiting branch of *S. quadrivalvis* is shown in Fig. 144. The wood of *S. Jamaicensis* is known as ironwood, or breakaxe.

Fig. 148. Flower and fruit of the cotton plant (*Gossypium herbaceum*). After Dodge. Report No 9, U. S. Dep't of Agric.

Family Chlaenaceae. Thickleaf family. Trees or shrubs comprised in 7 genera and about 20 species, of somewhat peculiar interest from the fact that the whole family is confined to the island of Madagascar. They are trees or shrubs, with leathery, spirally arranged leaves, and flowers produced from a sort of cup or involucre.

Family Gonystylaceae. Gonystylus family. Consists of the single genus *Gonystylus*, with 7 species of Asiatic trees.

Family Tiliaceae. Linden Family. Contains about 35 genera and 250 species, of wide distribution in warm or tropical regions, comparatively few in the temperate zones. They are chiefly trees or shrubs, having simple, usually alternate leaves, and clustered flowers. The calyx has 5 sepals; the petals are of the same number, or sometimes

fewer, rarely entirely absent; stamens numerous, united in several sets; ovary 2-10-celled, becoming a berry a drupe or a capsule in fruit. The Linden family is represented in our region almost exclusively by the linden proper (*Tilia*), of which there are several species in America and Europe. The tree may always be recognized, when in bloom, by the fragrant clusters of white flowers, the peduncles of which are partly coherent with, in fact seeming to spring from, a broad membranous bract. At other seasons the broad, cordate leaves are characteristic.

Fig. 149. Flowers, section of fruit, column of stamens, and seeds of the swamp rose mallow (*Hibiscus moscheutos*). After Dodge, Report No. 9, U. S. Dep't of Agric.

Lindens or basswoods are not only useful as shade trees, but they yield wood of fine quality, and the flowers provide a favorite food for bees. The inner bark is tough and fibrous, and in Russia forms an extensive article of commerce under the name of Russia matting, being used for tying, packing, etc. But it is the genus *Corchorus* that is of the most value in this respect, for several species of the latter yield jute, one of the most valuable of our fibers. One of the jute plants, an East Indian species (*C. olitorius*) is shown in Fig. 145. All the members of this genus are herbs. *Grewia* and *Triumfetta* are other types of the Linden

family, consisting of tropical trees, most of which yield useful fiber and good timber (see Fig. 146).

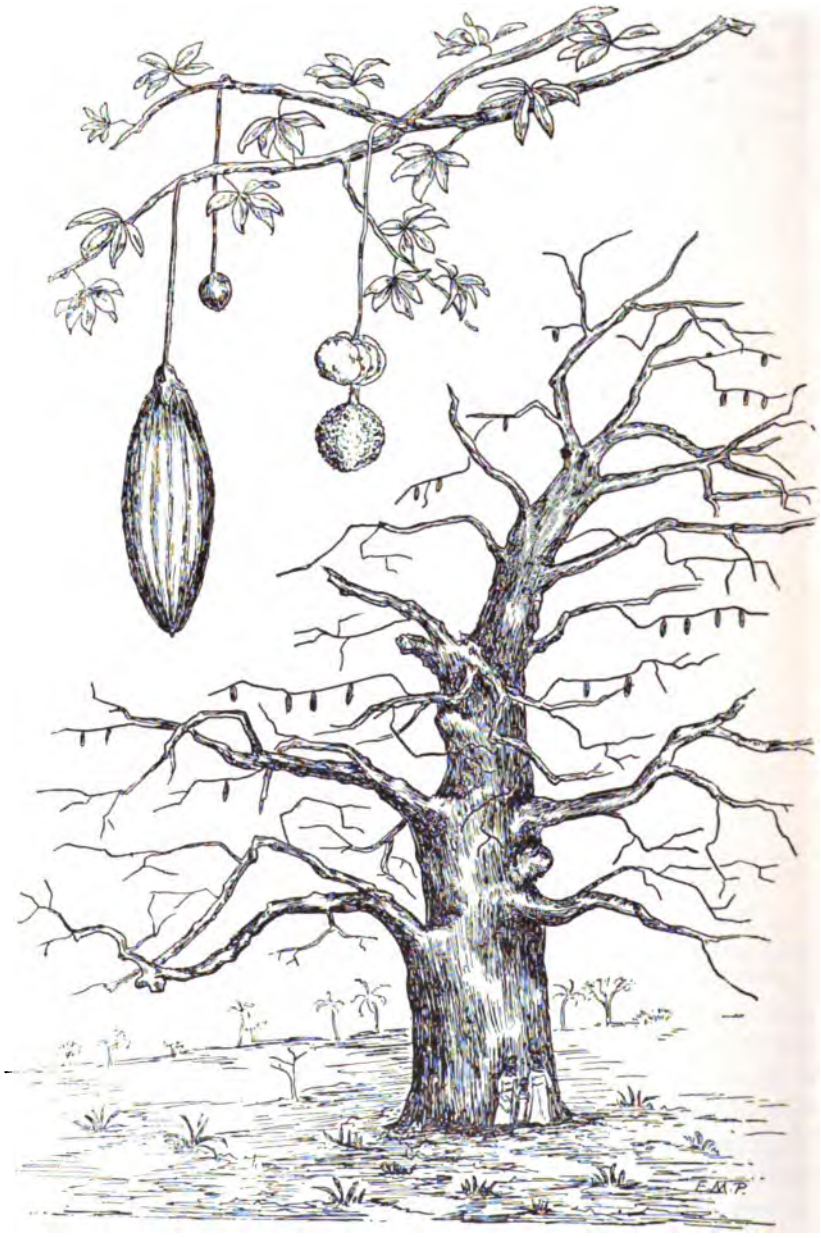


Fig. 150. Baobab tree (*Adansonia digitata*), the upper corner showing a branch bearing flowers and fruit. Redrawn from Engler.

Family Malvaceae. Mallow Family. Contains about 40 genera and 800 species, of wide distribution in both tropical and temperate regions. The mallows are herbs or shrubs, rarely trees, with mostly palmately-veined leaves and large flowers. The calyx, of 5 sepals, is often surrounded by leafy bracts at the base. The petals are 5; stamens numerous and always characteristic of the family on account of their union by the filaments into a single column closely surrounding the pistil, when they are said to be *monadelphous;* this column is well shown in the flower represented by Fig. 147. The ovary

Fig. 151. Flowers and fruit of the chocolate tree (*Theobroma Cacao*). Redrawn from Engler.

is several-celled, and the fruit is usually a capsule of several carpels. The mallow family as a whole possesses mucilaginous juice, and also yields fibers of more or less value. Cotton is the product of various species of *Gossypium.* It consists of the tuft of fine hairsattached to the seed, and known technically as the coma. One or two species of wild cotton are found in the extreme southern part of our country, but the commercial product is derived from species of exotic origin (see Fig. 148). One of the largest genera is *Hibiscus,* which furnishes us with such ornamental plants as the garden hibiscus, and the shrubby althea, which must not be confounded with the true *Althea,* one species of which (*A. officinalis*) furnishes the marsh-mallow of commerce. *H. cannabinus* affords a jute-

like fiber sometimes called bastard hemp. In the marshes along the Atlantic coast of the United States grows the beautiful rose mallow (*H. moscheutos*), very completely illustrated in Fig. 149. The nearly related genus *Abelmoschus* contains plants with aromatic properties, some of which are used in the manufacture of perfume. *A. esculentus* is the okra, one of the leading vegetables in the South, where it is extensively used both as a table vegetable and as the basis for soups.

In our western States, particularly on the Pacific coast, there are numerous wild mallows belonging to the genera *Sphaeralcea* and *Malvastrum*. *Malvaviscus*, *Pavonia* and *Abutilon* yield handsome greenhouse plants. *Malva*, with several species, is found as a weed in many parts of the world.

Family Bombacaceae. Silk-cotton Family. Contains 20 genera and about 100 species, widely distributed in the tropics of both hemispheres. Tney are trees of characteristic appearance, usually with palmately lobed or compound leaves, large solitary flowers, and capsules containing numerous seeds invested with a copious supply of down. The baobab of Africa (*Adansonia digitata*) which has been frequently described, is a member of this family. The accompanying figure (150) gives a good idea of the habit of the tree, with its enormous trunk, and also of the foliage, flowers and fruit. *Ceiba* is the common silk-cotton tree of the West Indies. The family may be distinguished from the Malvaceae by the fact that the stamens are in five or more sets.

Family Sterculiaceae. Sterculia Family. Contsins about 40 genera and 500 species, mainly South African and Australian. They are trees, shrubs or herbs, closely related to the preceding families, from which they differ in having the anthers of the stamens 2-celled. The seven tribes exhibit remarkable diversity in structure, so that it is not possible to give a more complete account of family Characters. One of the most important economic genera is *Theobroma* (see Eig. 151). Chocolate in all its forms is the product of the ripe seeds of *T. Cacao*, which are first fermented and then dried. The tree is successfully cultivated in many parts of South America. A valuable tonic is furnished by the juice of the cola nut (*Cola acuminata*), which, although a native of Africa, has been extensively introduced into South America. Others of the Sterculiaceae are in ornamental cultivation.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS

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CHAPTER XXV.

Order Parietales.

The name of this order is taken from a Greek word meaning *wall*, on account of the fact that the ovule-bearing surfaces (placentae) are attached to the walls of the ovary instead of forming a separate column. This condition may be plainly seen by sectioning the capsule of a violet or pansy. The ovary in this group is compound, and the stamens almost always numerous. It contains thirty-one families, many of them small and not well known; the most important ones are the Theaceae, Hypericaceae, Guttiferae, Cistaceae, Violaceae, Dipterocarpaceae, Passifloraceae, Caricaceae and Begoniaceae.

Fig. 152. Flowering shoot of *Dillenia Indica*, greatly reduced. Redrawn from Engler.

Family Dilleniaceae. Dillenia Family. A group containing about 30 genera and 250 species, consisting of trees or shrubs widely distributed in Australia, Indis, and some parts of South America. They may be distinguished by the five persistent sepals, borne in two rows, the five deciduous petals, and the numerous stamens, frequently bent over to one side. The fruit consists of several carpels, and is sometimes edible. Some of the trees

produce valuable timber, and many of them, as *Dillenia speciosa*, have handsome flowers, rendering them desirable for greenhouse cultivation (see Fig. 152).

Family Eucryphiaceae. Eucryphia Family. Consists of a single genus, *Eucryphia*, which presents rather anomalous characters, and has been placed by some authors in the Rose Family, and by others with the St. Johnsworts. There are four species, two in Chile and two in southern Australia and Tasmania; and oddly enough, one species in each of these pairs has pinnate leaves, the other simple entire leaves. All are trees or tall shrubs, having showy solitary flowers with four or five sepals, four or five petals, and innumerable stamens; the ovary is 5-12-celled, becoming in fruit a woody capsule containing winged seeds. One of the Tasmanian species, *E. Billardieri*, is a most beautiful forest tree, attaining lofty proportions, and at certain seasons is covered with large white flowers.

Fig. 153. Flower of *Ouratea spectabilis* and fruit of *O. elegans*. Redrawn from Engler.

Family Ochnaceae. Ochna Family. Includes 17 genera and over 200 species, trees or shrubs of exclusively tropical distribution. Their bark contains a yellow coloring matter, and is also very astringent, in consequence of which several species furnish tonics. The flowers are generally large and conspicuous, having the parts in fives, and the stamens often turned to one side; the carpels of the ovary are situated upon an enlarged base or *receptacle*, which becomes fleshy in fruit, like that of the strawberry. The largest genus is *Ouratea*, chiefly of West Indian distribution, some species of which are used as greenhouse plants (see Fig 153).

Fig. 154. Flowering branch of *Caryocar glabrum*, and fruit, partly sectioned, of *C. nuciferum*, both greatly reduced. Redrawn from Engler.

Family Caryocaraceae. Souari-nut family. Consists of two genera, *Caryocar* and *Anthodiscus*, the former with 10, the latter with 3 species, all South American trees. The Souari-nut, *Caryocar nuciferum*, may be taken as typical of the genus; it is a lofty forest tree with very durable timber, largely employed in ship-building. The leaves are compound, having three leaflets; the flowers are of large size, with five

sepals, five petals, and numerous long slender stamens borne in a ring. The fruit is also large, containing from two to four kidney-shaped nuts or seeds with a flavor somewhat resembling that of the Brazil nut; a superior quality of oil is extracted from them. Fig. 154 shows a flowering branch of *C. glabrum* and the fruit of *C. nuciferum*.

Family Marcgraviaceae. Marcgravia Family. Contains 5 genera and about 40 species, natives of tropical America. They are trees or shrubs, distinguished by the peculiar pitcher-like bracts which often subtend the flowers. In *Marcgravia* the flowers have the further peculiarity that the corolla is united in one piece (gamopetalous) which falls off like a cap. The stamens are usually numerous, the ovary 1-celled, becoming capsular in fruit.

Fig. 155. Flowers and fruit of the tea plant (*Thea Sinensis*), about one-third natural size. Redrawn from Engler.

Family Quiinaceae. Quiina Family. A small and unimportant South American family of trees, consisting of two genera and 19 species.

Family Theaceae. Tea or Camellia Family. Contains about 16 genera and 160 species, rather widely distributed. They are trees or shrubs with large regular flowers having usually 5 imbricated sepals, 5 petals, numerous hypogynous stamens and a 2-celled ovary, becoming in fruit a woody capsule.

The representatives of this family in our territory are shrubs of great beauty when in bloom, their large, solitary white flowers suggesting single roses. There are two genera, *Stuartia* and *Gordonia*, both natives of the Southern States, the latter known as the loblolly bay. But it is the genus *Thea* (including *Camellia*) which lends great commercial importance to the family. The genus consists of about 16 species of shrubs, confined in the wild state to India, China and Japan, but cultivated in many parts of the world. The flowers are large and handsome, and are succeeded by 3-valved capsules, two of which are shown in the illustration (Fig. 155).

The process of drying the tea leaves is an elaborate one, and upon the methods employed depends the flavor of the final product. The

highly expensive fancy teas are made of the young leaves and flower buds, but only a small quantity of these grades is ever imported. The active principle in the leaves is an alkaloid known as theine, and the percentage of tannin is very high. The family Theaceae has also been known by the name Ternstroemiaceae.

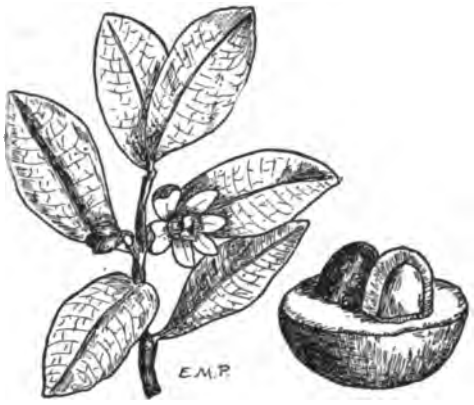

Fig. 156. The flowers and fruit of the mammey apple (*Mammea Americana*) greatly reduced. Original.

Family Guttiferae. Gamboge Family. A tropical group comprising about 30 genera and 300 species, trees or shrubs abounding in resin, with opposite leaves and flowers often incomplete or irregular; sepals and petals 2-8; stamens numerous, frequently united; fruit dry or pulpy. The family is of considerable economic importance. The yellow coloring matter known as gamboge is obtained from a species of *Garcinia*, the largest genus in the family. *G. Mangostana* is the mangostan or mangosteen, the fruit of which is described by all who have eaten it as being without a peer in the vegetable kingdom. A writer on Javanese fruits says: "It is of the size of a small orange, when ripe reddish-brown, and when old of a chestnut-brown color. Its succulent rind is nearly the fourth of an inch in thickness * * On removing the rind, its esculent substance appears in the form of a juicy pulp having the whiteness and solubility of snow, and of a refreshing, delicate, delicious flavour. We were all anxious to carry away with us some precise expression of its qualities; but after satisfying ourselves that it partook of the compound taste of the pineapple and the peach, we were obliged to confess that it had many

Fig. 157. The large golden St. Johnswort (*Hypericum aureum*); flowering branch and detached capsule, about one-half natural size. Original.

other equally good but utterly inexpressible qualities." The seeds of *G. Indica* yield cocum oil, used in India as an adulterant for butter, and also as a drug.

Fig. 158. Flowering branch and detached fruit of *Dipterocarpus retusus*, greatly reduced. Redrawn from Engler.

Another plant of this family producing an edible fruit is the mammey apple (*Mammea Americana*), the "mamey sapota" of the West Indies. It has a somewhat insipid flavor, but is popalar among the natives (see Fig. 156.) *Pentadesma butyraceum* is the butter tree of Sierra Leone. *Calophyllum* is another rather large genus noted for the oil yielded by its seeds, called Keena oil; the timber produced by these trees is also of good quality.

Family Hypericaceae. St. John's-wort Family. Contains about 10 genera and 280 species, mostly herbs and shrubs of wide distribution, a few trees in tropical regions. They have opposite or whorled leaves, and solitary or panicled flowers with 4-5 sepals, 4-5 petals, innumerable stamens and an ovary of 1-7 carpels, becoming a capsule in fruit.

The St. John's-worts embrace several of our annoying weeds, as well as some of our most picturesque wild plants. The species of *Hypericum* shown in the illustration (see Fig. 157) is a native of the Southern States in hilly situations, and has very large golden-yellow flowers, rendering it desirable for cultivation. Among our familiar plants belonging to this family may be mentioned the spotted St. John's-wort (*H. maculatum*) the orange grass or pinweed (*Sarothra gentianoides*); and the St. Peter's-wort (*Ascyrum hypericoides*). The black or pellucid dots in the leaves of hypericaceous plants contain an essential oil.

Fig. 159. *Reaumeria Persica*, an entire plant, greatly reduced. Redrawn from Engler.

Family Dipterocarpaceae. Wing-fruit family. Contains 16 genera and over 300 species, natives exclusively of the Asiatic tropics. They are trees of lofty proportions, resembling the Guttiferae in the abundance of resinous juice which they contain. The flowers are distinguished by the calyx, which is divided into five unequal sepals, two of them very large and wing-like. The whole calyx forms a persistent crown on the fruit, which is of woody texture, 1-celled and 1-seeded. The resin of various species is used as a medicine and also as an illuminant. Fig. 158 gives a good idea of the peculiar fruit.

Family Elatinaceae. Water-wort family. This group of marsh or aquatic herbs consists of two genera, *Elatine* and *Bergia*, wirh about 25 species of wide distribution. They have opposite or whorled leaves, with small regular flowers having 2-5 sepals, 2-5 petals, as many or twice as many stamens, and a 2-5-celled ovary becoming capsular in fruit.

Fig. 160. Woolly Hudsonia (*Hudsonia tomentosa*). After Britton and Brown, Ill. Fl. Northeast, U. S.

Family Frankeniaceae. Frankenia Family. Four genera and about 15 species of maritime undershrubs of heath-like aspect, widely distributed in tropical or subtropical regions. *Frankenia* is represented by a species on the coast of southern California. The capsule differs from that in related families by being one-celled.

Family Tamaricaceae. Tamarisk Family. Contains 4 genera and about 40 species, trees or shrubs of wide distribution, with small alternate leaves and white or pink solitary or clustered flowers. The ovary is of rather unusual structure, being imperfectly 3-celled by the intrusion of 3 placentas or partitions. The seeds bear tufts of hairs.

Tamarix, the tamarisk of Europe, represented by several species, is a graceful small tree with handsome racemes of pink flowers. *Myricaria*, a closely related genus, occurs in northern Europe and Asia. *Reaumuria*, a genus of low undershrubs, is found in the Mediterranean region and in central Asia (see Fig. 159).

Family Fouquieriaceae. Candle-tree Family. Contains the single genus *Fouquiera* with about 5 species, natives of Mexico and the Southwest. *F. splendens*, the "ocotilla" of the Mexicans, is a beautiful tree

in the desert situations where it occurs, being covered at certain seasons with brilliant scarlet flowers.

Family Cistaceae. Rock-rose Family. Contains four genera and about 160 species, natives almost exclusively of the northern hemisphere, and abundant in both North America and Europe. They are shrubs or somewhat woody herbs, with simple leaves and solitary or clustered flowers, the latter regular. Sepals 3-5; petals 3-5 or wanting; stamens numerous; ovary 1-several-celled, capsular in fruit. Three genera are represented in North America. The pinweeds (*Lechea*) are small plants with insignificant flowers and a wonderfully large number of species. The frostweeds (*Helianthemum*) have for the most part rather showy yellow or white, but very evanescent flowers. *Hudsonia* contains 3 species of little heath-like plants with hoary foliage and starry yellow flowers (see Fig. 160). In Europe the species of *Cistus* are very numerous, and many of them have flowers of considerable size and beauty. *C. Creticus* yields the gum ladanum, used as a perfume, having a pleasant balsamic fragrance. *C. ladaniferus* in Spain and Portugal yields a similar product.

Fig. 162. American violets: upper left-hand, *V. rostrata;* upper right-hand, *V. primulaefolia;* lowermost, *V. papilionacea.* After photographs by Dr. Adolph Koenig.

SUPPLEMENT.

THE FAMILIES OF FLOWERING PLANTS

By Charles Louis Pollard.

CHAPTER XXV.—*Continued.*

Family Bixaceae. Bixa Family. Contains 4 genera and about 20 species, mostly tropical, but *Amoreuxia*, a mallow-like herb with large flowers, reaches our southwestern borders. The type of the family, *Bixa*, consists of the single species, *B. Orellana*. It is a small tree with broad, cordate leaves, somewhat suggesting those of a poplar, and clusters of pink flowers having very numerous stamens and a 2-lobed stigma (see Fig. 161). The fruit is a very spiny pod which splits into several valves when ripe; the seeds have a red, waxy coating, constituting the substance known as arnotto. This is an orange coloring matter used as a dye, and also to impart a color to butter. Since the discovery of a method by which it can be prepared synthetically by chemical processes, the value of arnotto has depreciated.

Family Cochlospermaceae. Shell-seed Family. Contains two or three genera and abous 18 species, most of which are included in *Cochlospermum*. They are shrubs or small trees with palmately-lobed, long-stalked leaves, and large yellow flowers in terminal panicles. The chief difference between this family and the preceding lies in the single, unbranched stigma and the downy seeds. Some species of *Cochlospermum*, which is exclusively tropical, yield a variety of gum, while others furnish a yellow dye somewhat similar, but inferior to arnotto.

Family Koeberliniaceae. Junco Family. Consists of the single genus and species *Koeberlinia spinosa*, a remarkable shrub of the Rio Grande region in Texas and Mexico. It is apparently quite destitute of leaves, the latter being minute and promptly deciduous. The smooth green branches and twigs taper to sharp spiny points; the small white flowers, which are borne in umbel-like clusters, have 4 sepals, 4 petals, 8 stamens, and a 1-celled ovary becoming a black berry in fruit.

Family Violaceae. Violet Family. Includes about 15 genera and 325 species, of wide distribution. Many of the tropical genera are shrubs or trees, but in temperate climates the plants are mostly peren-

nial herbs. The genus *Viola* far outnumbers other members of the family, having nearly 200 species, about equally divided between the Old and the New World. Without possessing any claims to showiness, the violet is one of the most attractive as well as artistic flowers to be found throughout the whole range of seed plants. Before discussing the distinct types of habit and floral structure, let us examine the characters of the Violet Family. They have leaves provided with stipules (leafy bracts) at the base, and solitary or clustered irregular flowers. The sepals are 5; the corolla also consists of 5 petals, the lower one of which is usually much larger and differently shaped, or else provided

Fig. 161. Flower and fruit of *Bixa Orellana*, considerably reduced. Original.

with a spur. A twist in the peduncle causes this petal frequently to appear uppermost. There are 5 stamens, the anthers being more or less united into a ring. The ovary is 1-celled, with 3 placentae or partitions, developing into a 3-valved capsule.

We may dismiss most of the genera with brief consideration. *Cubelium*, the so-called green violet of our Atlantic States, does not afford a hint of its relationship in its coarse foliage and upright stems; but the tiny flowers scattered along the latter are decidedly suggestive of undersized and starved violet blooms. *Calceolaria* is a herb of the southwest and the tropics, the flowers of which are also inconspicuous.

Probably there is no other genus of flowering plants in which the divisions are so well marked as in *Viola*, and the species fall into natu-

ral groups which have been by some authors advanced to generic rank. For example, we have in America the beautiful bird's-foot violets, which are distinguished by their finely divided foliage, very short and truncate rootstocks, and the large beakless stigma. This includes the handsome prairie violet of the West, and the striking pansy violet so common in Maryland and Virginia but rare elsewhere. In general the genus may be roughly separated into two divisions: those with leafy stems, and those which are scapose, *i. e.*, in which the leaves and flowers seem to spring directly from the root. In Fig. 162 we have representatives of several of these types displayed.

The pansy (*V. tricolor*) has been for so long a time in cultivation that the range of color and markings is wonderful. These markings are apt

Fig. 163. Flowering branch of *Casearia sylvestris*, with detached enlarged flower of *C. tomentosa*. Redrawn from Engler.

to assume certain definite patterns, so that horticulturalists speak of the various "strains" of the pansy. The foliage is quite distinctive on account of the large stipules. In this country we have only one member of the group, the little annual white violet (*V. Rafinesquii*), but in Europe a large number of species closely related to *V. tricolor* have been described.

The perfume of the violet has always been highly esteemed, and is most prominent in the cultivated forms of *V. odorata*, although some of our native species are faintly sweet-scented.

Family Flacourtiaceae. Flacourtia Family. Contains 70 genera and about 300 species, tropical shrubs or trees of wide distribution. They have alternate leaves, and flowers with 4-7 sepals and petals, or the latter sometimes wanting. The stamens are equal to or some multiple of the petals. The fruit is either a fleshy berry or a 4-5-valved capsule; it is edible in some species. *Flacourtia* yields a powerful

Fig. 164. *Piriqueta Caroliniana*, one-half natural size. Original.

astringent. *Casearia* is one of the largest genera in the family, being particularly abundant in the West Indies and South America. Many of its species possess medicinal properties.

Family Stachyuraceae. Stachyurus Family. Consists of the single genus *Stachyurus*, with two east Asiatic species.

Family Turneraceae. Turnera Family. Contains 6 genera and about 90 species, most of which are comprised in *Turnera* and *Piriqueta*. They are herbs or undershrubs with alternate leaves and yellow, or rarely blue flowers; the corolla, which consists of 5 petals, is rather fugacious, and disappears early; the calyx is somewhat bell-shaped; stamens 5; style forking; fruit capsular.

Piriqueta Caroliniana is a common plant of the Florida pine barrens, and resembles a rock-rose (*Helianthemum*) when its yellow flowers are expanded in the sunlight (see Fig. 164). The drug known as damiana is derived from a Mexican species of *Turnera* (*T. aphrodisiaca*) and also from the West Indian *T. diffusa*.

Family Malesherbiaceae. Crownwort Family. Consists of the single genus *Malesherbia*, with about 15 species, natives of Peru and adjacent countries on the west coast of South America. They are herbs or low shrubs with alternate leaves and solitary yellow or blue flowers. The calyx is tubular, and merely 5-lobed, being gamosepalous

Fig. 165. Flower and leaf of *Passiflora foetida*, showing the corona, and the finely dissected bracts surrounding the flower. Original.

(not divided into distinct sepals). The petals are 5, persistent; stamens 5-10, their filaments often connected with the 3 styles, forming a column; ovary borne on a stalk, 1-celled; fruit a 3-valved capsule. These plants are closely allied to the true passion-flowers, and were formerly included in the same family.

Family Passifloraceae. Passion-flower Family. Contains 15 genera and about 300 species, of wide distribution, mostly in tropical regions. Of these, *Passiflora*, with about 250 species, is by far the most important. The plants are herbs or shrubs, often climbing, with alternate leaves and mostly solitary flowers. The calyx is 5-lobed; the petals 5, frequently clothed on their upper surfaces with small processes or filaments; stamens 5, monadelphous;

ovary 1-celled, stalked, with 3 styles; fruit 1-celled, either a dry or pulpy capsule. The flower of *Passiflora* is peculiar in having the filamentous processes disposed in a ring within the petals, so that they appear like stamens. This is shown in Fig. 165, and is called the crown or corona.

Most of the species of Passion-flower are natives of South America; a few reach our southern borders, and two (*P. lutea* and *P. incarnata*) extend as far north as Washington. The latter species is an extremely abundant weed in the South, where it is known as "may-pops," from the yellow, edible fruit. Many species are in cultivation in our gardens.

Fig. 166. Flower and leaf of *Mentzelia decapetala*, considerably reduced. Original.

The name Passion-flower has been given to the plant on account of the symbolic numbers which its various parts exhibit; "thus the three nails—two for the hands, one for the feet—are represented by the stigmas; the five anthers indicate the five wounds; the rays of glory, or, some say, the crown of thorns, are represented by the rays of the 'corona;' the ten parts of the perianth represent the Apostles, two of them absent—Peter who denied, and Judas who betrayed our Lord; and the wicked hands of His persecutors are seen in the digitate leaves of the plant, and the scourges in the tendrils."—(*Treasury of Botany.*)

Family Achariaceae. Acharia Family. Contains 3 genera, each with a single species, the plants formerly included in the preceding group.

Family Caricaceae. Papaya Family. Two genera, *Carica*, with

about 20, and *Jacaratia* with 6 species, all tropical trees. They are dioecious, the male flowers being disposed in loose clusters, with a funnel-form gamopetalous corolla, on the throat of which are borne the 10 stamens. The female flowers are smaller, with a corolla of 5 distinct petals. The fruit is oblong, very large, with a pulpy interior and a thick fleshy rind. In the tropics it is universally known as the papaw, a name, however, which is more properly applied to our northern tree, *Asimina triloba*. The most widely diffused species is *Carica Papaya*; it is sometimes known as the melon-tree. The fruit is not unlike a melon in shape, but is of a dull orange-yellow color; in flavor, to the uninitiated at least, it resembles a hybrid between a melon and a pumpkin; it is, however, seldom eaten raw, but is usually made into a preserve or sauce; the green fruit is either pickled, or boiled and eaten as a vegetable.

Family Loasaceae. Loasa Family. These are herbs, usually rough with glutinous or sometimes stinging hairs, and having white, yellow, or reddish flowers. The calyx-tube is united with the surface of the ovary, so that the latter is said to be *inferior*. Petals 4 or 5; stamens exceedingly numerous; ovary 1-celled, capsular in fruit. There are 13 genera and 200 species, all but one of which are American. *Mentzelia* is a conspicuous genus on the western plains, the yellow or white flowers of some of the species expanding five or six inches (see Fig. 166). Several other genera furnish greenhouse plants.

Family Datiscaceae. Datisca Family. Contains 3 genera. Two of these are monotypic; the other, *Datisca*, is represented by one species on the Pacific coast (*D. glomerata*) and one throughout southwestern Asia (*D. cannabina*). The plants are herbs or trees with monoecious or dioecious flowers entirely destitute of corollas. Stamens 3-7; ovary 1-celled, capsular in fruit. They possess bitter and purgative qualities. The resemblance between *Datisca* and the hemp (*Cannabis*) is so striking that the former is frequently called "false hemp."

Family Begoniaceae. Begonia Family. Contains 4 genera, two with one species, one with 3 species, and *Begonia* itself with about 200. The plants are succulent herbs or undershrubs, widely distributed in tropical regions. The leaves are alternate, provided with stipules, and almost invariably oblique in form; the flowers are monoecious, with only a calyx, which is colored like a corolla, and is superior to the ovary. The numerous stamens are aggregated in a head. Stigmas 3; fruit 3-valved and winged. The plants furnish many species valued in cultivation either for their foliage or flowers; they also possess medicinal properties.

Family Ancistrocladaceae. Ancistrocladus Family. A peculiar group, consisting of a single genus, *Ancistrocladus*, with 8 species, inhabiting the East Indies. They are climbing shrubs with hook-like branches, panicled flowers with ten stamens of two different lengths, and a 1-celled ovary.