

vation the plant produced smaller tubers than it did when wild. Some writers describe them as growing to the "size of an egg;" if a hen's egg is intended, we must say that, though we have dug up a good many, we never saw one larger than, if so large as, a pigeon's egg.

The name "Ground-nut" is an unfortunate one, as there is nothing nut-like about the plant. The botanical name, *Apios*, from the Greek word for *pear*, referring to the somewhat pear-shaped tubers, is a pleasant-sounding one, and easy to recollect, and it is in every respect preferable to "Ground-nut," which is often applied to pea-nut, as well as to some other plants. The early botanists placed this and the *Wistaria* in the genus *Glycine*, which is now restricted to a few tropical bean-like plants. There are two other species of *Apios* besides *A. tuberosa*, one growing in China, and the other, which is said to have handsome red flowers, in the Himalaya mountains.

The Racemose Fuchsia.

The varieties of *Fuchsia* are very numerous, and each year adds its novelties to the list. While a few of those in cultivation preserve the original form of the species, the majority, and those among the most beautiful, are produced by hybridizing and crossing. There has been such a commingling of blood, as breeders say, that it is impossible to trace some of our most prized varieties to their parent species. While we admire these productions of the florist's skill, we also like to see the unaltered species in cultivation, and are glad that another—*Fuchsia racemosa*—has been recently added to our collections. This species is far from being a new one, as it was described nearly a hundred years ago, but if it ever was in cultivation, it has long been lost, and now has all the interest of a new discovery. The plant has a spreading habit, throwing up numerous suckers from the root, and thus forming large clumps, from one to two feet high. The engraving of the upper portion of a stem gives the form of the leaves and flowers of the natural size. The flowers, which are clustered at the top of the stem in a raceme, are very narrow in proportion to their length; the petals, which in most other species are so conspicuous, are in this very nearly of the same size with the divisions of the calyx, and both are very nearly of the same color, which is a very bright scarlet, and exceedingly showy. The plant was collected several years ago by Thomas Hogg, Esq., in the mountains of St. Domingo, where Father Plumier originally discovered it nearly two centuries before, and described it in 1703, it being the first *Fuchsia* ever described, and the one upon which the genus was founded. It was exhibited at one of the exhibitions of the New York Horticultural Society, where it was examined with much interest by the florists present, who looked upon it as a novelty of great promise. The stock of the plant passed into the hands of Mr. Peter Henderson, who will no doubt offer it for sale in due time. Coming from the high mountains of San Domingo, it may prove much better suited to bedding purposes, and endure our hot summers much better than those which are descended from natives of the warm and moist forests of Mexico and South America. We have not had an opportunity to carefully examine this plant in bloom, but have no doubt that Mr. Hogg has manifested his usual accuracy in referring it to *Fuchsia racemosa* of Lamarck.

How Flowers are Fertilized.

BY PROF. ASA GRAY.

ARTICLE IX.—GROUND-NUT OR APIOS.

Our long story about Beans and their relatives was not quite finished in the October number. There is a wild Bean worth noticing for the curious difference between its arrangement for fertilization, and that of the common Bean-flower. I hardly know which is the more curious; but the one now to be described has the greater novelty. Indeed, I had the pleasure of finding it out only a year ago last summer. The plant in question abounds in low grounds, especially along streams, and climbs by twining up the stems of herbs and over bushes, and is described by the Editors on another page.

It is with the flowers only that we have now to do. They are like those of Beans in form and arrangement, with a little difference. The wing-petals stand forward, and make the same kind of landing place. But the weight of a bee or other insect alighting on them has no such effect as upon the Bean-flower, indeed does not alter the position of the stamens and pistil at all. The part of the flowers which encloses these (the keel, so called), is curved, not into a coil, as in beans, but into the shape of a sickle or semicircle. The tip of this keel rests firmly in a small notch or indentation at the middle of the top of the *standard*, the large and hollowed petal—in shape not unlike a ladies' bonnet of the olden time, when bonnets were ample—which forms the whole back-side of the flower. The keel remains fixed in this way, if the flower is let alone, spanning across the middle of the deep cavity, which opens to the bottom of the flower. Figure 3 represents a flower-bud, cut through lengthwise, so as to show the pistil within, and some of the stamens. The way in which the end

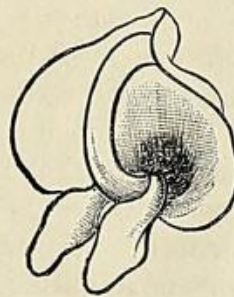


Fig. 1. Flower unvisited.

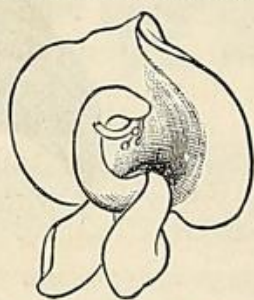


Fig. 2. — Flower which has been visited by a bee, and the keel sprung.

of the keel rests in the notch or pocket, is best seen in figure 4, which, on a larger scale than figure 1, represents a flower, with the part of the standard coming towards the eye, cut away, to give a clear view. The tip of the keel is not dislodged from its socket by any moderate jar, nor by pressing from the outside. But when, in any fresh flower, we raise the tip by a lift with the point of a pencil from underneath, the keel promptly curves more, and takes the shape and position shown in figure 2, at the same time splitting from the apex down the inner edge, and protruding the tip of the style, and, in a less degree, the opening and pollen-laden anthers.

Figure 5 represents, in outline or diagram, the change which takes place when the tip of the keel is dislodged from the socket. The dotted lines show the position of the trap—as we may call it—when set; the strong curvature shows it sprung.

How this contrivance subserves cross-fertilization, it is easy to see. I am confident that the blossoms are seldom, if ever, self-fertilized. The anthers from the first lie a little behind the stigma, which is small, and at the very tip of the naked style. Upon opening several flowers of various ages, even when the pollen lay loose in and around the bursting anthers, none was found upon the stigma. At first the stigma is covered with a pulpy secretion; at last, when the stigma develops fully, and the center is free from this pulpy matter, this forms a soft ring around its base, over or through which no pollen passes. Nor is it likely that any

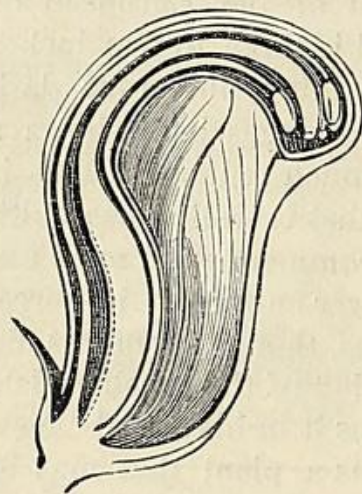


Fig. 3.—Section of flower-bud, enlarged.

pollen reaches the stigma when this and the anthers protrude upon liberation from their confinement. This liberation, I am convinced, ordinarily takes place only upon the visit of a bee, or some such insect, which entering, at least partially, into the open cavity of the blossom either side of the keel, presses the latter upward from beneath. The strong tendency to further curvature of the whole keel, and especially of the pistil, which before simply pressed the tip into its socket, and so held all fast, now takes effect, and it coils in the way shown in the figures; during which the stigma, and then the anthers are likely to be brought into contact with some part of the insect's body; and so, when flower after flower is visited, cross-fertilization must needs be effected. Equally, too, when a bee visits a blossom, which has been let loose, if it enters upon the side towards

which the style swerves (as it always at length, if not immediately, does, either to right or left), the stigma will first be touched, probably by a pollen-dusted portion of the insect's body, and then the anthers will give a new supply of pollen for the next blossom; and so on. To understand this well, compare the account and the figures with those of the common Bean, in the October number, and admire the wonderful contrivance, by which the same kind of flower is modified in two different ways. Both are equally good for cross-fertilization, receive full explanation upon that supposition, and are unintelligible without it.

I have two reasons for affirming that the flowers of *Ground-nut* do not self-fertilize. First, as here shown, the structure seems to forbid it. Second,

growing here in the Botanic Garden, and blossoming profusely, not a pod has been seen for the last two years; and in the neighboring low grounds, where it abounds, fruit is rare. It must be otherwise in some places or some seasons, for the herbarium contains copiously fruited specimens. The blossoms are dull in color; but their delicious

fragrance must appeal to the acute senses of bees. Here, in fact, as in most *Orchids*, the arrangement for cross-fertilization is so perfect and special, that, if not responded to, reproduction by seed fails. Now in this respect it differs from peas, clover, and the like, which can and do self-fertilize more or less, and so make sure of some seed. Even the bean-flower secures a margin for self-fertilization when it can no better be. When we depress the wing-petals, and bring out the stigma and the brush behind it, (see October number), any pollen which does not adhere to the brush is pushed forward so far that, when the style retracts, some of it reaches the stigma. In an early article upon the subject, (as far back as 1857), to which my attention has just been recalled, Mr. Darwin says that he fertilized some bean-flowers tolerably well, while protected from bees, by pressing down the wings so as to effect this movement.

Facts of this kind, and the setting of some seed when blossoms are covered, have been appealed to as evidence that such contrivances as we have been describing are merely something odd, perhaps unaccountable, of no material importance to the race, possibly even a disadvantage. But a little reflec-

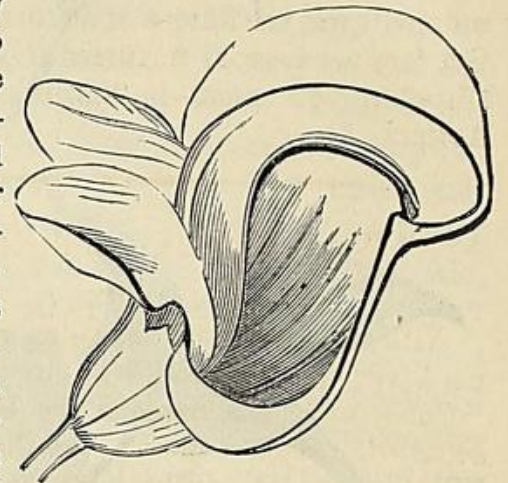


Fig. 4.—Enlarged flower, with a part of standard cut away, showing the keel in place, and the socket in which the tip of the keel is held fast.

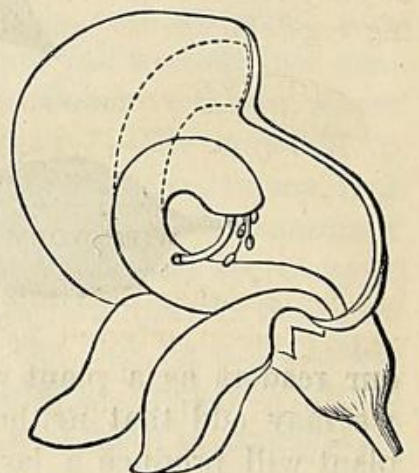
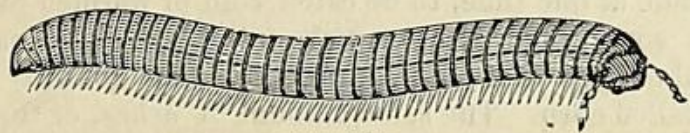


Fig. 5.—Diagram, showing same, with the keel sprung, and stigma and style protruding.

tion may convince any clear-headed reasoner that occasional or even frequent close-fertilization is no argument against the advantage (or the ultimate need) of cross-fertilization. Cross-fertilization, we may well believe, is the best thing, but is risky. Cross-fertilization, tempered with self-fertilization—which is the commoner case—is practically the best on the whole under ordinary circumstances—is the compromise between the two risks, viz.: failure of vigorous and fertile posterity on the one hand, and failure of immediate offspring on the other. "Get money, honestly if you can, but—get money," was the advice of an unscrupulous parent. Get fertilized, cross-fertilized if you can, close-fertilized if you must—is Nature's golden rule for flowers.

"Wire-Worms," and their Work.

With insects as well as plants, common names are used very loosely, and lead to confusion. Thus "Cut-worm" is a name given to the larvæ of insects of widely different families, and the name "Wire-worm" is applied to the larvæ of insects, and to animals that are not proper insects. Not long ago a correspondent at Montreal, Canada, complained that "Wire-worms" were doing great damage to his flower-beds, and asked what could be done to destroy them. Unlike many who ask such questions, he sent specimens that enabled us to know what he was talking about. His pest was not a worm proper, nor the larva of an insect, but one of the *myriapods*, or *millipedes*, as they are called, belonging to the genus *Iulus*, of which there are several species, one of which is shown in the engraving. These have long, cylindrical, shining bodies, made up of a great number of horny, arched divisions, the most of which bear two pairs of legs; they have two short feelers at the head, are mostly of a blackish or dark brown color, and when disturbed, roll themselves up into a coil. Our species are from an inch to an inch and a half long, but there is one in South America, having a length of six or seven inches. As the books generally say that the species of *Iulus* feed upon decaying vegetable matter, and some state that they are



"WIRE-WORM."—*Iulus*.

beneficial rather than injurious, we thought the correspondent referred to must be in error as to the cause of the damage, and asked for further particulars. He replied as follows: "I planted out last spring a good-sized bed of carnations; two-thirds of them were cut down in about a fortnight, and I could trace it to nothing else than these worms, with which I found the bed to be infested. I removed the balance to another part of the garden, and saved them. I then examined some of the lily bulbs in the next bed, and found some of the living bulbs partly eaten, with the worms in them. I have destroyed large quantities this autumn, by slicing apples and turnips, and laying them on the infested beds, the worms collecting under them in masses, which were removed and burned."—Testimony so positive from an evidently intelligent and careful observer, induced us to look up the authorities at hand more carefully than before, to see if the destructive habits of the *Iulus* had been noticed by any one else. Westwood, the eminent English entomologist, says that "they feed on animal and vegetable substances in a state of decay." Smee (Eng.) is "by no means certain as to the functions" they perform, and quotes Boisduval as saying that one *Iulus* is "a friend to the gardener." Among American authors, a writer in the "American Cyclopædia," and others, including Morse, the most recent of all, say that they live on decaying matter. Packard indefinitely says, "they live on vegetable substances, or eat dead earth-worms or snails." After a long hunt we came upon some light in the "Practical Entomologist," by the lamented Walsh, which, like its successor, the

"American Entomologist," was too good to last. Here, in Vol. 2, p. 34, (Dec., 1866,) we find a complaint of the destruction worked by an *Iulus* in the strawberry plants, and other plants, by eating their roots. Mr. Walsh says: "So far as is recorded in such authors, as are accessible to me, and so far as my own experience extends, all other species of the *Iulus* live on decaying vegetable matter, such as rotten wood." Finding this to be a new species, Mr. W. goes on to describe it as *Iulus multistriatus*, which is the species here figured. It is 1.15 inch long, brown, with most of the joints marked with numerous minute striæ or lines. What is quite singular, Mr. Walsh suggests just the same means of destroying the "worm," as that hit upon by the Montreal correspondent, only instead of apples and turnips, he suggests carrots, potatoes, or parsnips, which, he thinks, might be laid under pieces of board. It is quite strange that recent writers should have overlooked the matter, and that Packard, while he mentions the species, omits to give its most important character, in a practical view, and to state that it is really destructive. The fact that, while most of the Lady-birds are useful in destroying other insects, one species is a most destructive vegetable feeder, finds a parallel case in the *Iulus*, and shows that it will not do to infer, because some species have habits in common, all of similar structure are like them in these respects. It must now be admitted, that at least one *Iulus* is to be regarded as an enemy, and to avoid confusion, instead of calling it a wire-worm, or what is worse, "the wire-worm," let it be a Millipede. The very simple remedies above mentioned seem to be fairly successful. If any better ones are discovered, we hope that our friends will inform us of them.

KILLING THE "CABBAGE WORM."—The caterpillar of the European Cabbage Butterfly, *Pieris rapæ*, is without much regard to accuracy generally called the "Cabbage Worm." Though it is but little troublesome now in the localities where it first appeared, there are still many places where it has proved very destructive the past season, even ruining whole crops, and it is likely to continue to be a source of loss to cultivators in various parts of the country. Fortunately the natural enemies of the insect, especially insect parasites, increase with great rapidity, so much so that in places where a few years ago it seemed as if cabbage culture must be abandoned, the number of the "worms" at present is not sufficient to cause any serious loss. But cabbage growers cannot afford to feed successive broods of the caterpillar, until they in turn feed foes that will increase and in time destroy them, but prefer to kill them at once. We have published the various remedies that have been proposed, but we have not seen any that strikes us as so feasible as that proposed by the "Toronto Globe." It is simply hot water, applied by means of an ordinary watering pot. Those who have not tried it, are not aware that plants will bear with impunity water so hot, that one would suppose that it would kill them at once. By starting with water boiling hot, or nearly so, it becomes somewhat cooled by the time the cabbages are reached, it is cooled still more in passing through the air in applying it, and the cabbage leaves are so thick that they do not become suddenly heated, so that by the time the water touches the plant, it is hot enough to kill the caterpillars, and not sufficiently so to hurt the plant. It is of course, like other applications, most effective on the young "worms." One great difficulty in fighting insects of any kind, is due to the fact that they are not taken in time, but left until they have taken full possession. Cultivators of cabbages, cauliflowers, and the like, should note this for trial next season.

A NEW CANKER-WORM GUARD.—All the attempts to combat the destructive Canker-worm, depend upon the fact that the female perfect insect or moth is wingless, and after she comes out of the earth can only ascend the tree to lay eggs for her mischievous brood by climbing up the trunk. Surrounding the trunk with some obstacle

that the insect can not pass would seem to be a simple matter, but there have been numerous inventions to accomplish it, many of which will answer if properly attended to, but none will be perfect safeguards if left to themselves. Most of the inventions provide some adhesive material, like tar or printer's ink, or some liquid like oil, over which the insect can not pass. These, if not looked to, will become bridged over by dust, or by the dead insects, and as soon as a passage way is found the mischief is done. Mr. John Bryan, of Conn., has invented a guard to which none of the above objections will apply. It consists of a stout band of vulcanized rubber, about an inch wide; along the center of this are closely stuck ordinary pins, in a close row, and project about an inch. When this strip is tacked around a tree it presents a collar of pin points outward. According to the inventor, it is impossible for the female moth to crawl over this. The pins are inserted by machinery and the affair is not expensive. This new invention is called the "Elm City Tree Protector."

THE HOUSEHOLD.

For other Household Items see "Basket" pages.

Home Topics.

BY FAITH ROCHESTER.

Pass It Along.

To hoard up treasures, or to waste them uselessly—both are sins against society. Everything should be put to some use. Yet, let us not forget that there is use in beauty, nor demand that things which minister only to the finer tastes, shall needlessly be made to serve the grosser appetites. I say "needlessly," for I think no thoughtful member of the great human family, will love to lavish much upon his or her "finer tastes," when surrounded by neighbors who are suffering for the most common necessities of life. There is neither beauty nor utility in packing away, merely for preservation, articles that could give pleasure or comfort to human beings, though no longer servicable to ourselves, simply because they are ours. It shows ill-judged economy, or pure selfishness.

I think we might all afford more generosity in our daily lives. We might trust ourselves—or rather we might trust the great Giver—and share more freely with those who have need, without worrying about our own to-morrow and its supplies. What would happen, do you suppose, if all the members of all the churches should suddenly come a great deal nearer than ever before to obeying that most trying test put to the young man of great possessions, who desired to be a follower of Jesus?—"Sell all that thou hast and give to the poor; then come and follow me." A good deal of common sense would have to go along with the attempt to obey such a command.

But only think of all the chests and closets full of out-grown or old-fashioned, but strong and warm garments, to be found in many houses at whose doors the wolf never howls, and where winter's frosts cause no alarm. Then think of the suffering poor, whom we "have always with us." A great deal of thoughtless wickedness is practiced in cutting up for carpet rags or for linings, garments which might do a great deal of service somewhere, in their present shape. I never thought of this until a friend took me to task, many years ago, for cutting up a good sack for some trivial purpose, because I did not care to wear it. "Only think of all the stitches in that sack!" she said. "When a garment has been cut out and made, it ought, if possible, to be worn out in that shape." I thought so too, when I came to look at the subject. For this reason, good garments should be made with simplicity, so that they may never look "old-fashioned," in an offensive sense.

In some families it is customary to pass baby-clothes from one to another, as different mammas have need of them, and this practice tends to the increase of sisterly love and sympathy. The world