WHY FLOWERS ARE BEAUTIFUL.

BY THE EDITOR OF POPULAR SCIENCE NEWS.

Every seed is but a crystallized memory of the past history of its kind, and every plant the realization in fact and experience of the grandest features of that memory. That a developing seed could receive a fitness in its structure for a wet or rocky soil while grown upon that which is dry and loamy seems impossible. That such fitness should be carried as a message from plants of the same species miles away and taught to that seed before it had scarcely begun to develop in the parent flower, appears as if beyond sane belief. All this is nevertheless but a sober statement of what has been discovered by actual experiment. Two trees, shrubs or herbs, remote from each other, can interblend their natures and combine their powers through the medium of a tiny dust-like particle of pollen. The seeds and plants derived from the union possess in large degree the fitnesses of both. United through its pollen with others having different powers and experiences, a new race is born with a double capacity of adaptation. Professor Charles Darwin experimentally proved that crosses between individuals give vigor in proportion to the variety of conditions to which the parents are subjected, and not in proportion to remoteness of kin. Foxglove (Digitalis purpurea, Lin.), Fig. 1, when crossed from plants growing near together in similar soil, shade and surroundings, never gave as good seed as when crossed with pollen from plants of a remote neighborhood. ("Cross and Self-Fertilization," page 447.) The flower stems produced in the two cases were as 100 to 47, and the average height as 100 to 70. Plants near of kin, but raised in remote regions, when cross-fertilized with each other gave improved stock. Plants remote of kin, but grown near each other, when crossed gave inferior results. When we pass through the woods or garden and the little dust specks cling to our garments, how many of us pause to consider that each impalpable particle we are so desirous of brushing away is a volume containing more wonderful and more accurately recorded facts than any man could write? Viewed with the microscope, traces of its beauty appear in every distinct form assumed. Each kind of plant has a form for itself and, though borne on the passing winds miles away from the producing anthers, every tiny speck is sufficiently distinct to recognize its kind. In Fig. 2 is shown this dust from fifteen different kinds of plants, and surely no one could, after familiarity, confound them. Here is pollen from the lily (*a*), buttercup (*b*), hollyhock (*c*), enchanters' nightshade (*d*), wild balsam apple (*e*), mountain laurel (*f*), bassella (*g*), lark pine (*h*), evening primrose (*i*), chiccory (*j*), white pine (*k*), musk plant (*l*), bur cucumber (*m*), passion flower (*n*), and scolymus (*o*). These external appearances are, in their way, remarkable, but they shed no light on a pollen grain's unfathomable potentiality.

Every grain seems to be husbanded for the perpetuation of the plant or in some indirect manner to aid that perpetuation. For a plant to squander its life force in producing a superabundance of pollen is to lessen its resisting power against adverse forces in some other direction. In the struggle for life those survived best that were able to get the largest number of healthy representatives with a minimum of such expenditure. Every plant that gained some contrivance to save its pollen from loss became the parent of more vigorous offspring. Little changes that aided but slightly were multiplied through successive generations until great changes were the result. Plants occupying positions that caused unusual strain upon their structures were those that such savings and the consequent reserve force benefited most. But this saving of pollen introduced a necessity for some contrivance to carry it in an economical manner from plant to plant. The method chosen shows the perfection of natural adjustment to a remarkable degree.

The pistils and their seed-bearing ovaries usually occupy the center, while the stamens, like a circle of sentinels, stand guard around them. This is seen in the cotton flower, Fig. 3. In this A is the pistil, B the stamens and C the ovary. Their production of pollen is also less, since the necessity to sow every inch of the country that perchance a few grains may strike the

Fig. 4

stigma or top of the pistil of a kindred plant is now at an end. But how? The bringing together of both organs in a single blossom tends to self-fertilization, which has been shown to injure them. A careful examination of these flowers will reveal a most wonderful and almost numberless set of contrivances evidently intended to keep the pollen of the same blossom from reaching its stigma. These are in all degrees of perfection, from those that allow of free contact to those that exclude all possible contact. As they would all most surely perish without fertilization, and as they would slowly, but as certainly, deteriorate by self-fertilization, their winged friends come to their relief, and with the greater certainty the more enticing their forms, fragrance, and color. On any bright day of the summer months in the forest, on the prairie, or in the garden, insects can be seen at work consummating these unions. Butterflies and moths, bees and humming birds lingering around a bed of flowers are doing more than enjoying themselves with the fragrance and sipping the honey from the nectaries. The apparently trivial act of one of these in seeking food is fraught with changes of great importance to the floral world. They carry upon their bodies supplies of pollen which are borne from plant to plant. If you watch a bee as he forces his way down the honey-bearing gland of a fleur de luce (iris), Fig. 4, you will observe how he rubs his pollen-covered back against the stigma, A, on entering, but on finishing his repast he cannot return without a complete reversal of his body. This covers his back once more with pollen from B, which he carries to the next flower. In the mountain laurel (Kalmia latifolia) as he awkwardly tumbles among the bent stamens they spring up and cover him with their yellow dust. This he bears away to another plant of the same kind, where, by his movements, it is rubbed off upon the stigmas. Upon close inspection it will be found that, as a rule, the part of the insect bearing the largest pollen load is the very part he finds it necessary to turn toward the stigma in honey-bearing flowers when he seeks their sweet product. In lilacs and some others the insect first gets its head daubed with honey and then with pollen, which thus adheres, until reaching another flower it rubs past the stigma where it is deposited. In many other flowers the pollen is naturally rough or sticky and makes itself fast to whatever part of the insect presents itself. In some it is strung like beads on threads, in others it is in little packets cohering together. Sometimes it is projected with force against the insect so as to facilitate adhesion. In a few cases it is locked up in little boxes which the insect's touch opens. In some hinges and traps are devised so that the insect cannot enter the flower without throwing the pollen over itself as the touching of one part moves as a lever the other.

Wind-fertilized plants are frequently fertilized by insects, and from them it is believed all our pretty flowers sprang. They occasionally display beautiful colors when the vitality of a part is low, and honey and odor frequently can be found upon them. These were evidently the starting points for selection to work upon in leading up to lilies, geraniums and orchids. Those plants that displayed the greatest amount of a color pleasing to certain insects were most often visited and hence best fertilized. The least beautiful, if unable to continue producing pollen enough for wind fertilization, and failing to attract insects in sufficient numbers, were necessarily slowly extinguished. Every added beauty to a flower, by increasing its attractiveness, gave it the advantage in the struggle over its fellows, because it was made to produce more and better seeds. Features of color, shade or odor pleasing to one kind of insect proved displeasing or indifferent to another, so that a large variety of forms resulted. Dull yellow flowers are evidently obnoxious to beetles, for we find that they almost entirely avoid them. Dull purple seems to be the choice color of the host of minute insects that swarm around marshes, the margins of lakes and wet places generally. White is the favorite color of night-flying moths. Butterflies and bees choose brilliant reds, pinks, blues and violets. By actually counting the number of insects visiting various flowers during the course of a day, it is found to be the universal rule that where other things are equal those blossoms that are most conspicuous are oftenest visited —*Popular Science News.*

Fig. 1.

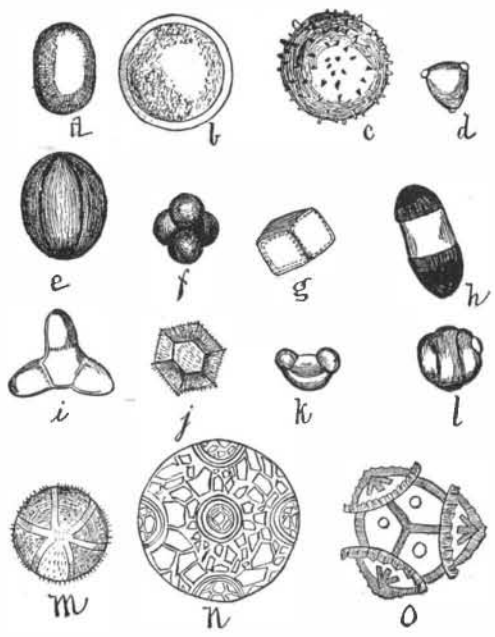

Fig. 2.

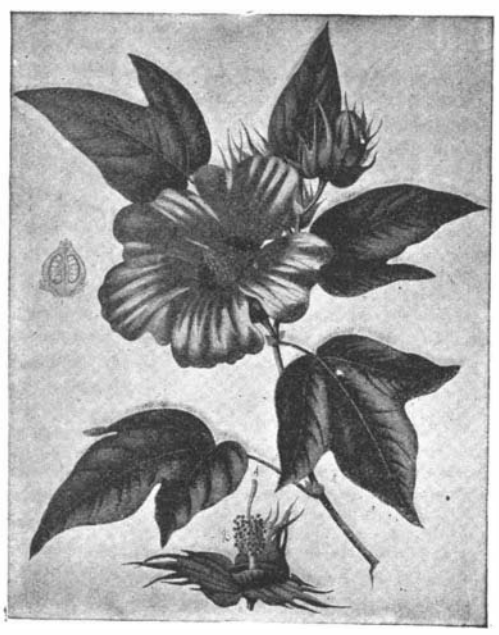

Fig. 3.

A Great Artificial Lake.

It is proposed to build at Cloquet, Minn., on the St. Louis River, a dam 900 feet long and 80 feet high, by which back water on the St. Louis will be extended sixty miles. A line of steel piping to the hills above Duluth will be laid, where a reservoir is to be built, whence, under a 600 foot head of power, electricity will be generated and distributed. Water will also be furnished for fire protection, and, if wanted, for drinking purposes. This project is said to be well matured, has the consent of the war department, controlling the river, and also of the saw milling interests at Cloquet. It is stated that the money needed for the project, some $3,500,000, is secured. A large share of the Fond du Lac reservation, which is, however, valueless for timber or agricultural purposes, will be flooded.