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Wild Flowers as They Grow

DAFFODIL

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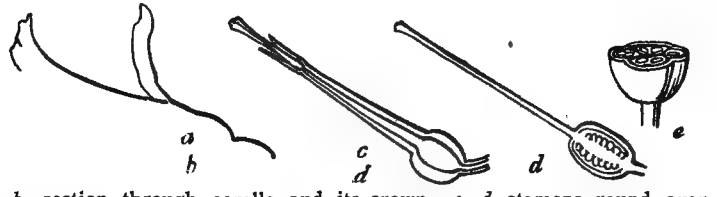
NARCISSUS PSEUDO-NARCISSUS

" When daffodils begin to peer—
With heigh ! the doxy over the dale—
Why, then comes in the sweet o' the year,
For the red blood reigns in the winter's pale."

SHAKESPEARE.

"DAFFODILS that come before the swallow dares and deck the winds of March with beauty," are inseparably bound up in thought



a, *b*, section through corolla and its crown. *c*, *d*, stamens round ovary and style. *d*, stigma, style, ovary (section showing seeds). *e*, section through fruit.

with the gladness of spring, with lengthening days, and the welcome return of the sun to power.

Wild Flowers as They Grow

When Daffodils appear other flowers press close behind.

" Herald and harbinger ! with thee
Begins the year's great jubilee !
Of her solemnities sublime
A sacristan whose gusty taper
Flashes through earliest morning vapour,
Thou ring'st dark nocturns and dim prime."

SIR AUBREY DE VERE.

For the plant's preparation for its flower's advent we must go back almost a year ; in fact, to the time when its one yellow flower—there is only one a year—withered the previous spring, for then its four or five leaves—long, thin and pale green—commenced to develop. Larger, coarser, and deeper green they became, and the manufacture of food-stuffs went on apace within them. Oxygen and carbon were absorbed from the air ; nitrogen and various salts in solution from the soil, and they met in the cells of the leaves, and were worked up by the aid of myriads of little green bodies—the chlorophyll corpuscles—which were there. The summer sun supplied the motor power, and as the

store material was formed it was passed down the long stalkless leaves in liquid form to that store-house below the ground that every Daffodil has—the bulb. There it became solid starch grains and swelled the bulb, and made it hard and firm until needed in the New Year.

Now a bulb, to be precise, is really a compound affair. In the centre is a dwarf stem bearing leaf and flower-buds; surrounding it are layer upon layer of scales, thick and white because of the starch they have stored. Outside these are dry, brown scales which largely protect the inner white ones from small nibbling animals. By midsummer days the bulb was filled, the store completed, and the leaves, their work done, were yellow and dead, and soon the plant had faded from the face of the earth to sleep until its reappearance with the spring.

When the increasing warmth of the sun wakes it the leaves and flower-stalk push upwards. For their growth they call upon the reserve store in the white scales. By the action of some ferment

this once more becomes soluble, and passes into the growing parts, which rapidly develop. In the centre of the long, flat, narrow leaves the flower-bud is at first covered by a scaly wrapper. It pushes through this and stands erect, a long-pointed oval. As the days pass it droops to one side, the yellow petals burst through the green bud scales, and the flower is before us. The simile of the "sacristan's gusty taper" for the long yellow flower as it stretches away almost at right angles from its stalk and flutters in the breeze is very apt. It has only one ring of floral leaves—sepals and petals are merged in it—and this is tubular below and spreading above. The most striking feature of the flower is the large golden "corona" that it bears round the top of the tube. It is largely to this that the flower owes its attractiveness. The lower part of the yellow tube has a lining of honey cells, and out of these plenty of honey filters amply to satisfy visitors from the insect world. These are chiefly bees from neighbouring hives whom the spring

sun has waked with the Daffodils, though sometimes some of the wild bees, particularly the genus Andrena, visit them. The pale yellow blooms shine out well, too, at night, and attract the early-season moths.

Now, there are six tall stamens in a Daffodil in the floral tube, and their pairs of pollen boxes open towards the centre. The seed-case is outside the flower, below the yellow perianth, but somewhat protected by the dry brown scale that once enfolded the bud. From the top of the case rises up through the flower a long, firm column which passes beyond the stamens and out into the open. On it the bees and moths mostly alight, and thus at once cover it with any pollen they may be carrying. Between it and the stamens they push down to the honey, and thus they unconsciously renew their dusty coat of pollen from the inward-opening stamens. Sometimes, it is true, they prefer to balance themselves on the crown rather than on the ovary column, but even then they cannot help carrying away the

flower-pollen with them. Self-fertilisation is very improbable in the Daffodil, since the ovary column is longer than the stamens and, consequently, its receptive tip beyond their reach.

The fruit is a capsule. If it be cut through in early days the three chambers of the ovary can be plainly seen, also the double column of seeds each contains. When ripe it opens by three valves atop.

But the propagation of the Daffodil is chiefly by the multiplication of bulbs. One buds off from another below ground, the attaching tissues decay, the pull of the roots of the daughter bulb draws it a little apart, and thus, when once the plant gets a foothold, it can cover by degrees a large area.

The Daffodil family is the *Amaryllideæ*, a family but poorly represented in our country—the snowdrop, the snowflake, and a pale variety of Daffodil known as Primrose Peerless being the only other representatives—though in sunnier and drier parts of the world it has many other members, such as

the alstrœmeria and the agave, and all the hundreds of varieties of narcissi.

In late years the Daffodil's message of spring has been brought with special force to the dwellers in large cities, who, moreover, receive it earlier than the country folk of the surrounding districts, for they do not know the Daffodil till late in March. Directly the New Year is in, in the very deadest time of the year, suddenly market stalls and florists' shops are lighted up by yellow blossoms from a warmer climate. One of the most remarkable minor developments of our present-day civilisation is the creation of this trade in cut flowers, and of that trade the branch that deals with the supply of Daffodils and other narcissi is the oldest and by far the largest. It is just about forty years ago that the first box of cut Daffodils was sent from the Scilly Isles to Covent Garden Market. Encouraged by the success of the simple venture, the islanders began to collect and transplant the wild bulbs that grew so freely in their mild and equable climate, and thus their

definite cultivation began. The demand increased with the supply, and now more than five hundred acres are given over to the production of flowers for market, the greater part of these being Daffodils and narcissi in general. In Lincolnshire, too, especially in the Spalding and Wisbech districts, bulb cultivation has developed into an important industtry.

Anyone who has been privileged to see these Daffodil fields in all their golden glory of fluttering flowers by the thousand thousand will be at one with Wordsworth who also once saw "a crowd, a host of golden Daffodils,"—

"Ten thousand saw I at a glance
Tossing their heads in sprightly dance.
* * * * *
The waves beside them danced, but they
Outdid the sparkling waves in glee;
A poet could not but be gay
In such a jocund company."

—and will say with the poet, as the memory afterwards flashes upon him:

"And then my heart with pleasure fills
And dances with the Daffodils."

THE DAISY

BELLIS PERENNIS

IF an Englishman knows and cares for no other flower, he knows and cares for the Daisy

> " Methinks that there abides in thee
> Some concord with humanity
> Given to no other flower I see,"

says Wordsworth. It stands to him in a special way as the emblem of childhood, innocence and

a, sheath of bracts. *b*, ray floret. *c*, disk floret. *d*, stamen heads joined. *e*, stigma, style, ovary. *f*, section through bloom showing filaments distinct.

home, while it is pre-eminently the children's flower —the first flower a child is taught to know. All the poets love the Daisy from Chaucer downwards. " It is of all floures the flour," he says, and specially

tells us that he had for them "so great affection" that the May Day dawn always saw him walking in the meadows to watch the Daisies opening in the sunshine, and further that "that blissful sight softeneth all my sorrow." He draws for us a charming picture which Dryden put into modern guise:

"A tuft of daisies on a flowery lea
They saw, and thitherward they bent their way;
To this both knights and dames their homage made
And due obeisance to the Daisy paid.
And then the band of flutes began to play,
To which a lady sang a virelay:
And still at every close she would repeat
The burthen of the song: 'The Daisy is so sweet.'"

It is Chaucer, too, who tells us the pretty legend of the good Queen Alceste, who gave up her life that her husband might have immortality. But Hercules rescued her and brought her back to earth in the form of a Daisy, and the number of its white rays is the number of her many virtues. Another legend, keeping still to the idea that the Daisy must have a heroic personality behind it, recounts

DAISY

that one of the Belides—the nymphs who presided over the meadows—was dancing with her lover, a rural god, when she fired the love of Vertumnus, the god of the changing seasons, and he pursued her. To escape him she became changed into the Daisy, hence the name *Bellis*. But many of these legends are really allegories, and this surely is one, for the Daisy in its apparently fadeless beauty making festive the country from May to Christmas seems beyond the reach of injury from the passing seasons.

Yet a third origin is found for this flower in the Ossian poems. As Malvinia was mourning the death of her infant, the mowers in the fields comforted her by saying they had seen the child borne on light mist strewing the flowers over the meadows "among which rises one with golden disk encircled with rays of silver, tipped with delicate tints of crimson. Dry thy tears, O Malvinia, the flower of thy bosom hath given a new flower to the hills of Cromla."

Wild Flowers as They Grow

The Daisy is the signal flag of spring, but spring has not really come until you can put your foot on twelve Daisies, say the country children, and their elders have a rather gruesome superstition that if you omit to put your foot on the first Daisy you see, Daisies will cover either you, or a dear friend of yours before the year is out.

But though everyone knows the Daisy, yet only a few are aware of the complicated processes that go on within the circle of those gleaming rays, for a Daisy, like some very small and delicate watch, has works which are invisible to the naked eye. One has to take the word of a botanist about what is there unless one possesses a magnifying glass. At an ordinary glance we see a yellow disk, almost solid-looking in the centre, but broken up into tiny areas in the outer part. Round this is a ring of some twenty white rays each with two little teeth at the tip. At the back of the flower is a strong sheath of thick green bracts which, without, have a scattered covering of white hairs and, within, hold bitter juices.

No moisture can pass, no small insects bite, through this protecting sheath.

A lens, however, reveals much more than this. Firstly, it shows us that round the yellow disk at the base of the white rays is a ring of little forks, each accompanied by sundry white hairs. The hairs represent the calyx, the white rays are the corollas, and the forks are each the top of a wee column rising from a minute seed-case containing an infinitesimal seed. Therefore every ray represents a flower, but only a flower of one sex—a female flower—for there is no trace of stamens within it. Secondly, it resolves the little areas of the central yellow disk into a large number, perhaps a couple of hundred, of minute florets; those in the outer rings are open, those in the centre are but buds. But each is a perfect flower, consisting of a tube-like corolla, five stamens with heads all joined, and the same minute seed-case and column as in the rays. In the outermost rings there are the little forks standing up, but distinguished here by carrying tiny brushes;

in the next few rings pollen balls are at the mouths of the florets; inside this again are the florets just opening at their tips from the bud stage, and then come the closed buds. The surface of the disk of a Daisy is almost level, and this in spite of the fact that these yellow florets are grouped upon quite a steep conical mound found by the end of the flower stalk, but the result is brought about by the outermost rings being tallest and the height decreasing as they creep up the mound. The exact method by which cross-fertilisation is brought about is set forth at length in the description of its near relative, the golden rod, in a later chapter. One characteristic mark of the Daisy is that when the stigmas have received their pollen they close their forks and withdraw into the tube again. Further, the closing at night promotes cross-fertilisation in the ray florets, for their stigmas are bound at that time to rub on the pollen balls on the adjacent disk florets.

Curiously enough, no one ever seems to find a

The Daisy

Daisy fading and in fruit. It is like Mr. Weller, Senior's, dead donkey of Pickwickian fame, in its elusiveness, though the fluffy fruit of its near relatives, the dandelion, thistles, and golden rod is an every-day sight. The fact is that it omits to provide the fairy-like parachute for its seeds that the others do, so they are small and of no account to look at and just fall on to the plate of leaves below them, though no doubt the wind quickly moves them on from that position. The Daisy certainly does not seem to suffer.

One word must be said about the opening and closing of the Daisy. Everyone knows that the "Day's Eye" closes at night and opens in the morning and, also, that if a bright day become overcast and wet, the bloom closes, whatever be the time, until the sun shines again. Exactly by what mechanism this happens we do not know, but we do see that it is dependent on the sunshine. Kerner suggests that the vibrations of light striking upon a closed flower become partly changed into

vibrations of heat, and the two together act chemically upon the watery substances in the cells and thus bring about changes of tension, and hence of growth. He points out the little known fact that every night the rays of a Daisy grow somewhat, and that it is only while they go on growing that the closing movements continue. Here, too, the cold scientific reason of the pretty crimson petal tips, immortalised by Burns, comes in, for they are due to a substance known as anthocyanin which has the special property of changing light rays into heat rays. When the Daisy is closed and its sheath folded round it these crimson tips form a dome over the central disk and, consequently, catch the full benefit of the sun's rays directly it appears and thus greatly facilitate the production of the necessary heat. This closing of the bloom is naturally a measure of protection.

The leaves are broad and flat and are arranged in a circular plate that lies closely upon the ground. Nothing can grow beneath them and they are,

therefore, very injurious to grass lands. They are, further, filled with acrid sap, so cattle disdainfully pass them. This explains Alphonse Karr's description : " There is a plant no insect, no animal attacks, that ornament of the field with golden disk and rays of silver, spread in such profusion at our feet : nothing is so humble, nothing is so much respected."

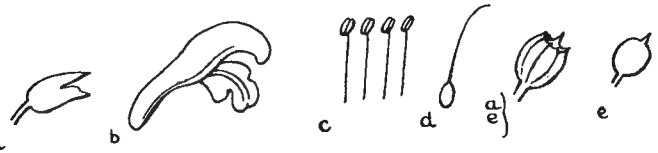
The roots, too, are acrid, and there was once a popular superstition (to which Bacon refers) that if they be boiled in milk and the liquid be given to puppies the animals will grow no bigger.

The Daisy belongs to that immense and universal family, the *Compositæ*.

THE RED RATTLE

PEDICULARIS PALUSTRIS

THE Red Rattle is taking to bad ways; it has not gone far upon the evil path, but its trend is in that direction, for it is a pilferer, a petty thief who takes just a little here



a, sepals. *b*, petals. *c*, stamens. *d*, stigma, style, ovary. *a*, *e*, fruit in calyx. *e*, fruit.

and just a little there. It does not perhaps do any material injury to the victim of its depredations; the little it takes is probably not even missed, but the injury is rather to itself, for though for the time being it supplies its needs at relatively little cost, it has yet given up its birthright of complete

RED RATTLE

independence, and Nature will ultimately take her revenge. Witness its relatives, the broomrapes and the toothwort, which are whole-hearted parasites, and could be nothing more now if they would, for, through non-use, they have lost their leaves and their green colouring matter—in fact, their whole machinery for working up their raw food.

It is a pretty little plant with much divided feathery leaves and flowers of a beautiful rose-pink colour, and one would never suspect from its appearance that it was of the clan of parasites even in a minor degree unless, indeed, suspicion were aroused (as often happens in our world) by a too intimate knowledge of the habits of its near relatives, such as the cow-wheat, the eyebright and the common rattle. Over all these the dark shadow of parasitism rests, and careful observers have tracked suckers from their roots passing over to the roots of grasses and meadow plants around. The suckers encircle these roots and cling to them, penetrating their surface and absorbing their life-juices, and quickly

killing that unfortunate portion that they have chosen for their embrace. Shortly afterwards these plants, including the Red Rattle, who have lives of only one short season, die themselves, but their seeds, scattering in the neighbourhood, germinate in the following spring, and may even press the same hosts into their service that their parents did. The Red Rattle's nearest relative, the meadow lousewort (*P. sylvatica*), however, lives for several years and its suckers, after they have killed one portion of root, will lengthen and seek some other portion to prey upon. Hence we often find unusually long suckers upon its roots. These two plants are the only representatives in England of the *Pedicularis* or Lousewort genus, but they have a large number of foreign relatives which are found even in the Arctic Circle, and likewise grow in all colder parts, such as bogs and mountains of our temperate zone.

But though it may be true that " this herbe is an infirmitie of the meadows," as an old writer said, yet when we turn to its flowers we cannot deny

that we have here a most ingenious mechanism, as well as a truly brilliant flower in a small way. There is a very broad lower lip of a beautiful rose-pink colour ; above this is a thin hood of a deeper purplish red, " like a small gaping hook," as someone suggests, but rather in profile, remarkably like a pigeon's head, beak and all. One very curious point is that all the flowers have a peculiar askew look about them because the over-arching hood is not exactly above the centre of the lower lip. This is usually attributed to accident in the particular flowers under observation, but it is really part of the design, for it gives a greater space on one side of the lower lip than on the other, so that bees can more comfortably settle there and probe into the corolla tube, whose throat moreover is also somewhat over towards that side. At the foremost point of the petal hood is a tiny opening, and through this the style protrudes slightly, thus forming the beak to the pigeon's head. Inside the hood are four stamens, two on either side ; their heads open towards the centre, but, as the opposite

faces touch each other and press together, the pollen, though ready to fall, cannot do so.

The plan of the flower having been grasped, watch a bee approaching. It flies straight on to that part of the platform assigned to it, and the projecting "beak" with the protruding stigma rubs gently on its head. If there is anything in the way of pollen to be rubbed off it, the stigma acquires it. But the bee, unheeding, pushes sideways into the long tube, for the honey is kept by the flower down in the tube in a ridge round the ovary. As it pushes in, though it does not actually touch the pollen-boxes, it yet jars them so that, for the moment, they spring apart, when promptly out fall their contents, or at least part of them, and some of the shower necessarily drops on to the insect's head. In the meadow lousewort the anthers are fringed with hairs so that the pollen shower cannot scatter, but this arrangement seems to be absent in its marsh brother, the Red Rattle. The honey secured, the bee backs out and flies away.

The dark calyx is noteworthy. It is divided into two broad lobes, each of which is edged with jagged teeth—"crested" it is sometimes called. It becomes of an inflated appearance, and as the flower fades remains round the oblique seed-case and protects it. Even when the seed capsule is mature only a short point of it projects beyond its envelope. It contains a few large dark seeds. This bladder-like calyx, together with the finely segmented leaves whose very segments have deeply indented margins, are characteristics that readily distinguish the plant.

The unpleasant botanical name of its genus, *Pedicularis*, and the English equivalent Lousewort, by which names both marsh and meadow species are known, are founded on a belief, long and stoutly held by farmers, that the healthiest sheep feeding on these plants inevitably become infested with scab. But this, as happens in other cases, is a libel on the plant; the fact is that the Red Rattle preferably establishes itself where the ground is marshy and the pasturage poor, and if sheep be

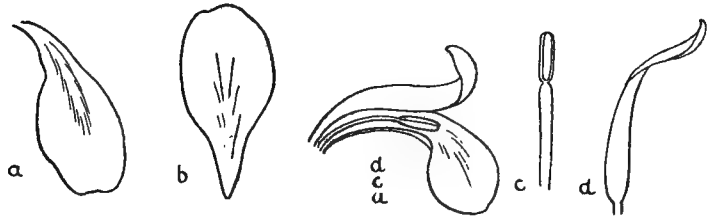
turned on to this ground they will naturally become poor in condition too, and therefore liable to be verminous and diseased whether the Red Rattle be their food or no. Unfortunately "if you throw enough mud some of it will stick," and in keeping alive both popularly and scientifically through its names the old mistake the Red Rattle will always be credited (or should it not be *dis*credited?) with having some relation to vermin. Other names sometimes used for the plant are "Cock's Comb," perhaps from the shape of its leaves, "Cow-wort," "Dead Men's Bellows," "Rattle Grass" (its common name three centuries ago), and "Suckies."

It can be found in flower from April to August, and it belongs to that family *Scrophulariaceæ*, which counts among its members such diverse plants as the snapdragon, the speedwell, and the mimulus.

THE YELLOW FLAG

IRIS PSEUDACORUS

"A FLOWER of the waters, crowned with gold, above the green dwellers by the shore," the Yellow Flag stood in full flower. To Richard Jefferies, as he pushed his way through the tall

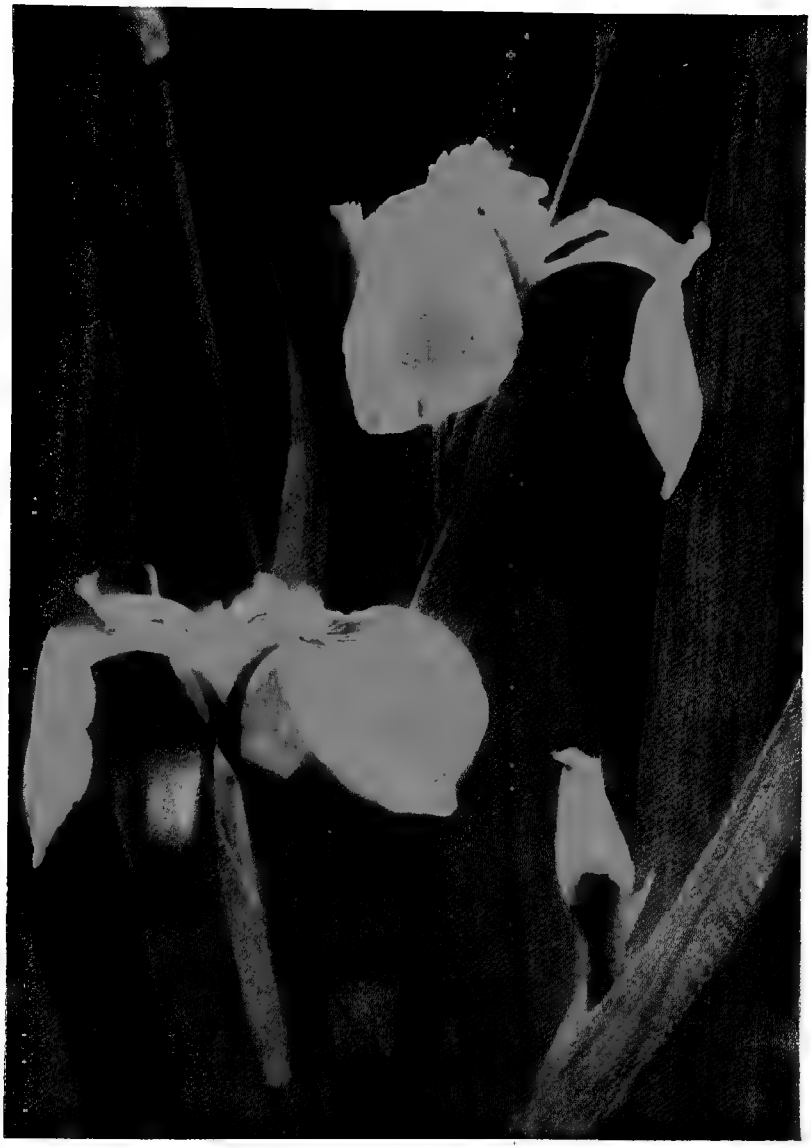


a, sepal. *b*, petal. *c*, stamen. *d*, stigma.

growth, "the marsh seemed lit up with these bright lamps of gold under the shadowy willows and dark alders." Of all the plants that grow wild in our land there is none that can rival in stately beauty this native representative of the Irises. Its long,

sword-like leaves rise directly from the marshy ground and stand erect as bodyguards beside the tall straight stalk which bears aloft the large gold flower and pointed buds. No wonder the Frankish kings of old, when they first stood before their people, bore a flowering spike of Iris as sceptre. From almost prehistoric times it has stood as the symbol of power and majesty; it was dedicated to Juno Queen of Olympus, and was the origin of the sceptre; the three leaves of its blossoms typified faith, wisdom and valour. The Egyptians placed it on the brow of the Sphinx and on the sceptre of their kings.

France is specially bound up with the Iris. The legend goes that early in the sixth century King Clovis, a heathen, was on the point of defeat in one of his many battles. His own gods appearing useless in the circumstances, he bethought him of the God of his Christian wife Clothilde, and prayed for victory. He conquered and became a Christian, and, urged by his wife, replaced the three toads on



YELLOW FLAG

his banner by three Irises, the Iris being very specially the Virgin's flower and of deep Christian significance. The Cathedral of Florence is dedicated to Santa Maria del Fiore (Our Lady of the Flower), the flower referred to being the Iris, which is still the emblem of the city, and always greatly in evidence there. Six centuries later, Louis VII. assumed it on his banner in his Crusade against the Saracens, and it is said that it became known as Fleur de Louis, corrupted into Fleur de Luce (as Flower de Luce it is still known), and then into Fleur de Lys, or Lis—i.e. the Lily Flower. It is curious how the idea of a lily is bound up with the Iris, considering it has nothing whatever to do with the lily family. Longfellow, quite incorrectly, apostrophises it as " beautiful lily," and Ruskin is more poetical than accurate when he refers to the Fleur de Lys having " a sword for its leaf and a lily for its heart."

This flower of legend and beauty has also a most interesting nature in itself, and on one or two points is quite unique. It has a thick, creeping rootstock

which, parallel to the surface, pushes through the moist ground in which it delights. Permeated by acrid juices, it once had quite a reputation, and was suspected of many virtues. For instance, the juice snuffed with enthusiasm brings on violent sneezing, and we have on Dr. Thornton's authority in his "Herbal" of 1814, that "in this way it has cured complaints of the head of long standing in a marvellous way." It also cured dropsies, dyspepsia, old coughs, and the "biting of serpents," among other things; was good as a "licking medicine," and "laid plaisterwise upon the face of man or woman, doth in two daies at the most take away the blacknesse and blewnesse of any stroke or bruise," though old Gerard, whose prescription this last is, adds a warning that if the skin "be very tender and delicate, it shall be needfull that ye lay a piece of silke, sindall, or a piece of fine lawne betweene the plaister and the skinne, for otherwise in such tender bodies it often causeth heat and inflammation." So warmly do the recommendations of it ring for the

cure of toothache that it might be worth while for distracted sufferers to try it nowadays. According to authorities, one must rub the aching tooth with a piece of the root, or lay a piece of the root upon it, or chew the root, when the pain flies like magic.

From below this creeping rootstock many rootlets pass downwards; from above broad, flat stalkless leaves rise, bound several together into a sheath at the base. The lower leaves may be two to three feet tall, the upper leaves much shorter and embracing the flower-stalk higher up. Their shape has given the plant the name of "Segg," "Skeggs," or "Cegg," all of which came down from the Anglo-Saxon days when a "segg" was a small sword. "Dagger Flower" is a name with similar allusion.

On the top of the stem that rises through the embracing leaves are the remarkable looking flowers. The lowest of them are probably fading, then come flowers in full beauty, then large pointed buds in various stages. The structure of a mature flower is not quite obvious at a first glance. There

are three large drooping yellow petal-like sepals with brownish mottled markings on their upper surfaces. Alternating with these are three erect much smaller and less petal-like petals, and inside these again are three more yellow very petal-like objects ending in a double lobe, so that there are three times three of gay floral leaves. There are apparently no stamens. Now the innermost trinity are really the stigmas, and they are far and away the most striking illustration we know of stigmas that resemble petals. In this flower it seems as though anything were more like a petal than the actual petals themselves. The stigmas arch gracefully over, and if we look under the curve of each we find the missing stamens. Each—there are only three altogether—is united at its base to the corresponding sepal, but its flattened stalk curves outwards in conformity with the curving arch above it. In no other flower does the stigma form such a rain-protecting roof for the pollen. Just beyond the top of the stamen is a little shelf on the under side of the stigma, and

this is the point destined to receive fertilising pollen. In this flower honey is contained in canals on the inner side (towards the base) of the small, erect petals, and out of these it exudes and lies round the ovary in the heart of the flower.

Now apparently the Yellow Flag lays itself out to receive two kinds of insect visitors. Firstly bees, secondly the long-tongued hover-fly—*Rhingia rostrata*—and it is sometimes asserted that two modifications of the flower may be met with according as the plant caters for one or other of these visitors. When, say, one of the big humble bees approaches and makes for the honey, it must needs settle on a drooping sepal. It pushes down between the over-arching stigma roof and the sepal floor, and necessarily rubs its great back on the stamen lying almost in the roof. But as it pushes in it rubs first on the receptive scale, and if its back is at all dusty when it arrives it must rub a little of this dust on to it. And then it rubs on the stamen. Now in this case the stamen-head has its

opening on the outside to meet this contingency, so promptly the pollen showers down on the intruder's back. The bee gets its honey and shuffles out, but apparently finds its simplest path one leading sideways from the stigma; anyway, it slips by the receptive scale without touching it, and so it does not cause the flower to fertilise itself. Of course, if the bee proceeds to the next sepal and plunges in beneath its arching roof it is bound to effect self-fertilisation there—there is no help for it—but the chances are even that it will prefer to pass on to another flower. If a hover-fly visit this flower it will draw up the honey with its long tongue and never touch either stamen or stigma so far as fertilisation purposes are concerned, and it is apt to add insult to injury after it has finished its gratuitous honey repast by reaching up to the pollen box and taking a final course of pollen. After its meal it flies away without rendering the slightest service in return. But apparently the plant will not always be frustrated in this way, and some-

times we find flowers of a slightly modified shape where the leafy stigma lies so close upon the sepals that there is no room for a bee to enter and the hover-fly in penetrating the narrow entrance is perforce bound to do the kind office of cross-fertilisation in return for its honey. Only the non-sensitive lower edge of the stigmatic scale is touched as it passes, but no pollen is left upon it ; this is retained among the hairs of the fly's thorax and deposited on the stigma of the next flower visited. This time, too, it cannot rob the flower of its pollen ; the exit is too narrow to allow of anything but a crawl out.

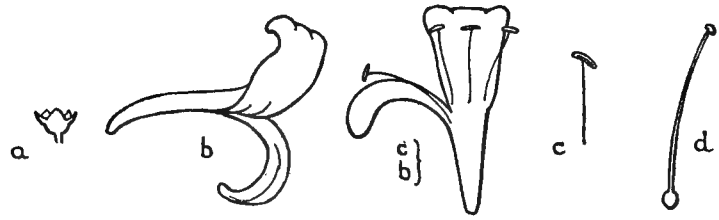
Finally the floral leaves fade and drop away from the top of the capsule, which increases in size. Inside it the seeds mature until they are little brown objects flattened on top and below by pressure one from another.

The Iris belongs to the family of the *Irideæ*, of which the crocus and the gladiolus are also members. It only differs from the daffodil family in its members having three stamens instead of six.

THE HONEYSUCKLE

LONICERA PERICLYMENUM

"VIRGIN lamps of scent and dew," the Honeysuckle blossoms are indissolubly bound up in thought with the fragrant dusk of summer evenings. During the hours of sunshine



a, sepals. *b*, petals. *c*, *b*, stamens arising from petals. *c*, stamen. *d*, stigma, style, ovary.

the "clumps of woodbine taking the soft wind upon their summer thrones" and exhaling only a faint sweet smell are but somewhat neutral personalities at best; it needs the evening hour when the sunset

HONEYSUCKLE

dies for them to be revealed in their true vivid character. "The honeysuckle lit the matted boughs with Cressets burning odour," says a modern poet,* and true it is that only as the hedgerows fade into dusk do the Honeysuckle flowers begin to gleam in the shadows and pour out lavish streams of fragrance. For the Honeysuckle is primarily a flower of the night, little as this is generally realised.

Take a spray of Honeysuckle just about to burst into flower. The deep creamy buds, closely set together, stand upright side by side, each a tube an inch or more long, thickening and crimson-tinted towards the tip. About seven o'clock in the evening those which are to flower that day suddenly relax the narrow under-lobe of their corolla, and it curls backwards; the wide, upper lobe, edged with four teeth, quickly follows suit; the stamens spread apart like the fingers of a hand, and within a space of two or three minutes the bud has become a full-blown flower. Further, it has moved from its

* John Davidson.

upright position to a horizontal one so that, as the inner side of the creamy petals is quite white, the now wide-open mouth of the trumpet-shaped flower becomes at once conspicuous in the deepening twilight. Out of it project five long stamens with see-sawing pollen boxes on their ends, and also a very long column from the little ovary right away beyond the bottom of the petal tube, but while the stamens are fixed like bayonets, this column droops for the time being. Honey pours into the tube from glands on the walls, and wells up until it may be half full; meanwhile the flower puts forth its utmost power of scent. This, then, is the position of affairs this first night of its life.

Now the visitors it specially caters for are the hawk-moths, especially the Privet and Convolvulus Hawk-moths, for they have very long probosces which can dive to the bottom of its very long tube. And these insects themselves are particularly attracted by the Honeysuckle. Kerner gives an interesting glimpse into their ways. He describes

how in a certain garden there was a Honeysuckle plant which was regularly visited at dusk on summer evenings by Convolvulus Hawk-moths. He noticed that after they had sucked the honey they were accustomed to settle near the plant on the bark of old tree trunks, or on fallen leaves, and there remain with folded wings as if benumbed until the next evening. One day he picked up carefully one of these pieces of wood with a moth on it, marked the insect slightly with cinnabar, and carried it, the moth never moving, to a distant part of the garden three hundred yards away. When twilight fell the hawk-moth began to wave the feelers, by which it smells, hither and thither a few times, then stretched its wings and flew like an arrow through the garden towards the Honeysuckle. He followed, and there was his cinnabar-marked moth hovering over the flowers and sucking the honey. It must have been able to smell the Honeysuckle fragrance even at that great distance, and had flown straight to it directly the Honeysuckle made its fragrant

appeal. In sucking the honey the moth is bound to rub its breast against the tilting pollen boxes, and so gets well dusted with the pollen. The microscope shows that every grain of the dust is covered with needle-like prickles, so that it sticks on the soft fluff of the moth's body.

During the second day of the flower's life certain changes happen. The inside of the petals and, in fact, the whole flower, turns yellowish, the upper and under lip of the corolla roll round further backwards, and the tube arches itself. The stamens are drooping, and probably empty of pollen, but the long ovary column has raised itself, and now, in its turn, projects bayonet-like. The net result is that the flower will no longer be as conspicuous in the dusk as it was the previous night. Both these stages can plainly be seen in any bunch of Honeysuckle. As the twilight falls again sweet fragrance is once more poured out lavishly, and moth visitors respond to the invitation. But, naturally, they fly first to the more conspicuous

flowers—the younger ones, and our day-old flower, though still offering plenty of honey, will only be their second choice. Still that exactly suits the plant's plans, for the moths rub their pollen-dusted breasts on the stigma—the end of the ovary column—which is in the position that the stamens were twenty-four hours ago. Thus is fertilisation effected. The flowers now become a still deeper colour—almost orange—the scent ceases, and finally the petals, stamens and ovary column fall off altogether, leaving behind just a collection of minute seed-cases wrapt up in the tiny green calices. These seed-cases now rapidly swell and, first green, then a vivid orange-scarlet, they become luscious semi-transparent fruits, maybe as large as peas. One old writer tells us that "the ripe seed gathered and dried in the shadow and drunk removeth wearisomenesse."

Mr. Step points out that these clustered flowers of the Honeysuckle are a half-way house, as it were, between ordinary single flowers, as a pea,

and composite flower blooms, such as the daisy. Indeed their calices and their ovaries are often definitely attached in pairs.

The woody twining stem of the Honeysuckle is one of the very few that increase in thickness, and it always twists from left to right. Often it presses very hardly upon the trees and shrubs round which it twines. "It groweth in woods and hedges and upon shrubbes and bushes, oftentimes winding it selfe so straight and hard about that it leaveth his print upon these things so wrapped," says Gerard, and Shakespeare's allusion, "So doth the woodbine the sweet honeysuckle gently entwist the maple," is distinctly optimistic.

The leaves have no stalks and arise in pairs. They are very sensitive to the direction of light, and it should be noticed that in whatsoever direction the stem may be growing the leaves upon it will always arrange themselves so that their upper surface will directly receive the light. Hence, we find them making all manner of angles with the

twisting stems. Tinged with red, they are some of the earliest to appear in the spring.

Culpepper, writing in King Charles II.'s reign, makes some quaint remarks about this plant. "Doctor Tradition," he says, "that grand introducer of errors . . . hath taught the common people to use the leaves or flowers of this plant in mouth-water, and by long continuance of time, hath so grounded it in the brain of the vulgar, that you cannot beat it out with a beetle . . . but come to Doctor Experience, a learned gentleman. . . . Take a leaf and chew it in your mouth, and you will quickly find it likelier to cause a sore mouth and throat than to cure it." But he goes on, "It is fitting a conserve made of the flowers of it were kept in every gentlewoman's house; I know of no better cure of an asthma than this; . . . if you please to make use of it as an ointment, it will clear your skin of morphew, freckles and sun-burnings, or whatever else discolours it, and then the maids will love it."

This plant was given its botanical name *Lonicera* to keep green the memory of Adam Lonicer, a clever German botanist who lived in the sixteenth century at Frankfort. Its old English name of "Caprifoy" was due to the belief that goats eat the foliage with special liking. "Woodbine," or "Woodbind" as it used to be written, of course refers to its habit of embracing other stems, and this, together with its fragrance, has made it specially beloved by poets, who have seen in it an emblem of steadfast affection. Chaucer used it thus, making those crowned with it—

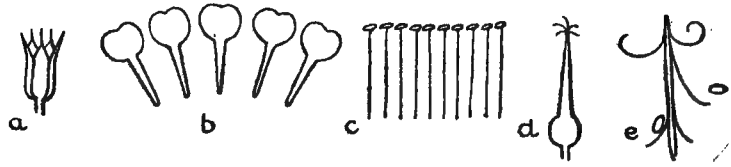
> "Such as never were
> To love untrue, in word, ne thought, ne dede;
> But ay steadfast."

It belongs to the family of the *Caprifoliaceæ*, and has the elder and the guelder rose for near relatives.

THE HERB ROBERT

GERANIUM ROBERTIANUM

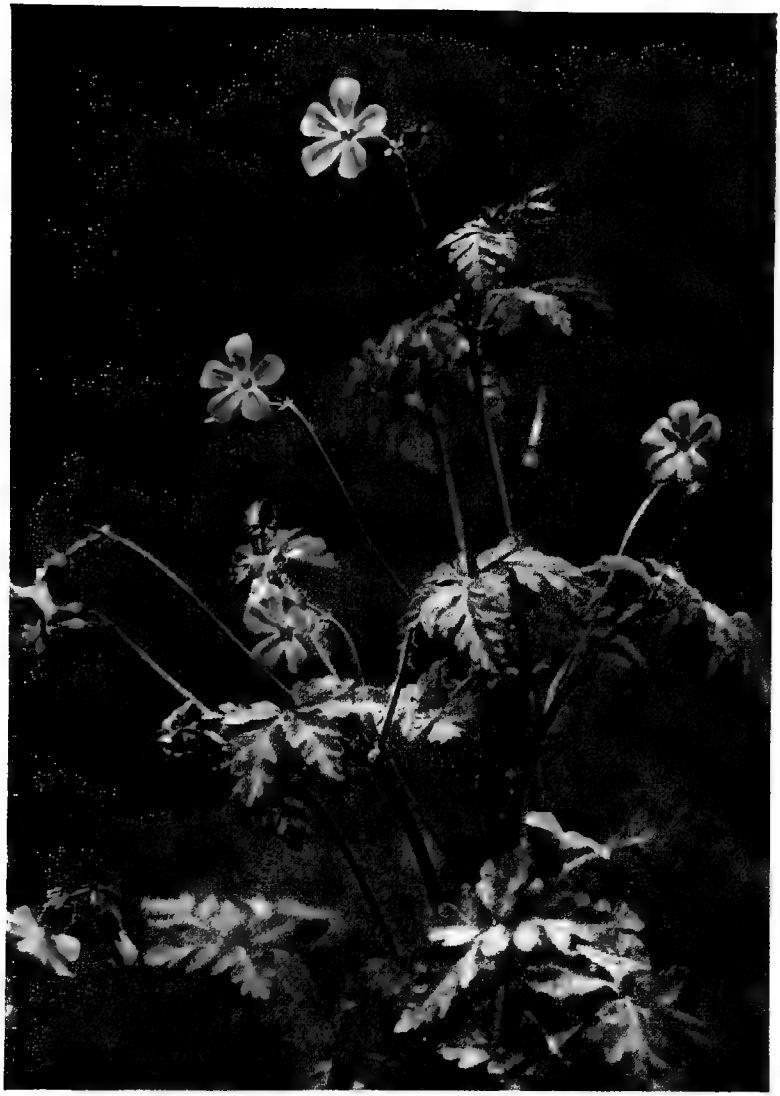
HERB ROBERT is the Robin Redbreast of plant life, for its brave red front and its cheery homeliness make it the friend of everyone. All through the summer, coming early and staying late,



a, sepals. *b*, petals. *c*, stamens. *d*, stigmas, styles, ovary. *e*, fruit exploding.

its little pink flowers may be found in every hedgeside and open wood, or lying on bare and stony ground, and yet when autumn comes and flowers of all sorts are few and far between and dying leaves speak of the winter that is at hand, it still keeps up its note of brightness by means of its crimson foliage. All

sorts of endearing names have been found for it. It is Robin, or Robin i' th' Hedge, or, more fondly, Little Red Robin; sometimes it is felt to be the complement of the robin, and so it becomes Jenny Wren, or Wren Flower; sometimes, again, it is honoured by the name of that evergreen country-side hero, Robin Hood, at other times it is Redbreast or, most aptly, Red Shanks, because of its long red stalks. When its hue is most striking and the leaves and stalks are alike dyed with crimson stain it becomes Dragon's Blood, or Bloodwort, or even more suggestively, Death-come-quickly. How it became Herb Robert can now be only a matter of tradition, so far back do we find the name. Prosaic folk assert that Robert is a corruption of Rob-wort, the red plant; but one would rather receive the old belief that it keeps alive for us to-day the memory of that Abbot of Molesne, the founder of the great Cistercian Order, St. Robert, whose dedicated day is April 24th. The story goes that he performed miracles of healing by means of this plant. Others



HERB ROBERT

again assert that it was not to St. Robert, but to Robert Duke of Normandy, for whom a wonderful medical work was prepared, the "*Hortus Sanitatis*," that the plant stands as memorial.

The plant may be a foot or rather more in height with stems that are much branched, thin, and rather weak, but thickened for strength where the branching occurs. They carry a few soft hairs, the upper ones being glandular. The foliage is a great feature, the leaves are charmingly fashioned into three main divisions, and these again have their margins gashed so that the whole appearance is one of lightness and grace. Always beautiful, as our picture taken in May days shows, their charm is doubled when the green of early spring passes into the warmer reds of later days.

"Down in the grass
And blushing through green blades, Herb Robert fain
Would catch the eye of pilgrims as they pass,
Who seek for rarer plants."

Because of its glow of colour the plant had a great reputation as an astringent; "scarcely any

plant is in that respect equal to it," said an old writer a century ago, and he adds a reflection, rooted in that old heresy, the Doctrine of Signatures, " that nature seems to have set her stamp upon several herbs which have the virtue to stop bleedings ; this and the tutsan, the two best remedies the fields afford for outward and inward bleedings, become all over as red as blood at a certain season." For use in this way the whole plant, root and all, was dried and powdered. It is not employed for this purpose now, but it is certain that its tissues contain some strong principle, for if bruised they give out a disagreeable smell, and hence, in retaliation, country folk have called it, rather brutally, " Stinking Bob." They, however, are glad enough of this property when they require to use it as an insecticide, in its ability for which they have great faith.

When we turn to the scientific aspect of the plant there are various points to note, the development of the fruit being of particular interest. The little pink flowers—the Bachelor's, or Billy, or

Soldier's Buttons—conform to the geranium type, for the plant belongs to the *Geraniaceæ* family—that is to say, there is a calyx of five separate sepals, a corolla of five separate petals much longer than the sepals, two rings of five stamens each, the outer ring carrying glands of honey near their base on their outer side, and an ovary made up of five parts ranged round a central column and continued at the tip into five lobes, which at first are all erect and pressed together, but later spread out into five rays. Now the characteristic feature about the calyx is that the sepals stand in so closely together that they form an apparent tube; and about the corolla, that each petal has a ridge down its centre which, projecting into the tube, forms five bays round it. Thus the honey is protected by the mouth of the tube being partly closed; moreover, the whole flower turns over and hangs down to make assurance doubly sure when rain begins to fall. In the little wood geranium, its close relative, the honey is guarded by fringes of hairs at the base of the petals, hairs which are

immortalised historically by having started the botanist Sprengel in 1887 on his now classical researches into the true meaning of every adaptation in a flower. He tells us that he felt that " the wise author of Nature would not have created even a hair in vain," so he sought the plan behind it.

As to fertilisation, though the flower is occasionally visited by insects, it is not very dependent upon them. The pollen is ready to fertilise and the stigmas to be fertilised at one and the same time, and no doubt the plant is self-sufficient as a general rule. Sometimes, however, the strain will be strengthened by a cross-fertilisation. Flies are found now and then visiting the flower; the disagreeable scent may even attract them, and their tongues are guided down to the honey through the passages formed by the ridges on the petals.

And now comes the most interesting episode in the life of Herb Robert. As the flower fades, the central axis, round which the parts of the ovary are ranged, gradually lengthens, and the whole

structure, from which both petals and stamens have now disappeared, raises itself into an almost upright position. Five seeds, each enclosed in a capsule, lie round the base of the column, and each capsule projects upward into a rod-like structure that lies along the column. A short tongue keeps the seed-capsule in place for the time being. The general appearance of geranium fruits at this stage has given the genus the name of "Crane's-bill" (*geranos*, a crane). Probably, too, it accounts for "Adder's Tongue," a name that it sometimes bears.

Naturally, as the central column grows the upward rods of the capsules are greatly stretched, their outer fibres being apparently in a state of greater tension than their inner. Presently their resistance is overcome, they give way one by one at the base, and curl up rapidly outwards. The capsules containing the seeds are shot violently off as if from a pop-gun, not necessarily all at the same moment, and the rods which held them likewise become detached. "In their natural habitat,"

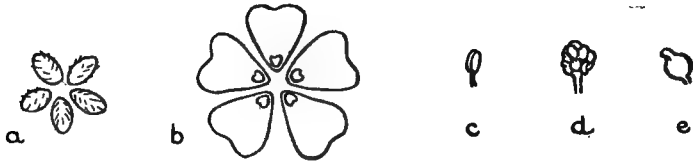
remarks Lord Avebury, "it is almost impossible to find the seeds when once thrown. I therefore brought some into the house, and placed them on my billiard table. They were thrown from one end completely beyond the other, in some cases more than twenty feet." Among both plants and animals we occasionally find individuals of apparently simple and mild character who are roused to violence when it appears that the welfare of their offspring is in any way at stake, and our friend Herb Robert must be classed among these. Its method proves successful too, for it is one of our very commonest wild flowers.

There are no fewer than twelve native British species, five being perennial with larger flowers, and seven (among which we count our present subject) annual with smaller flowers.

THE MEADOW BUTTERCUP

RANUNCULUS ACRIS

THE Buttercup is usually taken as a type of what a flower should be. Like the paragons of virtue we sometimes meet, it is complete at every point, straightforward and distinct in every



a, sepals. *b*, petals with nectaries. *c*, stamen. *d*, ovaries. *e*, single fruit.

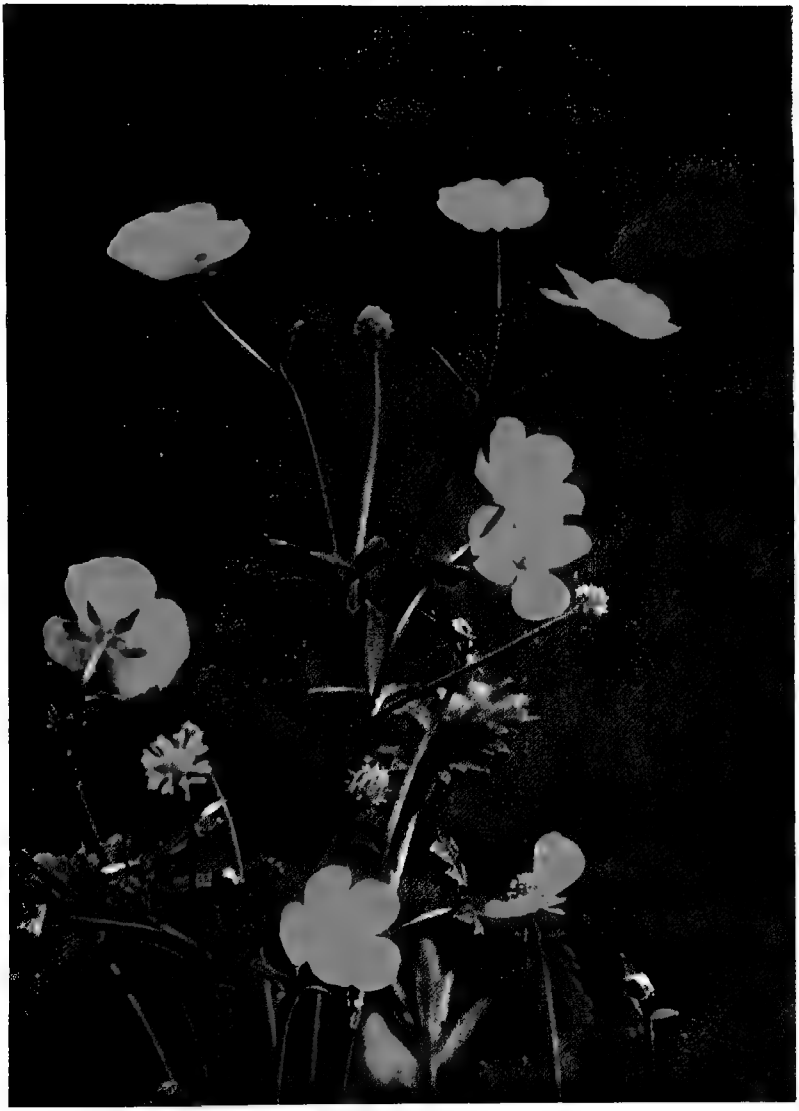
detail, while originality and eccentricity are unknown to it. This model of floral symmetry and rectitude has five simple green sepals, all alike, arranged in a ring at the stalk end; five yellow petals, all alike, arranged in a similar ring (but alternating with the sepals); a large number of stamens of typical

form standing within, again in alternating rings; and in the centre of all a considerable number of minute parts, each of which represents a seed-case with one seed and the usual receptive surface for fertilisation purposes. Even the honey is stored away in five little sacs arranged most methodically one on each petal, and carefully covered by a scale. If the petals be pulled off a flower, these honey sacs can be distinctly seen at their base as small heart-shaped structures.

But in one particular the Buttercup can lay claim to a special touch of brilliancy in a literal sense. Usually, the coloured petals of a flower, however gay their colour, have a "dead" surface, but in the Buttercup the petals are not merely gold, they are burnished gold, and glint in the sun's rays.

> "The rich buttercup,
> Its tiny polished urn holds up
> Filled with ripe summer to the brim,"

says J. R. Lowell. That this sheen is a device of the plant to enhance its attractiveness is obvious,



MEADOW BUTTERCUP

since only the upper surface of the petals has it. "The glaze of the Buttercup," says one, "is of kindred character with the song of the lark that rises from the dewy field beside it into the blue air. . . . They are both the outcome of the spirit of love that pervades all Nature. They both appeared at first to give Adam and Eve a bridal welcome. They are both the sign of the great marriage festivity of Nature." And the golden shimmer seems specially to attract shimmering insects, for iridescent flies and beetles are chief visitors, though, to be sure, hive bees do not disdain Buttercup honey upon occasions.

The manner in which the Buttercup flower arranges its internal affairs is as follows: when the bud opens and the petals spread to form their cup, only the outermost rings of stamens are mature; these bend somewhat outwards, and they open their pollen boxes also on the outside. All the inner parts of the flower, both stamens and stigmas, are as yet unready to act. Any insect coming now to tap the

virgin stores of honey must rest on a petal and push under the ripe stamens to get to it, but however much pollen showers on her and however much she moves about the flower no self-fertilisation of the flower can happen, and she must go away carrying all her burden. As the hours and days pass, successive rings of stamens—working inwards—ripen, and as they do so they always bend a little outwards and strew their pollen on the honey-seekers. Finally, the innermost ring of stamens is reached by the wave of ripening, and the stigmas, too, share in it. This is the moment for cross-fertilisation through the agency of a chance visitor. But at this stage the little flies wandering about the flower are also certain to disturb the stamens so that they rub upon the adjacent waiting stigmas, and self-fertilisation is inevitable, if fertilisation is not otherwise effected. So the Buttercup makes quite certain of its future, and we discover why it encourages creeping flies even though they will not act as carriers from blossom to blossom. Each flower blossoms for seven days. Later

the little seeds in their cases develop and swell somewhat, forming a globular head, but they always remain hard, dry, and unattractive. Our picture shows both flowers and fruits.

And here a curious question may be put: What is the true Buttercup?—for the subject of this chapter only represents one of three plants which are impartially claimed as Buttercups. It is true all three are members of the same family, the *Ranunculaceæ*, and the closest of relatives and botanists know them as *Ranunculus acris*, *repens*, and *bulbosus* —that is, the Meadow, the Creeping, and the Bulbous Buttercup respectively—and, as might be expected, their flowers are very similar. Bees apparently do not distinguish between them, for they fly from one to another indifferently, and yet as a strict rule bees always keep, for the time being, to the same species of flower when they are out collecting. But let us, at any rate, distinguish between them. The Bulbous Buttercup is characterised by its stem being thickened into a small bulb at the base; the Creeping

Buttercup by its long runners rooting at every node; our plant has neither characteristic. The flower stalk in the Bulbous is smooth and furrowed, in the Meadow it is hairy and furrowed, in the Creeping hairy and without furrows. Though the leaves of all three are divided into many segments, those of the Meadow Buttercup are the most finely divided and the most rounded in general outline. The flowers of the Bulbous Buttercup can at once be known from those of the other two because in them the sepals are bent right back on to the stem. They flourish also only in quite early summer, while the other two varieties begin later and last on much longer. This earlier flowering is connected with the bulb at the base of the stem—though the two are not usually associated in the minds of those who gather the flowers—for in the bulb the plant has nutriment stored from the previous season, so that it can get to work at once with its flowers in the spring, instead of waiting to manufacture the necessary food stuffs as the other Buttercups,

which have only fibrous roots, have to do. The Meadow variety may be two or three feet high, and is much taller than the Bulbous variety, which rarely exceeds a foot in height, while the Creeping variety keeps close to the ground.

In all three plants bitter acrid juices course through their tissues; so pronounced are they in the Meadow Buttercup that they have given it its second name, "acris." If cattle, by mischance, munch its seed it is said even to blister their mouths, while little children gathering it in the fields have had their hands hurt. Tramps have found out its value in their nefarious practices, for they have been known to rub their bare feet with the leaves and thus raise sores to encourage the charitable to give alms to the poor and footsore man. In Thornton's "Herbal" of the beginning of last century it is stated that rheumatic affections have often been relieved by pounding the leaves and applying them as a blister. The writer also informs his readers that if a decoction of this plant be poured

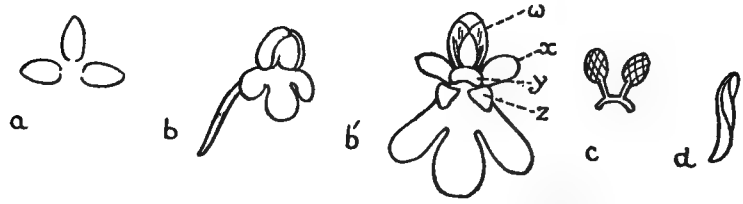
on ground containing worms " they will be forced to rise from their concealment," but his conscience smites him for giving the information, and he concludes, " although we cannot but condemn such bait as a wicked and barbarous practice." And in this spirit the information is handed on!

There is an old legend that the Buttercup was once a young Libyan with a beautiful voice. Then he sang of his love, but now he has become a flower, his rich attire alone " betrays a secret fire." In the Midlands country folk sometimes call the flowers " Crazy," because they think smelling them will send people mad. Other country names for the plant are " Bassinet " (little basins), " Blister Plant," " Crowflower," " Eggs and Butter," " Gilcup," " Gold Knops," " Goldy," and " Guilty Cup."

THE PYRAMID ORCHIS

ORCHIS PYRAMIDALIS

THERE are all sorts in the plant world, and the Pyramid Orchis is prince of mechanicians there. "In no other plant, or indeed in hardly any other animal, can adaptations of one



a, sepals. *b*, petals. *b'*, centre of flower with labellum; *w*, anther; *x*, stigmas; *y*, rostellum; *z*, guiding plates on labellum. *c*, pollinia. *d*, twisted ovary.

part to another and of the whole to other organisms widely remote in the scale of Nature be named more perfect than those presented by this orchis." This was the final judgment of Charles Darwin as he finished a most careful study of the plant. And

since the colleagues it has chosen in the animal world to work out its plans are the butterflies by day and the moths by night, whose touch is as gossamer and whose probosces are of infinite delicacy, it stands to reason that its elaborate mechanism must be of the finest possible order. Bees that are favoured by many a delicate flower seem coarse and clumsy when the Pyramid Orchis is in question.

That the plant is very beautiful our illustration well shows. "I know of no more beautiful sight in the floral line than to see a gently undulating grassy hillside decked and furnished with the rich rose-coloured flowers of the orchis in question, and interspersed at irregular intervals with patches of the deep-blue flowers of the devil's bit," says one writer.* The leaves are the palest green and unspotted, and their long, lance-shaped blades make a lovely contrast to the vivid blossoms. When the spikes of rose-red flowers first open, each is a perfect pyramid, rather short, with a broad base. Fully

* Webster, "British Orchids."

PYRAMID ORCHIS

opened flowers are round the bottom and, tapering upwards, are all stages of flowers to the youngest buds at the top, and all are rose-red, for the bracts that wrap up the actual rose-red petals in the buds are themselves warm-tinted. This pyramid formation at once declares this orchid, and hence its name. Later, however, when the top buds open and the spike lengthens, something of this characteristic shape is lost.

It seems rather a reflection upon our boasted modern catholicity in garden matters that this plant, albeit wild, is not more frequently cultivated in our gardens. It is easy to grow if it be given a somewhat chalky soil and a fairly open situation. It multiplies quickly, and gives brilliant touches of colour in June, July, and even August. Moreover, it is a joy for the purpose of gathering, for the spikes will deck a room a fortnight or more if they are put into water with a piece of charcoal to keep it sweet. Very occasionally a plant will be found which bears white flowers.

Passing from the beauty of its outward semblance, let us go on to discover why it deserves Darwin's encomium. Of course, it is to the flowers that he specially alludes, and since they are so distinguished it is worth a little pains to understand them and a lens to read them with greater distinctness. There are three narrow, spreading, coloured sepals outside, then three red petals—two small and standing up to form a hood over the centre of the flower, and one very large in proportion hanging down. This large one is divided into three lobes, and is known as the "lip," or "labellum." On this lip are two strongly marked ridges which, widely apart at the middle of the lip, converge into the centre, so that anything passing between them is led straight into the very heart of the flower. The back part of the labellum is fashioned into a very long spur or pocket.

Now, take a lens and look into the centre of the blossom. Under the petal hood is a short, thick column which represents the filament of the one stamen and the column from the ovary joined

together. The hinder part of this carries the two-celled anther, and in each of its cells is a pear-shaped mass of pollen grains all united by thin elastic strands. Each mass is known as a "pollinium," and it boasts of a slender stalk which is set in a sticky disk. The two disks are joined together to form a saddle-shaped object, which is enclosed in an envelope called the "rostellum." We shall see later that this is veritably a saddle, and that the pollinia are the riders that use it. This rostellum overhangs the forepart of the column, which divides into two rose-red sticky stigmas or receptive organs. When the flower opens, the rostellum is always ruptured by some means or another, and hangs a little below the saddle, partly closing the mouth of the ovary—"Like a trap placed in the run for game," says Darwin. The slightest touch, even a hair pushed at it, is sufficient to depress it. The ovary is very long and narrow, and has a curious twist in it. It contains very many minute seeds.

Now, watch a butterfly hover over a flower just

opened; it settles on the three-lobed lip, and pushes its thin and most delicate proboscis between the ridges, and so into the flower. The opening is so fine that the insect will almost certainly touch the rostellum and depress it, and so necessarily leave bare the saddle above. Directly the air touches the moist under-surface of the saddle, its two flaps suddenly begin to curl and firmly clasp the proboscis—the saddle is being harnessed to the steed. The "glue" on its under-surface sets rapidly, and in a moment or two the pollinia, always attached to the saddle, are drawn from their niche under the hood, and are riding on the proboscis. Meanwhile, the butterfly is exploring the long pocket. Now, it is a very strange thing that no single drop of honey has ever been found in this apparent honey-sac, hence this orchis has been called a "Sham Honey Flower," and the taunt has been thrown that it is merely a clever deceiver who deludes generation after generation of insects. But this is unjust, for though there is no honey, so to speak,

loose in the pocket, yet in the tissues under the skin are copious sweet juices, so copious that they ooze out in drops if the end be cut off. Therefore, Darwin came to the conclusion that butterflies and moths actually pierce the skin and suck the juice out of the tissues. Perhaps the little extra time this takes is the very time that the pollinia need to get safely mounted on their saddles.

Finally, the insect backs out and flutters gaily away, carrying the twin riders. At first they are erect enough, but within half a minute they have fallen slightly away from one another. Over another flower hovers the butterfly; in it plunges, and as it does so the two pollinia-riders strike on the sticky surfaces of the two stigmas, for the exact angle at which they fell apart is the exact position that will cause them to do this. The stickiness is sufficient to drag some of the pollen grains out of them, tearing their elastic threads, and these fertilise the stigma. The rest of the pollinia ride off again. But the proboscis of the insect has now an additional

pair of riders—the pollinia from the flower it has just visited. Like a circus horse collecting riders, so the butterfly or moth, as the case may be, may collect pair after pair of pollinia on its proboscis. Thus one poor individual (a Caradrina) was found to be carrying no fewer than eleven pairs, one behind the other, some full of pollen grains, others nearly emptied by the successive stigmas it had visited during its journeyings.

No fewer than twenty-three kinds of moths and butterflies have been caught visiting this orchid. It is easy to know where they have been from the tell-tale and characteristic pollinia they carry. It is wholly dependent upon them, as we have seen, for the carriage of its pollen from flower to flower, and how well they co-operate was pointed out by Darwin, who counted forty-eight out of forty-nine flowers on a single spike that had been visited. "These facts," he said, "show how well moths and butterflies perform their office of marriage priests." And the result of their kind offices is the production of vast

quantities of most minute seeds. Happily they do not all become parents themselves; if they did the offspring of a single plant would, in four generations, completely cover the world! In the Orchid, as in many other plants, is exemplified something of Nature's reckless extravagance.

The scent of this plant seems to vary. It is usually called sweet-scented, but at night may have a foxy odour (supposed specially to attract moths, as its purple colour renders it almost invisible). At other times it seems almost scentless. It may be found in flower from June to August.

THE BETONY

BETONICA OFFICINALIS

"SELL your coat and buy Betony," ran the old proverb. "*Autres temps, autres mœurs,*" say the French, and they might well point the moral now with Betony. Once upon a time to

a, sepals. *b*, petals. *c*, stamens. *d*, stigma, style, ovary.

possess this herb was to possess one of the great goods of life or, if it were lacking, it were worth purchasing even with a man's last resources. To be without it was to court disaster, and well it might be since, on the showing of Antonius Musa, the valued physician of the great Roman emperor, Augustus Cæsar, it was a certain cure for no fewer than forty-seven

BETONY

diseases. From the bites of mad dogs to indigestion, from the stings of serpents to the toothache, from a splinter in the thumb to the plague, there was nothing it could not set right —even witchcraft vanished before it! The recital of its virtues makes even the most vaunted nostrum of a modern-day quack seem poor and ineffectual. Through the whole of a long volume its praises were set forth by the learned doctor, "and it was not the practice of Octavius Cæsar to keep fools about him," remarks Culpepper. This same old herbalist further endorses the eulogy in the words, "it is a very precious herb for certain, and most fitting to be kept in a man's house."

It was extraordinary how belief in its virtues was ingrained. Turner, a physician at the end of the seventeenth century, recounts nearly thirty complaints that Betony will cure, and adds, "I shall conclude with the words I have found in an old manuscript under the virtues of it. 'More than all this have been proved of Betony.'" Because of

this reputed excellence there once passed current the saying, "You have more virtues than Betony," when a particularly delicate compliment was intended, or, "May you have more virtues than Betony," when a warm benediction was given. Most ridiculous superstitions grew up about it; one of very ancient date was that serpents would fight and kill each other if placed within a ring composed of it; and others declared that even the wild beasts recognised its efficacy, and used it if wounded!

But let us leave tradition and turn direct to the actual plant itself. Now, it is one of the ironies of plant life that to-day not nineteen people out of twenty who pass along the country lanes or traverse the woodlands recognise the Betony when they see it, though it is common enough. Its personality is lost amid the host of rather uninteresting, purplish or reddish weeds—the hedge stachys, the red dead nettle, the galeopsis, the calamints and others—which play such a large, if somewhat obscure, part in roadside vegetation. Even among so dull a group

it does not stand out as particularly remarkable, nor has it any specially distinguishing features. It comes up year after year from a woody root the thickness of one's little finger. Its square stem, a foot or two high, is furrowed, each portion that lies between the pairs of leaves having two sides more deeply hollowed than the other two. These deeper grooves are the gutters of the plant leading down to its reservoir, namely, the soil immediately round the root, and they run from the points between the leaves of one pair to the midrib of each of the leaves in the pair immediately below it. The surfaces of the leaves collect moisture and tilt so as to send it down the next groove, and so on, and thus the greater part of the rain falling on a plant is gathered up into two streams which increase in volume as the base of the plant is reached. It is interesting to find that though the ungrooved part of the stem is not " wetted " by water, these gutters can be so wetted, and hence the passage of water is facilitated down them. The reason of this

difference is that on the ungrooved parts of the stem there is a clothing of somewhat fine, rigid hairs all pointing downwards and pressed on to the stem, and these, like a mackintosh, turn off the rain.

The leaves next the root are on long stalks, and are of a drawn-out heart shape. Up the stem towards the flowers are a few pairs of leaves stretching out like wings, two pairs between them pointing to all quarters of the compass, for they arise on alternate sides of the stem. Hence it follows that the gutters which always start between each pair are not continuous down the whole stem, but the streams of water are successively collected and turned from side to side. The lower pairs of these stem leaves are possessed of short stalks, but the upper pairs are set completely down upon the stem. All the leaves feel rough to the touch, and are fringed with the tiniest edging of hairs; their whole surface is marked with dots—storehouses of a bitter and aromatic oil.

Not so long ago some ingenious herbalist be-

thought him of Betony leaves for the making of snuff. He dried and powdered them and sold the powder as a cure for nervous headaches. The use of this snuff produced violent sneezing—probably the hairs which had covered the leaves were responsible for this. Anyway, Betony snuff had a considerable reputation for a while. Betony tea, too, is a cottage remedy; drunk early in the morning it is supposed to cure headache. The mere smell of it—like the sight of the dentist's door—is sufficient to chase away all pain in certain neurotic folk.

At the top of the stem are the purple-red, two-lipped flowers arranged in dense rings which together form short spikes. Then there is a break and a piece of bare stem with two or four leaves, and then more flowers. They are distinctly more showy and brighter than the spikes of the purple dead nettle.

Our picture clearly depicts the form of the flower. Its cup or calyx is crowned by five sharp points, each representing a sepal. The corolla is a long tube, which ends in the usual two lips—

the family trait—but which does not enlarge at the throat as that of some of its relatives does. Probably the length of the tube is not too great for an ordinary bee to drink the honey easily from the lip, so there is no need for enlargement to allow the insect to press farther in. The lower lip forms the usual three-lobed platform for its accommodation. It is a flower with two stages in its life. When it first opens its lips to the world its four stamens—they lie in two pairs snugly protected under the arching upper lip—are quite prepared to act, and directly a bee comes in their vicinity they give her a good dusting of pollen. But low down in the tube the receiving column of the immature seeds is playing a waiting game and keeping quite in the background; not until those pollen boxes above have got rid of their pollen does it wish to be in the running. The second stage comes directly this is done and visitors have carried the pollen dust away, for then it begins to grow and push well forward into the very mouth of the flower. Now it is its turn to

welcome visitors, and the flower's turn to receive benefit. The next bee visitor, if happily this is not the first flower on her calling list, will rub pollen dust on its knob; the infinitesimal magic tube from each grain of dust will quickly traverse the column and touch the ovules one by one. Once the passage is accomplished the column fades, the purple-red petals will fall off, but the calyx will remain faithful. And down in its centre there will develop four brown, smooth, three-cornered nutlets to give hostages to the future. The cycle of life is complete.

THE FIELD ROSE

ROSA ARVENSIS

IF the dog rose is the glory of the hedgeside in early summer days the Field Rose worthily carries on the tradition into still further summer-tide—late June and July are its months. It is a

a, sepals. *b*, petals. *c*, *a*, stamens on sepals. *d*, fruits maturing in receptacle cup.

pity that, to the casual passer-by, the hedgeside roses are so often all one. Yet the most moderate of those who have studied them will not admit fewer than five distinct kinds—the dog, field, sweetbrier, downy, and burnet or Scotch rose—while students with more analytical minds will

FIELD ROSE

treble or quadruple this number, for these plants often cross among themselves and vary considerably from type, so that exact definition is difficult.

There is, however, really no excuse for confusing the Dog Rose (*R. canina*) and the subject of our charming illustration, the Field Rose (*R. arvensis*); their characters are quite distinct, the first is of a robust and glowing type, the second of a more fragile and clinging nature. The Field Rose has pure white blossoms untouched by the blush that characterises the dog rose; its stems rarely or never show the strong, upstanding shoots armed with great, cruel teeth that the dog rose does; they are far slighter and more dependent upon the hedge-side for support, often trailing many feet upon or through it, and their teeth are but small and far fewer and much less aggressive. The prickles in both roses are hooked, and thus when a young shoot has pushed through the hedge and its prickles have developed it can never slide back again—the little hooks would offer resistance at every point.

The upper surface of the stems is often warmed by the sun into hues of dull purple.

The leaves are rather few and scattered upon the stems. They are each cut into five leaflets of a pretty green above but a paler, deader hue below, and the stem carrying the leaflets, really the equivalent of the midrib in, say, an oak or an apple leaf, is purplish, and fenced below by a pair of little wings. The edges of the leaves are daintily cut into a simple saw-like pattern.

The flowers are grouped together in twos and threes, and when we come to look closely into these lovely white blossoms—more cup-like than those of the dog rose—we are at once united in fellowship with certain rose-lovers of centuries past who studied the wild roses from behind convent walls, and who sometimes embodied their discoveries in quaint Latin verse, one couplet of which, referring to the sepals, has been handed down to us to-day:

Quinque sumus fratres, unus barbatus et alter
Imberbesque duo, sum semiberbis ego,

which, anglicised with generous freedom for the benefit of those whose Latin is rusty, is :

> Five brothers take their stand,
> Born to the same command ;
> Two darkly bearded frown,
> Two without beards are known,
> And one sustains with equal pride
> His sad appendage on one side.

Turn the flower over and catch the allusions ; the little diagram, too, at the head of the chapter makes it plain. The five brothers are the five sepals all in a ring " of equal standing " ; two have curious appendages—the " beards "—on both of their edges ; two have no such appendages, their edges being quite simple ; and one has an appendage on one side only. These peculiarities, though pointed out long ago by the monks, seem to have been left as unexplained facts. Lord Avebury to-day carries the matter a stage farther, pointing out that these are referable to the arrangement of the sepals in the flower bud, where in the general folding they overlap one another to some extent. Two have both edges

exposed, two have both edges covered, and one has one side covered and one side exposed, and the great scientist points out that it is the exposed edges that carry "beards"; the unexposed edges are without them. This does not, however, explain *why* the exposed edges should have them, or what purpose they serve. Another suggestion, thrown out by Mr. Owen and Prof. Boulger, is that this is a "curious illustration of progressively diminishing resemblance of floral leaves to foliage leaves," for in their eyes "two of the five sepals are pinnately lobed" (after the fashion of the leaves), "two are undivided, and one has lobes on one side only."

The five delicate petals are all alike; on their under-surfaces are many glands of a highly volatile essence, and from them is exhaled a faint but delicate fragrance of the myrrh type. (It may not be generally known that there are no fewer than seventeen different kinds of scents among the roses.) Their petals' snowy whiteness throws up in strong contrast the crown of the many dark-coloured stamens.

There is no honey, but the flowery pollen dust is sufficient to give a good feed to many an insect, and to the bees pollen "bee-bread" is just as necessary to life as honey is. In the centre of the stamens is a green column, and this column is one of the chief idiosyncrasies of this rose. In all other roses the seed-bearing parts of the flower are quite distinct one from the other. Each has one seed at its base, and a column with receptive tip rising from it; the lower part is sunk in a cup at the stalk end, and the columns rise above its margin and show as a group in the centre of the stamens. But here all the columns unite and rise up as a single pillar in the centre of the flower. The receptive top is ready at the same moment that the stamens begin to shed their pollen, and it would seem as if the plant encouraged self-fertilisation; in fact, it appears inevitable. But inasmuch as this column is the very point on which insects alight, it follows that they almost certainly put on it pollen from outside sources before their movements can

brush any of its own pollen on to it. Hence, cross-fertilisation is the rule and not the exception.

Then the fruits form. Gradually the stalk-end grows and imprisons the seeds. It tinges with yellows, oranges, and reds in succession, and ultimately is a crimson globe (not a drawn-out oval, as the hip of the Dog Rose is). Often the mummified remains of the column project from its tip and single it out in the autumn days as unmistakably the hip of the Field Rose. The scarlet coat is rather like the thick rind of an orange, and not much more pulpy. It covers closely a hard, white globe which is cut up like a jig-saw puzzle into many segments, and these, though they vary in size, are after the pattern of the "quarters" of an orange. A little care will peel off the scarlet coat and leave the hard globe intact. As November draws near the hips are in their gayest and most conspicuous days. The birds, attracted by their brilliant colour, come and attack them as they grow on the branches. They peck away at the vivid rind, but it is not that that they

seek ; they desire, curiously enough, the hard seeds which together build up the globe, and they sit swinging on an adjacent branch and carefully pick out the pieces of the jig-saw globe. The proof that they do not care so much for the rind—the only pulpy part of the fruit—lies in the fact that often one can find it left like a ragged cup upon the branches, emptied of all its contents. The birds have torn away the upper part, greedily swallowed all the seeds and contemptuously left, as of no account, the lower part of the rind. The seeds pass through their bodies—no doubt their slight hairiness facilitates the process—and they find earth again in the droppings of the bird. The Roses always carefully refrain from allowing their ripe fruits to fall to the earth, for their aim is to keep them specially for the birds and to protect them from field-mice and other small animals, who are most effectually kept at bay by the long prickly stems, which their tender feet cannot tread.

THE MEADOW-SWEET

SPIRÆA ULMARIA

"QUEEN of the Meadows" is the usual salutation given to this plant, and a most fitting one, for, graceful and beautiful, its tall, stately presence fragrant with rare sweetness, it can claim

a, sepals. *b*, petals. *c*, *a*, stamens on sepals. *d*, stigmas, styles, ovaries. *e*, ripe fruits. *e'*, single fruit.

all the attributes of queenship. Its spires of creamy flowers rise tier above tier high above all others in the water-side meadows, thickest and finest where they fringe the brook, and as they toss to and fro in every breeze they have been, not inaptly, compared to sea-foam tossing on the beach. A nearer view, and they suggest them-

MEADOW-SWEET

selves as waving white plumes, and justify the country name of "Bridewort." In a somewhat similar name, "Courtship and Matrimony," it is a little difficult to catch the special allusion. As "Maid of the Meadow" and "Maid of the Mead" it is often known, while "Mede-sweet," "Meads-weed," "Meadow-wort" and "Mead-wort" are yet other names it carries. In some of the southern counties cottage folk call it "Meadow-soot" by a curious inversion of sound and sense. An old writer describes it prettily as "Medwurt, the herb regina."

The Meadow-sweet is one of the spiræas, and far more beautiful than some of those that are better known to us through cultivation. There are only two other spiræas growing wild in Britain, the little dropwort and the willow spiræa, but the latter is almost certainly not a native plant. Long before the flowers appear in mid-summer, the Meadow-sweet adds charm to the meadows, for in quite early spring days the tall, reddish-tinted stems

carry a mass of graceful foliage. Each leaf is deeply divided into a number of pointed segments, the margins of all being slightly "nicked," and while the face of the leaf is a deep green the back is almost white, and covered with a soft down. Every breeze that sets the delicate leaves quivering reveals this silvery backing, and calls attention to the daintiness of the plant. It is from the fashioning of the leaves that its second botanical name—*ulmaria*—comes. Three hundred years ago it was explained to us that the leaves are "slightly snipt about the edges, white on the inner side, and on the upper side crumpled and wrinkled like unto those of the Elme Tree; whereof it took the name Ulmaria, of the similitude or likeness to Elm leaves" (*ulmus*, an elm). Down by the stem each leaf has a broad leafy appendage known as its stipule.

The flowers, carried on furrowed stalks three or four feet high, gain their general attractiveness from being massed together in light and feathery clusters, but though individually small they are particularly

dainty, the true inwardness of their beauty being better seen if a lens is used. The plant belongs to that family famed for beauty, the *Rosaceæ*, and hence the flowers are of the rose pattern. There are five sepals, each turned right back and set closely against the "receptacle"—that is, the end of the stalk bearing the flower; the five little cream petals are attached most delicately by mere points in a ring round the edge, as the diagram at the head of the chapter shows. The attachment is so slight that at the least provocation they scatter like snow. Just within, and in a ring also, stand up many fragile stamens, all golden-tipped and producing an apparent over-abundance of pollen for the necessities of the plant. But the lavish production has an end in view, the Meadow-sweet has an object for her pollen other than merely fertilising her seed. She provides no honey to back up in tangible form the fragrant invitation she scatters abroad, but she offers pollen instead, and this is equally acceptable to the bees, for they must provide and store up in their

hives "bee-bread" made of pollen to feed their nymphs and larvæ. Hence they visit the blossoms eagerly, and go away well satisfied with their harvest. In the very centre are five minute structures—the carpels—each consisting of an ovary, a style, and a stigma. As they ripen they provide us with a little surprise, as is usual in this family, where the fruits always tend to form in a curiously individual way instead of after a type, for they twist and lie so as to form a spiral. As the fruit is, at best, very small, this point is often overlooked even by those who are very familiar with the plant. Lord Avebury asks, "Can the object be to mimic small caterpillars, and thus inveigle birds to carry them about?" It is quite possible, for we know that such mimicry undoubtedly exists in other plants, such as in the castor-oil plant, where the seeds are like beetles and obviously intended to deceive birds. Inside the twisted cases are small brown, flattened seeds. The flowers, no doubt, are usually cross-fertilised, for the stamens are ripe and shed their

pollen before their own stigmas are prepared to receive it. They blossom during June, July and August.

Though the flowers gain the chief credit for the plant's fragrance—"The almond-scented Meadow-sweet whose plumes of powerful odour incense all the air"—yet the same aromatic principle runs through the whole plant. The leaves used to be put into claret to give a fine relish to it, and they have a pleasant flavour like orange-flower water. In olden days the Meadow-sweet stood very high in estimation for a strewing herb. "The leaves and flowres excell all other strowing herbes for to deck up houses, to straw in chambers, halls and banqueting houses in the summer time," says Gerard, "for the smell thereof makes the heart merrie, delighting the senses; and neither does it cause headache, or lothsomenesse to meat, as some other sweet smelling herbes do." On the other hand, a more modern flower-writer, though agreeing as to its harmlessness and delightfulness in the open air,

asserts that it is very injurious in a close room, and that it has been the cause of severe illness to some who kept it in their bedrooms.

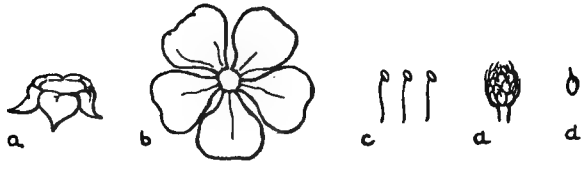
A recipe more than a hundred years old tells us that if the flowers are infused in any kind of liquor they give a pleasant taste, while if added to mead the flavour of the Greek wines is attained. The truth is that the same flavouring which characterises the almond is the base of that of the "Queen of the Meadow." If a few of the unopened buds are placed in the mouth, the flavour of, say, an almond or plum kernel can immediately be detected. Even in the roots it is present, and Linnæus pointed out that if these are dried and ground and mixed with meal they form no bad substitute for flour.

The Icelanders have a curious superstition with regard to this plant. They say that if gathered on St. John's Day it can be used to discover a thief. It will float in water if that thief be a woman, and sink if it be a man.

THE BRAMBLE

RUBUS FRUTICOSUS

THE latest theory about the Brambles is that there are no fewer than one hundred and three different kinds growing in our little British Isles, which speaks volumes for their



a, sepals. *b*, petals. *c*, stamens. *d*, ovaries, styles, stigmas. *d'*, single fruit.

variability! Some botanists, however, are not so exacting, and content themselves with discovering forty-five species, others sixteen, and others, again, are satisfied to class them under five species, though they admit that individual Brambles show many peculiarities, for Brambles, unlike daisies,

do not consent to be cut out in one universal pattern.

The Blackberry Bramble is found everywhere in our hedges—"as plentiful as blackberries" is a byword—but it is not quite so much nature-sown there as we are apt to think, for our forefathers used definitely to plant the Bramble in the hedges to fill up weak places. Thus an agricultural writer in Queen Elizabeth's reign urges farmers in preparing a hedge "to sow in the seed of the bramble and haw," and he further advises:

To plot not full
Ad Bramble and Hull,
For set no bar
Whilst month hath an R,

which, being interpreted, declares that Bramble and holly may well be set in all the months of the year except May, June, July and August.

The Bramble is specially fitted for a hedge plant. Its stems weave with great rapidity in and out of the branches of other growths; they are thickly studded with hooked prickles which point backwards

BRAMBLE

and so are no hindrance to the plant pushing through the hedge, but which are of the utmost assistance in preventing it slipping back. Anyone who has tried to draw a Bramble shoot out of the hedge knows the difficulty of the task. Sometimes the long whip-like shoots arch over and touch the ground again, whereupon they send out roots and start new plants at that point. The older part dies, the apex left grows upwards and new branches arise. A strange cure once advocated for rheumatism was to find one of these arches and then crawl under it. One's pains were supposed to be left behind! These shoots were formerly used to bind down the sod on newly made graves, so Jeremy Taylor reminds us, "The summer gives green turf and Brambles to bind upon our graves." For bee-hives and hay-ricks they were equally serviceable.

The leaves of the Bramble are remarkable for the gorgeousness of the colouring that they carry in autumn days, their glowing reds being some of the most beautiful we see. Hence is the plant's Latin

name *rubus*. They are further noteworthy for the little prickles that run up the midrib on the back of the leaf and which do their humble share in fixing the plant securely on the hedge-side. The face of the leaf is smooth, the back is covered with a coating of hairs. Kerner points out in a simple experiment how these hairs affect the welfare of the plant. "If one (i.e. a leaf) be wrapt round the bulb of a thermometer—hairy side outwards, and another be wrapt round the bulb of a second thermometer smooth side outwards, and both thermometers placed in the sun, the temperature of the leaf with the smooth side outwards will be several degrees (2°—5°) above the temperature of the one with the hairy side outwards. Also if such leaves be plucked and exposed to the sun, some with the white felted side, others with the smooth green side, uppermost, the latter always shrivel and dry up much sooner than the former. There can be no doubt after this, that a dry coat of hair over succulent plant tissue which is exposed to the sun's rays, considerably restricts

the heating of and exhalation from this tissue." But probably in the Bramble the hairiness is rather to protect from mists which rise from below. In the late autumn a pale twining mark like the trail of a serpent is sometimes seen. This was formerly regarded with superstition as the special mark of the Devil, and such shrubs were severely left alone, however luscious their fruit. Nowadays we know that it is merely the track of a small moth.

The flowers may be found in bloom from June to October, and they have the usual character of the rose family, to which this plant belongs. There are the five sepals, in a cup-like ring at first, but sharply turning down their long, fine points as the flower approaches maturity; five delicate petals, sometimes white, sometimes tinged with pink; very many stamens crowded in a thick ring, and in the centre and *raised above* sepals, petals and stamens are the many carpels. (In the crab-apple with a similar flower, the carpels are sunk in a depression at the end of the leaf stalk, and this is the more

usual thing.) A bountiful measure of honey is stored in a fleshy ring just below the stamens, and is quite accessible to insects with short as well as long probosces. Therefore, the Bramble has a perfect host of visitors of all sorts—as many as a hundred different ones having been counted. The outer ring of stamens shed their pollen first and turn their faces up; the stigmas are ripe at the same time, but with so many visitors foraging among the stamens for honey and pollen the flower usually gets cross-fertilised before the inner stamens pour out their pollen in close proximity to the receptive columns of the carpels. This cross-fertilisation is expedited by the fact that a bee in settling on a Bramble flower necessarily chooses the central, stronger part—the carpels—as his alighting place.

And so we come to the fruit—and, after all, in the Blackberry Bramble "the fruit's the thing." Again we notice how variously the members of the rose family, all with flowers of a similar type, go to work when it comes to fashioning fruit, for the

blackberry differs essentially from crab-apple, rose and strawberry. In this case each little separate ovary in a flower becomes fleshy, juicy and sweet, and can be distinguished apart, though all—twenty or more—cohere to form the blackberry, which is, therefore, known botanically as an "aggregate fruit." In each sweet granule of the mass is a single seed. If we compare a strawberry with a blackberry, the hard yellow specks on the strawberry are the equivalent of the black juicy knobules of the blackberry, while the red flesh of the strawberry is equivalent to the dry stalk end of the blackberry. (In the raspberry, which is very similar to the blackberry, this dry stalk end, in the shape of a cone, can be pulled out of the fruit clear and entire.) Naturally so sweet and luscious a fruit makes a special appeal to the birds, and it is eagerly seized and eaten by them; apparently the dry little seeds pass unharmed through their bodies. As the autumn comes on, a species of decay sets in, which is doubtless the cause of the old legend that on the day of St. Simon and St. Jude

—October 28—the Devil sets his foot on the Brambles, and not a single decent fruit can thereafter be found. A variation of this legend is that the Devil throws his cloak over them in late autumn and hence they must be avoided; and children, particularly in Ireland, were strictly forbidden in late October days to touch the fruit.

In some parts of the country the fruit is known as "bumblekites," in others "scaldberries," from the idea that too great a feasting on it gave the children the "scald-head."

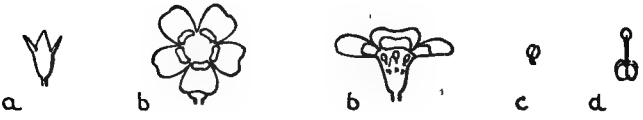
Naturally this plant has played its part in the remedies of the old herbalists. From very ancient days both the flowers and fruit were considered a safe cure for the bite of a serpent; the roots were boiled in wine by Roman physicians and given as an astringent; the fruit was, and still is, valued in decoctions for soreness in the mouth and throat. At one time a black dye was obtained from the stems, and it is said that silkworms will thrive upon the leaves, and spin cocoons of excellent silk thereon.

THE FORGET-ME-NOT

MYOSOTIS PALUSTRIS

THE Forget-me-not is the flower of modern sentiment. Its tender name, the halo of romance that encircles it, the association of which Tennyson wrote :

" The sweet Forget-me-nots
That grow for happy lovers,"



a, sepals. *b*, petals. *b'*, stamens on corolla tube. *c*, stamen. *d*, stigma, style, ovaries.

have all been created in this country in comparatively recent times. Certainly our ancestors of several generations ago did not know it by its present pretty, affectionate name. It was merely the " Water Scorpion Grass " to them, or the " Mouse-Ear " (from

the shape of its leaves), and its botanical name, *Myosotis*, is just the Latin rendering of this name—mouse-ear. The original English Forget-me-not, as some say, was the little blue veronica, the speedwell, whose petals are so fugitive and whose beauty is so transient, or, as others assert, the ground pine or yellow bugle, for the very unromantic reason that medicine made from it was so terribly nasty that the taste was quite unforgettable. However, on the Continent the plant seems long to have had an equivalent name to the one it now bears here, and so, early last century, we happily fell into line, and it is now the only recognised "Forget-me-not."

There are five different varieties of myosotes or scorpion grasses—the water, wood, field, early and changing myosotes—growing wild in this country, and most of them are in turn hailed as *the* Forget-me-not, for the distinction between them is not very marked, but the one in our picture, the Water or Marsh Forget-me-not, is generally considered the typical one.

FORGET-ME-NOT

The Forget-Me-Not

The rootstock creeps below the ground, throwing up stems, six inches to a foot and a half in height, in all directions; thus we often get considerable masses of the plant growing in soft, moist soil by the edges of streams. The leaves—long, narrow, and quite simple in outline—have yet two points of interest about them, one with regard to their hairiness, the other with regard to their veining. Now, as a rule, the leaves of Forget-me-nots in general are rather rough to the touch, for they are covered with very minute hairs, which all point towards the apex. This pointing is so definite that if a leaf be passed from stalk to tip across one's lips or cheek the surface feels almost smooth, but if an attempt be made to draw it in the opposite direction it is almost impossible to do so, so strong, so disagreeable and sharp is the opposition the hairs offer. This peculiarity is, of course, a most excellent defence against small, creeping insects. Any such intruder is quite at liberty to crawl *away* from the main stem and off towards the leaf tips, but if he

attempt to reverse this direction and storm the central path that leads to the flowers, he is at once checked by the impossible roughness of the road. In the Water or Marsh Forget-me-not the leaves are often quite smooth and shining. If the plants are growing well in the water it is obvious that creeping insects cannot in any case invade them, so no armour is necessary, but the plant varies much in this matter.

As to venation. A casual glance at a leaf shows only a very distinct midrib (sunk on the surface, but a ridge on the back) and no other veins, so thick is the leaf texture, but if a leaf be held up to the light two long veins can be seen running up quite close to the margins on either side and parallel to the midrib. This is a very unusual arrangement and, of course, immensely strengthens the framework of the leaf.

The clear, blue flowers are worth more than a passing allusion to their beauty, for their structure is distinctly interesting. The long "cymes" in

which they are arranged curl round like a scorpion's tail towards the top, and the buds are tucked right under. Hence the plant's name of Scorpion Grass. A minor point to be noticed is that the calyx is deeply divided into five segments in all the species except the Marsh Forget-me-not, and there it is only slightly cleft. The exquisite petals, five in number, spread out and form a scalloped salver at top; below they are united into a tube. Just at the mouth of the tube each petal has a bright yellow ridge stretching almost across it and slightly arching over the centre, and the five pieces together form a wall round the mouth. In the centre of each petal a white ray streaks back into the blue. Therefore the yellow-and-white centre of each flower is very attractive, and it has a certain historical interest for us, for it is said that while looking at this flower and considering what the purpose could be of the white lines and the yellow wall, the German scientist Sprengel was led to formulate his theory of honey guides, a theory which has given meaning

to so many markings and so much colouring that had hitherto been considered as entirely purposeless. His book, pointing out that the marking and colouring of flowers were intended as lures and guides to insects seeking for honey, was published in 1791.

Just below the ridge the stamens are fixed inside the corolla tube; they are very small, and having scarcely any filaments to support the anthers, they are said to be "sessile"—that is, sitting upon the tube. Below them, again, hairs form a lining. In the centre of the flower is a very tiny ovary divided into four parts, down between which the column from the ovary springs and reaches up as high as the stamens. Honey is not hidden in the yellow ridge as is often believed, but is found at the bottom of the tube round the base of the ovary, and is sheltered by the overarching wall above.

Now, an insect arrives and hovers over the flower. The bright centre marks the spot where it must probe the flower; its tongue, kept closely in

the centre by the narrowing yellow wall, pushes between anther and stigma. It gets dusted with pollen on one side, at any rate, and as its owner flits from flower to flower it will eventually put some of the pollen on to another stigma. The fruit is in the form of four little nutlets, bright and shining; the calyx, shrivelled and dry, remains attached to them; in the Marsh Forget-me-not it is almost smooth, as the seeds are dispersed by means of the water around, but in the other species it is covered with hooked hairs. These catch on to animals and birds, and the nutlets falling out of their cover one by one as they are carried about, are thus dispersed over a wide area.

There are several legends associated with the Forget-me-not. One runs that a knight was drowned in getting some for his lady-love and was only able to throw them at her feet, saying "Forget-me-not" as he sank. Again, there is a tradition that Henry of Lancaster, afterwards Henry IV., chose this flower as his "token," combining it with his watch-

word "*Souveigne vous de moi,*" and having the initial S and the flower embroidered on his collar. His adherents wore the flower as a secret badge during his exile, and thus the motto gave it its name. It is recorded that at a famous joust in 1465 the victor, Lord Scales, was given a gold collar enamelled with blue Forget-me-nots. The children tell a pretty little legend that when the flowers were being given their names by the Creator this little flower forgot hers, and went back timidly to ask for it, and was then told to be "Forget-me-not."

The Persians have a beautiful story that an angel loved a maiden of earth whom he had beheld twining blue Forget-me-nots in her golden hair by the river-side, but because of his love he was put out of heaven. He wept bitterly outside the gate, and was told he could only re-enter when she whom he loved had planted the Forget-me-not in every corner of the earth. He went back to her, and together they set forth on their task. At length it was com-

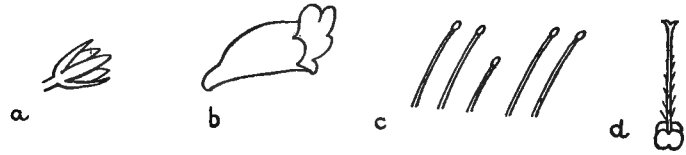
pleted, and they returned, and she was allowed to enter with him, her love and obedience having gained her immortality. Finally we recognise, as the emblem of Love both human and divine:

"That blue and bright-eyed floweret of the brook,
Hope's gentle gem, the sweet Forget-me-not."

THE VIPER'S BUGLOSS

ECHIUM VULGARE

"A MOST gallant herb of the Sun." From sun-baked patches of bare earth blue masses of Viper's Bugloss were throwing back colour for colour to the bright August sky. A few weeks



a, sepals. *b*, petals. *c*, stamens. *d*, stigma, style, ovary.

ago the field had been a vast extent of waving greens and pinks, from which wafted rushes of scent with every breeze that stirred it; now the crop was cut and only stray plants, which had here and there escaped the mowers, spoke of the clover which had so lately reigned supreme. But the Viper's Bugloss

VIPER'S BUGLOSS

had entered into possession of the bareness and given a new beauty, and as the sun blazed down upon it the old herbalist's happy epithet flashed into memory down two and a half centuries. It is indeed "a most gallant herb of the Sun"—in its upright, stately bearing; in its gay colouring of blues and pinks and purples, and above all in the armour with which it equips itself.

At the very outset this armour makes itself realised (does it not belong to the family of the *Borragineæ*, whose very name implies the armoured?), for the whole plant—the strong, sturdy stem, the great spreading tuft of root-leaves lying flat upon the ground, the finer, slighter leaves that rise in a spiral up the stem, even the very flowers themselves—is clothed with a coating of hairs so sharp and stiffened as to be almost prickly and certainly disagreeable to handle. On the stems they can be seen as white bristles each rising from a single dark gland; under a lens these glands show very distinctly as glistening knobs. On the leaves the

hairs are finer and softer, and not so glandular, but among the flowers they are sharp enough again to prick smartly one's lips if placed to them.

The flowering spikes are not only brilliant, they have a striking individuality, and a distinction largely due to a curious curl that they form as the days go by. In their early days, such as are depicted in our plate, they are almost straight, and rose-red buds appear at the tip. As they open these lose their rosiness and streak with purple; then, as the flower is fully revealed, the petals stand as a bright blue tube, large and yawning.

Yet another peculiarity marks the flowers of the Viper's Bugloss. They all arise on the upper side of the bowing stem, and there they stand crowded together side by side, a small green-pointed leaf standing erect by each as if on guard. Thus this "scorpiod cyme," as the botanists call this form of curving flower-spike, from its resemblance to the curly tail of the scorpion, has deep pink buds just showing at the tip; purplish, pink-streaked opening

flowers above them; then one, or possibly two, blue, fully opened flowers; behind these, fading flowers; and back of all, down near the stem, are a number of rough green calices persisting long after the delicate petals have vanished, and protecting the four little nutlets they enclose. Owing to the curling of the stem each flower as it comes to the zenith of its day is pushed forward, and presented most prominently to the notice of any visiting insects that may be around.

Now, let us look for a moment at one of the flowers on its "day." Five rough sepals with stout ribs build up the calyx and give support to the petals; the petals, five altogether, are joined to form an irregular tube, with two lobes projecting above, one lobe on either side, and one rather receding below. Right beyond the edge four stamens thrust themselves; they have crimson filaments and the tiniest of dark heads; one stamen, much shorter than the rest, hides within the tube; they are all fastened alike to the corolla tube just where it

narrows, and they lie upon the lower side. Their anthers are open on their upper surface, and the pollen dust lies exposed upon them. The four stamens form a capital landing stage for bees—a necessary provision since the lower part of the tube recedes. The little fifth stamen is a cunning dodge of the flower to catch and dust smaller insects, which are apt to fly straight into the petal cavern without first alighting.

Soon, however, another column pushes out and grows beyond them. This is the column from the ovary at the remote end of the tube, and it is thickly clothed with tiny hairs, and has its free end divided into two minute branches. All insects approaching the flower, whether flying straight in or alighting, are bound to touch and dust it if they are carrying pollen. Since the stamens are first in the field they manage to get their pollen carried off before their own flower's ovary column appears, and since this ultimately projects beyond them, it, in its turn, gets dusted with other pollen before the visiting

insect alights among its own flower's stamens. Hence there is always cross-fertilisation.

As for insect visitors, the Viper's Bugloss attracts a whole crowd of them; one observer patiently counted no fewer than a hundred different sorts. Bees are particular favourites, while the Humming Bird Hawk Moth in favoured situations often pauses above it and drinks its fill. Some observers say that bees and butterflies are apt to get their delicate wings torn by the rough hairs on this plant. It is also said that there are two different kinds of bees whose entire food consists of its pollen.

The fruit eventually forms as four dry, blackish nutlets, and some have seen in their shape the suggestion of a snake's head and hence, they assert, the plant gets its name of Viper's Bugloss, also its botanical name of *Echium*, from the Greek (*echis*, a viper). But Culpepper, who claimed to found all his assertions upon "Dr. Experience," tells us that it is "an especial remedy against the biting of the viper, and all other venomous beasts or serpents, as

also against poison, or poisonous herbs." The ancient Greek physician Dioscorides went farther than this; he asserted that if a person took a dose *before* the viper bit him he would suffer no ill effects from the bite. Others, therefore, rest the name upon this remedial value. Others, again, profess to find the reason in the rough, speckled stem, whose surface is like a serpent's skin.

The curious name of Bugloss is probably derived from two Greek words, *bous*, meaning an ox, and *glossa*, a tongue, and has reference to the rough, pointed leaves which are reminiscent of an ox's tongue.

The Viper's Bugloss is sometimes claimed as our handsomest native plant—a large claim—but undoubtedly, as Thomas Green wrote one hundred years ago, "It is a showy plant; and such is the absurdity of fashion that *if it were not common*, it would assuredly obtain admittance into our gardens." It is usually about a foot or two high, but may even rise to a height of three feet where conditions are

propitious. It loves dry fields and waste places, but is abundant only in the south of England.

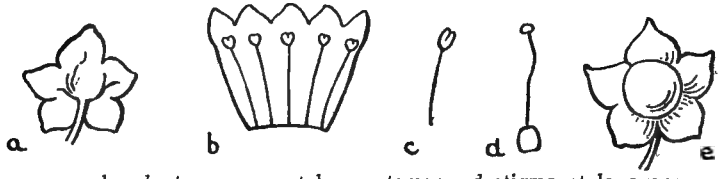
A few years after Culpepper was writing so warmly of it, the Viper's Bugloss shared in the fashion of the day and went colonising to the United States. It was in 1683 that it first appeared an uninvited guest of the new land. No one knew how it had travelled there, but the few stowaways quickly became a mighty over-riding host that had to be reckoned and fought with. A century and a half afterwards, Dr. Asa Gray, the naturalist, reported that it had taken complete possession, even of cultivated fields, of over a hundred miles in a certain valley in Virginia. No wonder that the farmers of the New World grumble and say that their most pernicious and persistent weeds are all foreigners.

Other names for this plant are Common Echium, Cat's Tails, Viper's Herb, and Viper's Grass. In America it is also known as Blueweed, Snakeflower, and Blue Thistle.

THE DEADLY NIGHTSHADE

ATROPA BELLADONNA

ATROPOS was one of the three Fates. She it was who cut the thread of life spun by her sister. And this plant is her namesake, for it is, perhaps, the most poisonous plant that grows



a, sepals. *b*, stamens on petals. *c*, stamen. *d*, stigma, style, ovary. *e*, fruit surrounded by sepals.

wild in our country, and is well named the "Death Herb." Gerard's stern caution rings through three hundred years, "But if you will follow my counsell deale not with the same in any case, and banish it from your gardens and the use of it also, being a plant so furious and deadly, for it bringeth such as

DEADLY NIGHTSHADE

have eaten thereof into a dead sleepe where many have died, as hath been often seen and proved by experience both in England and elsewhere." Long before his day, when Duncan I. was King of Scotland and Macbeth his general, the wily Scots poisoned a whole army of invading Danes, by placing its berries in the wine they supplied during a truce, and since that day the tale of tragedies due to it has been continued. Children are particularly apt to be attracted by the shining lusciousness of the berries. Happily the plant is rare even in the waste and stony places it favours. It is a true native, but is also often supposed to be a relic of olden days, when it found a place in every herb garden, and colour is lent to this supposition by its frequent presence near ruins and quarries. In the darker days of the Middle Ages, together with the hemlock and the henbane, it played a great part in the machinations of witches.

Most of its common names refer to its evil properties; Daft Berries, Devil's Berry, Mad Nightshade,

Deadly or Sleeping Nightshade and Banewort (a plant to be banned) all illustrate this point. Dwale, the name by which Chaucer knew it, and by which it is still known in some parts of England, is said to be derived either from a French word, *deuil*, signifying mourning, or from a Danish word, *dwaelen*, meaning delirium. The curious name "Manicon," sometimes met with, is probably a country rendering of the old name "Maniacum," owing to the madness it causes. Shakespeare no doubt had this plant in mind when he spoke of "the insane root that takes the reason prisoner."

From a botanical point of view the plant is interesting. It has a thick root which, year by year, sends up branching shoots two, three, or even four feet high. On these shoots are leaves of two very different sizes, and on the horizontal branches the manner of their arrangement is striking. Looking down on such a shoot we see large leaves arranged on short stalks in a row on either side of the stem; in the spaces that are left between their stalks small

leaves are inserted one in each gap, so that there are two rows of small leaves lying close by the stem. All four rows of leaves have their faces turned upwards, so that all are equally well lighted, and the whole arrangement forms a charming mosaic.

In the angles which the leaf stalks make with the stem the flowers arise, those in the axils of the little leaves being the older, so that we may get fruit maturing in their case, while their neighbours on either side growing by the big leaves are still in their flowering prime. The flowers hang singly and droopingly on short stems; they are bell-shaped and of a curiously dull, lurid purple, deeper in hue within than without, and streaked with yellow towards the bottom inside the bell. Lord Avebury suggests that from their size and shape they are chiefly adapted for "middle-sized humble bees." The calyx is dull green in colour and divided into five parts; on the corolla the five stamens stand on long filaments, but the ovary within the bell carries a yet much longer column. Round the

ovary honey is hidden and carefully protected by stiff hairs growing on the stamens. Now when the bud first opens we have a drooping bell with the ovary column stretching a good way out beyond it, its end being particularly sticky. When the " middle-sized humble bees " come to the flower they are bound at once to strike it with their probably pollen-dusty bodies, and so leave pollen sticking upon it. It is particularly sensitive to pollen influence, and within an hour of receiving it, it will turn brown, wither, and eventually drop off, its function fulfilled. The bee dives into the bell after the honey, but in the earliest hours of the flower's life the pollen boxes are closed and pressed against the petal wall. But in a neighbouring flower matters may have progressed farther; the stamen heads have come out towards the centre and opened, and the filaments have lengthened so that they are well at the mouth of the bell. Here the bee collects—inadvertently, it is true—pollen, as well as honey, to impinge later upon the sticky stigma of a younger flower.

Perhaps it is to meet the necessities of the case that neighbouring flowers are so different in age.

Then the fruit forms, the calyx surrounding it like a halo, though the other parts of the flower have vanished. It has a curious habit of retiring behind the leaves at this stage, and remaining out of sight there while it matures. It grows juicy, dark, and cherry-like, and it is now that it is so alluring to children. One of the children's names for the plant is "Naughty Man's Cherry," which suggests a warning mother. Another name due to this aspect is "Great Morel." If the berry be cut through, a number of small seeds will be seen carefully arranged in the pulp round two oval cushions. Poisoning by eating these berries causes thirst, delirium, loss of consciousness, and finally death, unless remedies are applied. The best treatment in such a case is to give an emetic, a dose of magnesia, and then some hot coffee, and keep the patient warm.

The poison principle runs throughout the plant. Grazing animals leave it severely alone, but small

animals, such as rabbits, seem to eat it with impunity. If, however, these rabbits are in their turn eaten by man, he may be poisoned. But to reverse the proverb, what is one man's poison may be another man's meat, and so we find that a certain small beetle (*Haltica atropæ*) lives almost entirely upon its leaves. In an old MS. we find some advice to bird catchers: "For to take all manner of byrdys," they are recommended to soak corn in dwale solution and lay it by the birds' "haunteyne" (haunts). They will eat and sleep, and "ye may take them with your handys." It is a plan with more to recommend it than the traditional application of salt to their tails.

The plant is used extensively in these days to supply the doctors and chemists with belladonna for plasters, ointments and tinctures, and is cultivated in fields for these purposes in Suffolk and near Hitchin. When the plant is in flower it is gathered and sent to the laboratory for its juices to be extracted. Later on the root is also dug up, dried,

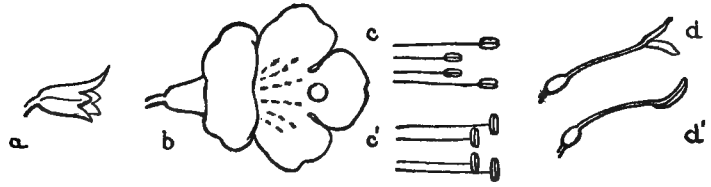
and employed for making other medical drugs. The extract has a remarkable effect upon the pupils of the eyes, and in the form of atropin is largely used by oculists to dilate the pupils. If one touches the leaves and then rubs one's eyes, the sight will even be effected by the slight amount on one's fingers. Its second botanical name *Belladonna*—beautiful lady—refers to the Italian ladies' practice of using it as a cosmetic to increase the apparent size of their eyes, and hence to enhance their beauty.

The plant stands in a genus all to itself, and its family, the *Solanaceæ*, is but poorly represented so far as our native plants are concerned. But since the potato, the tomato and the tobacco are among its members, it cannot be said to be an unimportant family in a world-wide sense.

THE MONKEY FLOWER

MIMULUS LUTENS

THERE is something distinctly un-English in this showy, quaint plant as it grows in the height of summer among the familiar little forget-me-nots down by the water's edge, even though it



a, sepals. *b*, petals. *c*, *c'*, stamens. *d*, stigma (open), style, ovary. *d'*, stigma (closed), style, ovary.

seems very much at home there. It is as though one caught sight of a foreign face among a crowd of one's countrymen. And the impression is correct, for it is a native of North America which first came to this country about 1826, and which has been

MONKEY FLOWER

busy since then naturalising itself here with conspicuous success. Unmentioned among British wild flowers in the books of the first half of last century, it finds a place in Bentham and Hooker's "British Flora" of 1887, as "long cultivated in our flower-garden, and now naturalised in boggy places in many parts of Britain," while Lord Avebury, in 1905, writes of it as "now thoroughly naturalised in Britain." So it has pursued a victorious path, and is one of the few weeds we have received from America in exchange for the many that we have sent over there.

The stems are quadrangular, succulent, and rise about a foot above the damp earth. The leaves are ovate in shape and inclined to be "frilly" with margins cut out into little sharp teeth, and having usually seven well-marked veins running from base to apex. They arise stalkless in pairs upon the stem, and the flowers spring on long stalks from their "axils" (i.e. the upper angle that the leaf makes with the main stem).

The flower is of special interest. It belongs to the strongly marked family of the *Scrophulariaceæ*, and has for relatives the snapdragon, foxglove and mullein. The sepals are united into a cup whose margin is cut into five teeth—the top sepal is longer than the other four—and the delicate, semi-transparent tissue of the cup is supported by five stout ribs. The handsome corolla, often an inch and a half across, is a vivid yellow marked by red spots, and its curious, irregular, two-lipped shape has given the plant the nickname of "Monkey Flower," which strikes one as apt, though it is difficult to say offhand where the resemblance lies, even though some folks profess to see a grin in it.

Examine the flower from the point of view of a hovering insect—a lens will materially assist, even though the blossom is so large. The lower lip is fashioned of three lobes, and invites as a convenient alighting place; the upper lip is two-lobed, and forms a porch to a most alluring cavern glowing with golden colour. The floor is humped from entrance

to back into two long mounds, and covered with a forest of short, yellow, upstanding hairs. Crimson spots are dotted all over it, and are also repeated on the side walls. Often there is a large and special red spot placed on the entrance platform definitely to mark its centre. At the very back of the cavern is a glow of green.

Peering up in the roof we can see five structures, one like a big open mouth in front and four behind. The four are stamen heads, which are in pairs, end to end, one pair behind the other. Their long stalks are attached to the roof, and run in four parallel lines to the back of the cavern. Now it is the remarkable mouth-like structure that is the great point of interest in this plant, and it is a point about which few of those who admire and gather these flowers know, for this is a mouth with sensitive lips that can open and close just as a real mouth can do. Really it is the stigma, the organ in the flower that is intended to receive the pollen which will fertilise the seeds in the seed-case, and in most of our English

flowers it is either a tiny fork, as in the mint, or just a little knob, as in the cowslip. If we slip the corolla off an adjacent monkey-flower—it is easily detached, and carries the stamens with it—this organ is left quite naked and we can study it at our leisure. It is carried on the top of a long curved column, and when fully open is a round plate with a hinge across it. It is covered with fine hairs, and the edge is daintily fringed. If it be gently touched with a pin we can watch it promptly close like a book. After a few minutes it will open again, but will repeat the closing process on being once more touched. Both these positions are suggested in the protruding stigmas shown in our picture—the upper one open, the lower one closed.

If we now return to the adjacent whole flower, the working of the plant's schemes is obvious. First we discover that the rough flooring of hairs strikes dismay into any small creeping insect that adventures towards the cave. It can never make its way through it any more than we can push far

through a jungle. But it has no terrors for a big bee, and, in fact, is probably only regarded as giving a good foothold. So the bee alights on the appointed spot so carefully indicated on the platform and seeks the entrance. Its head touches the waiting stigma, now widely open. Probably there is pollen dust on the bee, and a grain or two is deposited on the downy surface. The stigma closes over and secures it. Fertilisation necessarily follows, and the stigma mouth never opens again, or, even if it begin to open after pollen has been placed on it, it will close immediately the influence of the pollen is felt—i.e. directly the pollen grain tube has begun its passage downwards. If, on the other hand, it was the first visit the bee paid that day and no pollen was brought to it, though it closes, it will re-open quickly on the chance of being more successful when the next visitor arrives. That is the rôle Lord Avebury assigns to it. Another botanist, Delpino, suggests that this large-lobed stigma, though splendid for receiving pollen, might

possibly be in the way as the bee foraged for the honey, and prevent it touching the stamens behind, so it closes to leave a free passage. Doubtless for both reasons this most interesting sensitive stigma acts as it does. Other members of this family, though none of them natives of this country, have somewhat similar sensitive and moving stigmas.

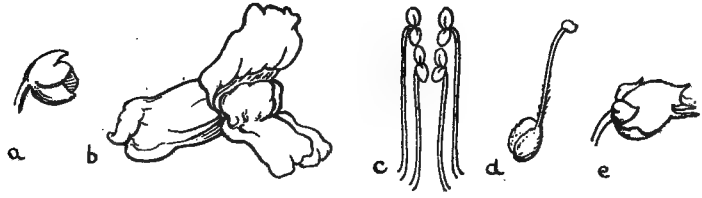
One other point of interest lies in this flower. Each anther, as Kerner points out, may be compared to two little tubs standing side by side, each having a lid. When they are ripe they twist round through a right angle so that they lie lengthwise instead of across the roof of the petal cavern. Then the lids open, those nearest the outside opening first, and the pollen dust is shot out of them on to the bee visitor's head.

The fruits, when ripe, are extremely minute and well adapted to be carried by the stream. It is no doubt because the plant thus utilises our waterways that it has been able to spread through the length and breadth of our southern counties in the way it has done.

THE SNAPDRAGON

ANTIRRHINUM MAJUS

A CHAMBER whose door is most jealously kept closed, a treasure-house to the one who has the key to unlock it, a prison to intruders where the gate shuts irrevocably with a snap upon

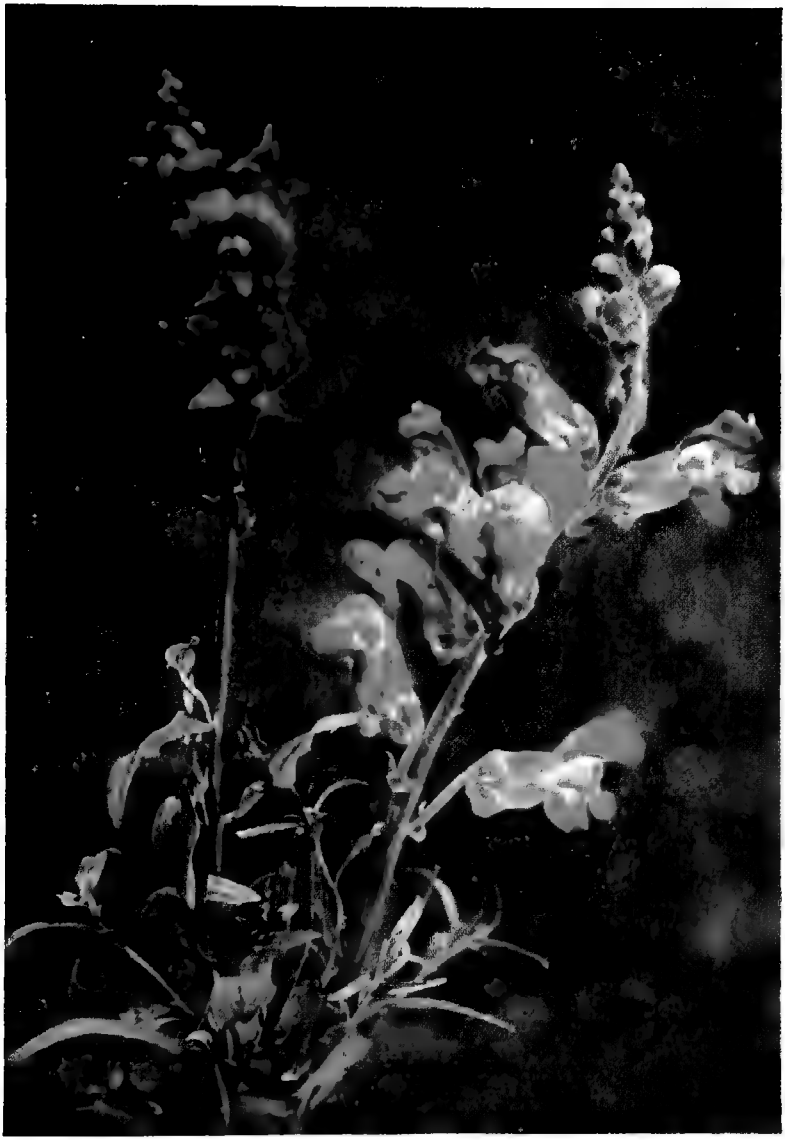


a, sepals. *b*, petals. *c*, stamens. *d*, stigma, style, ovary. *e*, fruit.

its captives, the flower of the Snapdragon is bound to arrest our attention. The plant is said to be not actually a native, and, indeed, we usually find it on walls and cliffs and in chalk pits and such like places, where it is likely to be an escape from some

past civilisation. Still, it is self-sown so plentifully nowadays that we are bound to class it among our wild flowers, even though it originally came to us from the coasts of the Mediterranean.

Apart from its flowers it is in no wise remarkable; a herb a foot or two high, carrying simple, narrow leaves upon a stem inclined to be shrubby at the base, it is the flowers and the flowers alone that have created an atmosphere of interest about it. Vivid in colouring, as our photograph well shows, grotesque almost to uncouthness, they have caused it to be associated with the supernatural and the uncanny, and it was one of the plants the witches employed. But, curiously enough, the association has always been in an antagonistic sense; it broke up the evil spells of others, it turned curses harmlessly aside; though the witches used it, it was rather as a defence against the wiles of other sorcerers than aggressively; in fact, it was often hung up in doorways and entries to ward off witchcraft. If a man carried it about him he became gracious in the



SNAPDRAGON

sight of his fellows. With all this attributed power of beneficence it is, therefore, rather surprising to be told by Parkinson that it " is seldome or never used in Physicke by any in our dayes," and, indeed, in the old herbals it is conspicuous by its absence.

The flowers are arranged in spikes, the lowest buds opening first and the blossoming proceeding upwards. The calyx of each flower is quite insignificant in comparison with the corolla, though it proves later to have far more lasting qualities. The corolla is a big round tube ending in two bold lips, the upper one overarching, the lower one receding; in botanical parlance it is a " personate," or mask-like corolla, but, unlike most two-lipped corollas, the lips are tightly pressed together as in a shut mouth.

Its striking form has caused the plant to be given many homely names. Snapdragon is chief favourite, but " Dragon's Head," " Dragon's Mouth," " Bear's Mouth," " Tiger's Mouth," are all well known and particularly appropriate from the trick the flower has, so familiar to every child, of opening wide its

lips and displaying a lurid mouth and throat when squeezed at the sides with finger and thumb. "Bull-dogs" and "Dog's Mouth" are names in use in some districts, while to see the likeness that inspires the names "Rabbits," "Bunny Mouth," and "Bunny Rabbit," one should turn the flower upside down, when the inverted lower lip makes quite a good "bunny," ears and all.

Now the mouth is kept firmly closed by the tissues just at the junction of the lips acting as a kind of spring; moreover, the closing is made particularly complete by the lower lip having a ridge running round it which fits into a hollow on the lip above. Hence it follows that the centre of the flower is a closed cavity—an extremely rare thing in an insect-fertilised flower, since it naturally tends to preclude any possibility of visitors. And, indeed, that is largely the Snapdragon's aim. It desires to eliminate all visitors but one, and to that one alone does it open its doors with a welcome. And that visitor is the great hairy wild bee, the humble-bee;

and, in fact, as Lord Avebury pointed out, the Snapdragon flower "is a strong box of which the humble-bee only holds the key." No wonder the Snapdragon is built on bold, uncouth lines when adapting itself to visitors whom Maeterlinck describes as "enormous and covered, like primitive man, with a formless fur which rings of copper and cinnabar encircle. They are still half barbarous; they ravish the calices, destroying them if they resist, and push through the satin veils of the corollas like a cave-bear that might have forced its way into the silken, pearl-bestrewn tent of a Byzantine princess."

Watch a humble-bee approaching. With much noise it hovers over the flower, then suddenly alights on two knobs that are conveniently placed for the purpose on the lower lip. The lip swings down under its weight and the mouth is open. The bee half clumsily pushes in, finding a good foothold among the thickly set hairs that carpet the surface of the lower lip. It dives down towards the honey, which

is plentiful and stored away in a sac enclosing the ovary, its proboscis being guided there by two parallel lines of hairs, like railway lines, running towards it. Although well in the flower its great body prevents the lips from quite closing behind it, and while it sips the honey its back rubs on the roof as it almost fills the cavity. But up in the roof, their four filaments running along it like parallel beams, are the pollen boxes, and these open and pour out the yellow dust on to the back of the insect. Another column, the receptive column from the ovary, lies among the stamen filaments, and no doubt this gets dusted with pollen from the bee's back—either its own flower's pollen or that from a neighbour. Darwin experimented and found that, in the crimson-coloured Snapdragon, pollen from the stamens of its own flower could not fertilise it at all, but that in the white varieties it might possibly, though not very readily, do so. Anyway, no doubt cross-fertilisation is the usual procedure. Finally, the available honey being

secured, the humble-bee scrambles out backwards and flies away to an adjacent flower.

One or two of the humble-bees, however, are thieves, and they simply pierce a hole low down in the corolla-wall and suck out the honey from the outside. The hive bee behaves in a similar dishonest way if she wants honey. Lord Avebury suggests that she dare not attempt to get it by the legitimate way, for she would surely be made prisoner if she did. If she is merely collecting pollen, however, she sits on the lower lip, and through the entrance reaches up to the pollen and takes it away. She does not need to enter for this purpose. But wood ants and a host of other small flies sometimes manage to creep through the lips in spite of a strongly set guard, only to find that once in they are trapped and imprisoned. There is no means of opening the flower from the inside.

Fertilisation completed, the flower slips off whole, like a garment, the bright corolla with the stamens on its roof. The ovary with the column still

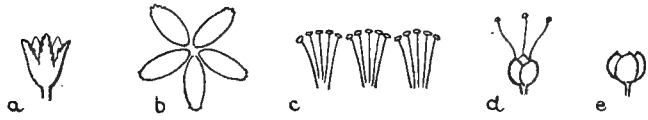
standing on it is left quite naked, except for the calyx, which remains faithfully clasping it. The column withers, the seed-case grows and dries, and the fruit forms, a hard little capsule of curious shape. It has been compared to a calf's head, and the plant has therefore been called "Calf's Snout," but Gerard remarks, "In mine opinion it is more like unto the bones of a sheep's head that hath lane long in the water, the flesh consumed clean away." And Gerard's simile is very apt if one reverses the capsule and looks at it when it is quite ripe and discharging its seeds. Large cavities, which might well be the cavities of eye orbits and nostrils, have then formed at its tip by the folding back of teeth. The seeds are small and almost black, and are covered with ridges and points. It is said that in some Continental countries an oil, little inferior to olive oil, is expressed from them.

This plant will be recognised as a member of the *Scrophulariaceæ* family.

THE HAIRY ST. JOHN'S WORT

HYPERICUM HIRSUTUM

ONCE upon a time the St. John's Wort was a name to conjure with. It was "a plant of power," and "under the celestial sign Leo and the dominion of the Sun. It may be," continues



a, sepals. *b*, petals. *c*, stamens. *d*, ovary with styles. *e*, fruit.

the old physician* scornfully, "if you meet a Papist he will tell you, especially if he be a lawyer, that St. John made it over to him by a letter of attorney." Anyway, within it rested most mystic powers which were invoked on that midsummer night of magic, June 23. On that Eve of St. John the wise

* Culpepper.

propitiated the powers that be, and young men and maidens wove for themselves garlands of St. John's Wort and vervain—another "plant of power"—and lighted fires, and then, dancing round the fires, cast their wreaths therein as they prayed for good fortune through the coming year. Doubtless the custom was the survival from pagan times of some sort of propitiatory sacrifice.

To the St. John's Wort, too, was attributed the power of warding off the spells of witches, and of keeping at bay evil spirits; decoctions made from it were believed to be wonderfully efficacious in restoring sanity to the mad and in relieving the fits of the epileptic. Therefore was it called "Fuga dæmonium," or the "Devil's bane," as it acted so effectually as a devil chaser. In Saxony custom has long decreed that each village maiden must seek the plant on St. John's Eve.

"Thou silver glow-worm, oh lend me thy light,
I must gather the mystic St. John's Wort to-night;
The wonderful herb, whose leaf will decide
If the coming year shall make me a bride."

HAIRY ST. JOHN'S WORT

She must then take it home and stick it in the wall of her bed-chamber. If it retained its freshness for a while she would be a happy bride within a year, but woe betide her—

> " If it drooped its head, that plant of power,
> And died the mute death of the voiceless flower,"

for it was well known that in such cases—

> " They closed the cold grave o'er the maid's cold clay
> On the day that was meant for her bridal day."

Now, there are no fewer than eleven species of St. John's Wort growing wild in our fields, hedgerows and woods, all showing the family traits very distinctly. The one commonly known as *the* St. John's Wort is *Hypericum perforatum*, but there is no doubt that country folk were not very nice in their distinction between the different species in olden days, and all must have shared the halo of magic. As the witches and spirits were not botanists either, no harm was done by this generalisation. The plant pictured in our plate is the Hairy St. John's Wort, the lover of woods and thickets; it

is chiefly distinguished by having a downy coat on its stems and along the veins on the under-side of its leaves. Its leaves differ from *H. perforatum* in having little stalks—those are stalkless—but are like them in being marked all over the surface by pellucid dots. If a leaf be held up to the light these little clear spots can be seen looking almost like perforations. Really they are glands containing an oily, aromatic liquid, and it is suggested that the plant develops them among the cells of its tender green leaves to make the latter unpalatable to browsing animals or leaf-loving insects, and hence protects itself from the not impossible fate of being eaten off the face of the earth. These spots caused the St. John's Wort to be known as the herb of war ; as a poet said long ago :

" Hypericum was there, that herb of war,
Pierced through with wounds, and marked with many
a scar."

Our picture well shows the handsome pyramid of pale yellow flowers that the plant bears. Now

the individual flowers of a St. John's Wort are remarkable in that, to a large extent, their beauty lies in their stamens. The first thing that strikes one about them is the large number of golden spikes, each tipped with a golden knob, that form so great a part of each flower and are so lovely a feature. They make all the greater show because they are not all the same length and are gathered into bunches. In some species they are in five bunches, in some they are in three, as in the plant illustrated. Everyone is familiar with the Large-flowered Hypericum (*H. calycinum*) of our gardens, and with the charm that lies in its multitude of graceful golden stamens. These are the attracting force in a St. John's Wort; the plant says unmistakably to the insect world, "Though I do not provide any honey for you yet here is abundance of pollen for your food." And the insects respond by visiting in large numbers; over forty different kinds have been counted by one observer. The little they eat of that abundance is as nothing to that which they carry away on

their bodies, and thus do the plants pass on pollen from flower to flower.

But if the stamens are the most conspicuous, the five green sepals which form the protecting cup are the most curious part of the flower, for they are edged with a row of very noticeable black dots. These, too, are glands, and are no doubt intended as a line of defence against little creeping insects which might steal the pollen without making any compensating return to the plant. A flower-bud with its closely enfolding green sepals edged with black dots, and surmounted by the pale yellow cone of wrapped-up petals, is distinctly remarkable.

The petals are twice as long as the sepals; they are narrow, and stand like a golden five-rayed star behind the stamen clusters. Above the petals, in the centre of the flower, is the three-celled seed-case, each cell surmounted by a long column. It has already been pointed out that the stamens are of unequal length; now the shortest are on the outside, the longest on the inside, and these longest ones are

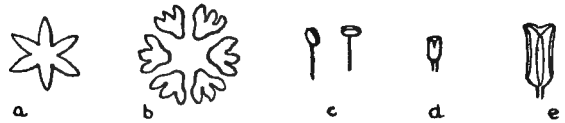
the same length as the ovary columns. All the stamens do not ripen together, but the shortest and outermost set free their pollen first, then the median and the medium-sized ones, and, finally, just before the flower withers, the innermost long ones. These turn to the centre, and their pollen necessarily falls on the ovary columns by their side, and hence will fertilise them, if that has not already been done by pollen from other flowers. Fertilisation completed, the columns wither and drop off, and the fruit forms as a three celled capsule containing many little seeds, which have to trust to the wind to jerk them ultimately out of their home.

St. John's Worts are to be found in flower from the end of June to October, and they are classed in a small family—the *Hypericineæ*.

THE WILD MIGNONETTE

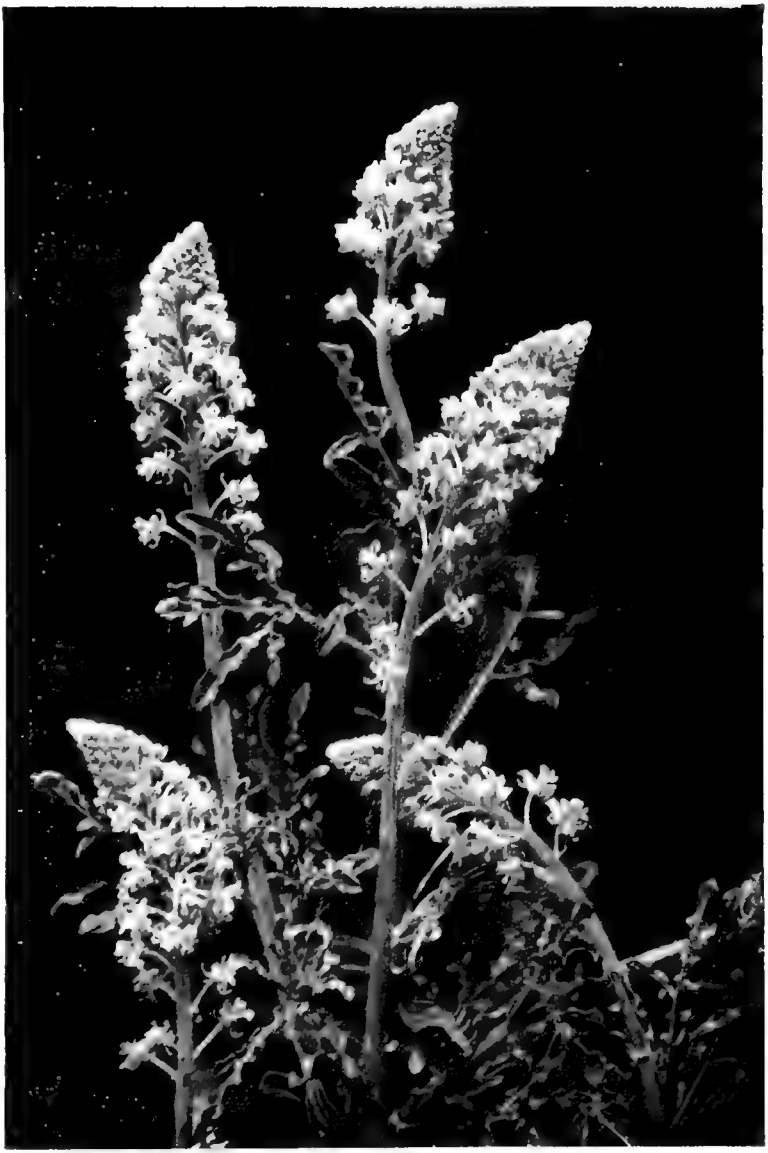
RESEDA LUTEA

"YOUR qualities surpass your charms." This motto stands beneath a sprig of Mignonette on the arms of a certain noble family of Saxony. The story goes that one of its members was once



a, sepals. *b*, petals. *c*, stamens. *d*, ovary. *e*, fruit.

affianced to a capricious Court beauty. One evening, in play, she selected a splendid rose to represent her; her lady companion, plain and homely, but good, chose the Mignonette. The coquetries of the Beauty that evening brought matters to a climax, and the Count transferred his affections to her companion, presenting her with a sprig of



WILD MIGNONETTE

Mignonette, and saying, "Your qualities surpass your charms." The remark was not too gallant, perhaps; however, she married him, and hence the quartering on the arms.

But if this motto aptly describes that now naturalised Egyptian weed, the garden mignonette, where the sweetest honey and the most delightful scent—scent specially vivid at sunrise and sundown —grace an otherwise somewhat unattractive flower, it can scarcely be made to apply to the Wild Mignonette. This plant, though it boasts of honey, has absolutely no scent, and its yellowish-green spikes are even less ornamental than those of the garden plant. Our photograph, however, manages to give it a certain distinction of appearance. It has a general unmistakable resemblance to the garden mignonette in spite of the greater yellowness of its flowers, and no one, seeing it even for the first time, could fail to recognise it, though the recognition usually carries disappointment with it when the expected fragrance is found lacking.

It is a herb whose life is but a season long, though sometimes, if the winter be mild, it will struggle through it and enjoy another spell of summer. It likes dry waste places and limestone cliffs; for instance, a road high up by the sea will often have it growing freely by its side. The leaves are cut into many segments, and the whole plant, as it lies half sprawling on the ground, tends to have a rather ragged and untidy appearance, especially when the flower is passing into fruit.

Individually the flowers are nothing to look at, but since they are collected into somewhat dense spikes they make the most of themselves. There is, however, a good deal noteworthy in them, in spite of their insignificance. There are generally six green sepals and six yellowish-green petals (sometimes the number is five or seven). The petals are really rather curious, for they are cut into three upper lobes and a lower flap. The honey is stored in a cup-shaped hollow in the disk below the ovary, and the flaps of three of the petals form a lid over

it and shut it in so securely that before any honey can be taken out the lid must be prised open. There are a good many small stamens and an oblong seed-case (surmounted by three teeth), which is built up by the union of three carpels. Curiously enough, this seed-case never quite closes at the top, and this is a peculiar characteristic of the flower.

The stamens shed their pollen at the very time the stigmas are ripe to receive it, so that a flower is quite in a position to fertilise itself, but it does not often appear to avail itself of the chance; for the most part its pollen seems useless to fertilise its own seeds. (The garden mignonette is quite sterile to its own pollen.) Evidently the flower aims at fertilisation from a neighbour, and little flies who might help are often found visiting it, but a German observer, Müller, who made a special study of the visits of insects to flowers, pointed out that the Mignonette is specially visited by, and specially adapted to the visits of that variety of wild bee known as Prosopis, one of the four

thousand five hundred varieties that are said to be known.

Now the Prosopis is supposed to be the present-day representative of the primitive wild bee, from which all bees have been evolved. She occupies the same position in the bee world with regard to the hive bee that the cave-dweller occupies in comparison with a respected London citizen. She is small, half starved and naked, and has no beautifully arranged hive for a home; all she can provide are a few poor cells in galleries in dead wood or loose earth. Solitary and alone she lives, storing up a little honey for her offspring, but, dying before her eggs hatch, she never knows them. She has no long proboscis such as the hive bee has, but merely a short, flat, trowel-shaped one with which she plasters her cells, but which (and here plant and insect are mutually adaptive) is the very thing to prise open the lid of the honey chest in the Mignonette. Only a bee fashioned in this way can get at the flower's treasure, and thus we see that even the

poorest and lowest of the bees finds a flower that will make a bid for its special favour, and will, moreover, seek its co-operation in an exclusive way. There are fascinating possibilities of research in the large field of bee-fertilised flowers, as to how they are often specially adapted, not merely to bees in general, but to some definite variety of bee in particular, as, for instance, in the case of the Mignonette and Prosopis, the snapdragon and the humble bee, and the bryony and that variety of bee known as Andrena florea.

After fertilisation the seed-case swells, and if it be cut across transversely it can be seen that it is built up of three carpellary leaves, which are, as it were, standing upright and joined together by their margins. Along the three lines of union are two rows of black, shining seeds—that is, six rows in all. As the capsule matures it opens still more widely at its mouth, and the swaying of the flower stems by the wind jerks out the little smooth seeds.

The family of the Mignonette is but a very small

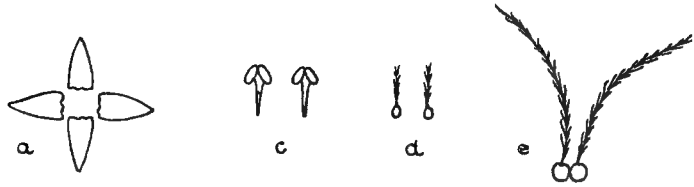
one and among British wild flowers is only represented by three species altogether, namely, the Wild Mignonette (*Reseda lutea*) of our sketch, the White Mignonette (*Reseda alba*) and the Dyer's Mignonette, known also as " Weld," " Yellow Weed," or " Dyer's Rocket " (*Reseda luteola*). This last has glossy, undivided leaves, long pointed flower spikes, and is taller and more erect than the plant we have been considering. At one time it was largely used by dyers, as its juices gave a beautiful yellow colour. Linnæus observed that it follows the course of the sun, turning to the east at dawn, to the south at noonday, to the west at sunset, and due north at midnight. It also has a great partiality for waste places and limestone rocks.

The name *Reseda* is from *resedo*—I appease, I calm—because certain species were said to have a sedative effect upon people. *Lutea* means golden-yellow.

THE WILD CLEMATIS

CLEMATIS VITALBA

"WILD Clematis grew so thickly on one side of the narrow lane, that the hedge seemed made of it. Trailing over the low bushes the leaves hid the hawthorn and bramble, so that the hedge



a, sepals. *c*, stamens. *d*, stigmas, ovaries. *e*, fruits.

was covered with Clematis leaf and flower. The innumerable pale flowers gave out a faint odour and coloured the sides of the highway. . . . No care or art could have led it over the branches in so graceful a manner; the lane was festooned for the triumphal progress of the wagons laden with corn."

Thus does Richard Jefferies describe "Clematis Lane." And the Clematis seems always associated with the highways of man; it is the "Traveller's Joy"—Gerard's name for it—"decking and adorning waies and hedges where people travell." The vocation to bloom and die unseen has no attraction for it, and it is perhaps because it ever keeps itself before the public eye that it has received so many familiar names up and down the land. Between thirty and forty such have been collected, each of which refers to some special characteristic.

Early in the season when the spring flowers are at their loveliest it is not much in evidence, but, as their first glory passes and the summer days draw on, it bursts into flower and claims the passer-by's notice. Its stems, woody and tough, twist in and out of the hedge, matting it together, but always coming to the top and somewhat stifling the hedge-row beneath it. It is the only plant we have that can in any sense represent those giant climbers —the lianes and "twist-ropes" of the tropics.

WILD CLEMATIS

Because of this character it is known as "Bind-with," "Bedwine," "Hag-rope" (i.e. Hedge-rope), "Love-bind," "Robin Hood's Fetters," and "With-wind." Trailing like a vine, it is called the Clematis from the Greek—*klema*, a vine—or anglicised, the White, Hedge, or Wild Vine respectively. Its second botanical name *vitalba* emphasises it as the "White Vine."

But it has no tendrils to help it to climb as the vine has, so it utilises for this purpose the stalks of its leaves. Now, each leaf is made up of five heart-shaped leaflets (two pairs and a terminal one), set rather far apart from each other on fine stems, so that it has a dainty and airy appearance. These leaf-stalks seem to have some power of sensation, for when they touch a suitable branch they twist round it and thus secure a further hold for the growing plant. Darwin, indeed, believes that the leaves in many varieties of Clematis move spontaneously in order that their stalks may have the chance of twining. That twining is actually caused

by stimulation is shown by the fact that if they touch nothing they remain uncoiled. This method of climbing is a little unusual. Some of its trailing stems are to be found several yards long.

Then the flowers appear, thickly covering the plant and making the hedgerows all white atop. Often the plant forms veritable bowers, and so it has been called "Lady's Bower" (originally, no doubt "Our Lady's Bower"), and "Virgin's Bower," but this, we are specially told by an old writer, had no reference, like the former name, to the Virgin, but was given out of compliment to the virgin Queen Elizabeth. There is, however, a legend that the Virgin Mary rested under a Clematis bower during her flight into Egypt, and thus sanctified it. And since in harvest time it is at the zenith of its flowering "Snow in Harvest" is a well-known country name. In the mass the flowers are charming; individually, we find their charm lies essentially in their multitude of silvery stamens tinged with faint green, standing out rosette-like. There are no petals whatever, but

the stamens are backed by four white sepals, felt-like to look and touch, which early disappear. The centre of the flower is occupied by a green brush, made up of a number of carpels, each responsible for a single seed, and quite distinct from its fellows. In the early hours of the flower's life, the stamens are to the fore, discharging their pollen gifts upon all comers, and the central brush is closed; then they droop, and the brush opens and receives the visitors and all they can bring. There is no honey anywhere in the flowers, but the visitors can feast upon pollen, which is plentifully supplied. In fact, the spreading brush and the lavish pollen, together with its elevated position on the tops of hedges, have given rise to a suggestion that possibly the Clematis may look to the wind for assistance in cross-fertilising its flowers. The scent, without being actually sweet, is very fresh and fragrant, and something like that of the hawthorn. It is said to be specially attractive to flies, and we certainly find flies frequenting this plant. It has been, perhaps a

little extravagantly, described as the "most spiritual, impalpable, and yet far-spreading of all vegetable odours, a perpetual pearl of simplicity intermingled with fragrance."

As the flowers fade the plant increases rather than diminishes in beauty.

> "The Traveller's Joy,
> Most dainty when its flowers assume
> The autumn form of feathery plume,"

wrote Bishop Mant, for the upper part of each thread of the fruiting brush begins to grow and curl outwards, while the little fruits swell and push apart. They are now of a pinkish colour, and each carries a lengthening plume of silvery-grey, most delicately fringed. By degrees clusters of silvery-grey fluff stud the branches where the flowers have been, and are the reason for a pretty name of the plant—"Silver Bush." Other names, owing their birth to aspects of the plant at this stage, are "Greybeards," "Daddy's Beard," "Old Man," "Old Man's Beard," and "Old Man Woozard."

The Wild Clematis

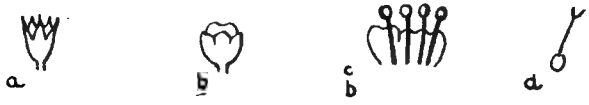
By now the autumn is drawing on, and, with its later days, the wind rustles through the delicate clusters and breaks them up. Each fruit with its long streaming plume floats away through the air, swaying hither and thither until it becomes entangled in some other hedgerow or is brought to the ground by rain, when it at least makes an attempt to start life on its own account.

It is not always realised that the Clematis and the buttercup are close relatives; both belong to the family of the *Ranunculaceæ*.

THE PEPPER-MINT

MENTHA PIPERITA

A MERE touch of the hand, a slight bruising of the heart-shaped leaves between one's fingers, and the secret of this plant's personality is revealed, for a strong scent, like no other



a, sepals. *b*, petals. *c b*, stamens on petals. *d*, stigmas, style, ovary.

that we know, exhales. Even if the plant be totally unknown to us by sight, this will at once betray it—it is the Pepper-Mint. All the Mints are known by their aromatic essences, but the Pepper-Mint is by far the richest in them. Hidden away in the tissues, chiefly in those of the leaves and the sepals, are multitudes of tiny glands containing a

PEPPER-MINT

fragrant volatile oil, and by the bruising of the tissues in any way this oil is set free. Closely associated with the scent is a pungent, aromatic taste, for a leaf laid in the mouth bites the tongue with a heat like pepper—hence its name—to be followed a moment later by a sensation of coldness. First hot, then cold, that is the characteristic action of both pepper and the Pepper-Mint.

It is not one of our commonest wild flowers, and, indeed, some critics hold that it is not a true native of this country, but it certainly grows wild now in many districts, preferably in damp places and by the edges of ponds. Lord Bacon, in his famous passage on the Breath of Flowers, specially refers to this plant: "Those which perfume the air most delightfully . . . being trodden upon and crushed, are three: that is Burnet, Wild Time, and Water Mints. Therefore, you are to set whole alleys of them, to have the pleasure when you walk or tread." Of course, it is possible these plants may be descendants of escapes from the gardens of our own far-back

ancestors, where mints always found a place among their many other herbs. Indeed, a garden in the Middle Ages was only very secondarily a flower garden, being almost wholly given up to the growing of aromatic herbs, essential in the days when spices were unknown for flavouring, and essential, too, in our forefathers' estimation, for hanging up in their houses and for strewing the floors both at home and in church.

> "My lady's fair pew had been strewn full gay
> With Primroses, Cowslips and Violets sweet,
> With Mints, with Marigolds and Marjoram,"

says an old play written by a contemporary of Shakespeare. Probably in those days, when sanitation was chiefly distinguished by its absence, our ancestors instinctively realised the value of these plants as health agents, an instinct amply justified to-day with reference to this very plant, for some of the most modern derivatives manufactured from Pepper-Mint are recognised by us as strong antiseptics and disinfectants.

The Pepper-Mint

A low perennial herb with square stems, it has its leaves arranged in pairs, each pair being at right angles to the pair above and below it. Lord Avebury points out that these two characters generally go together, and that it is actually a structural advantage for plants with opposite leaves to have their stems square. Soft hairs form a scanty coating on both stalk and leaves.

The flowers, which appear in August and September, are of a delicate lilac-blue colour, and are massed, twenty or more together, into balls for the sake of attractiveness. Each flower has a five-toothed calyx and a corolla with four lobes, one a trifle larger than the rest. Now, most of its family relatives have their corollas formed into two lips, hence the family name *Labiatæ*, but in the Mints this two-lippedness is reduced almost to nothing, and it could never be distinguished if it were not carefully looked for. Standing on the corolla are four stamens ; they are much taller than it is, and they project right beyond it, so the eighty or more stamens that

protrude from each tuft of flowers form a sort of halo to the blue ball. Every flower produces four seeds—each in a little pocket of the ovary—with a column rising from down between them and passing up through the stamens and ending in a fork. As they mature the petals turn brown, lingering on long after they are dead; the calyx, too, dries and persists protectingly until the four nutlets are black and ripe and are scattered to the winds. Our photograph is an excellent presentment of the plant.

The Pepper-Mint appears to have been first definitely recognised as wild in Hertfordshire, and to have received its name from Ray in his *Historia Plantarum,* published 1704. It is one of the few plants whose reputation in medicine is of comparatively recent origin. Culpepper does not mention it among the medicinal herbs of his day, though he records a common belief that if a wounded man eat ordinary mint his wound would never be cured—and he sapiently opines, "and that is a long day!" Its

value was not realised until the following century, and its commercial history began in 1750, when a little land was set apart for its cultivation at Mitcham, in Surrey. A large herbal published at the beginning of last century writes of essence of Pepper-Mint as "an elegant medicine," and suggests many occasions for its use, while Dr. Thornton's "Herbal" of 1814 mentions the plant as being then cultivated in very large quantities for the sake of its essential oil—Pepper-Mint water, spirits of Pepper-Mint, oil of Pepper-Mint being the three forms under which it was in use. The zenith of its cultivation was reached in 1850. Since then the competition from imported foreign varieties of Pepper-Mints has affected it adversely.

To-day the Pepper-Mint is grown for medicinal purposes at Mitcham, Carshalton, Hitchin, Wisbech and Market Deeping. Two varieties of the plant are found, the Black and White Pepper-Mints. The former is coarser, hardier, and flowers later than the White Pepper-Mint, and gives about thirty pounds of

oil extract per acre. The latter gives only twenty-four pounds, but the extract is finer flavoured.

The plant needs rich, somewhat sandy soil, in a moist and warm locality. It is gathered for distillation when the flowers are out in August, and is put straight into the still, some five hundredweight of Pepper-Mint being put into a still seven or eight feet high. Water is added, heat applied, and the oil distilled. In about four and a half hours the process is completed, the herb drawn off, and later ploughed back into the land. Almost colourless at first, the oil becomes thicker and redder by age. One of its chief uses is to disguise unpleasant medicine from the faddy and difficult patient, but it is also very valuable on its own account in digestive troubles; therefore the "bull's eyes" and peppermint drops of our youthful fancy have a special sanction from the faculty. It has two remarkable effects upon the human body—firstly, wherever it touches the skin it causes the blood vessels to contract acutely, hence the person feels cold there; secondly, it seems

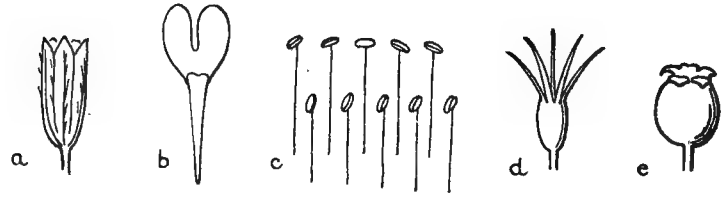
to diminish the number of white corpuscles in the blood when it is taken as a medicine.

Menthol, an increasingly popular remedy for neuralgia, rheumatism, toothache, etc.—in fact, a local anæsthetic—is a crystalline substance derived from oil of Pepper-Mint. Attention was first called to it in the *Lancet* of 1879, but the Japanese have known it for two hundred years, and it was carried as a matter of course by Japanese gentlemen in a little medicine box attached to their girdles. Nowadays, however, the Japanese variety of the Pepper-Mint is commonly employed for making it, as this is cheaper. This Japanese variety of the plant has been satisfactorily grown near Colchester.

THE WHITE CAMPION

LYCHNIS VESPERTINA

A CINDERELLA among plants. All day long the White Campion stands in the bright summer sunshine as rather a little drab of a plant. A foot, or maybe two, high, its main stem branches



a, sepals. *b*, petal. *c*, stamens. *d*, styles, ovary. *e*, fruit.

but slightly, and its leaves, of a long oval tapering at both ends—more so at the tip than at the base—are of simple outline, and stand in pairs, somewhat sparsely, at intervals along the stalks. It is often roughish with short hairs, and its few colourless

WHITE CAMPION

flowers droop dully, shabbily. There is no beauty to be found in it; it seems to have no part in the gaiety of the flowers around, and it finds no place in the children's bright nosegays. Not for it are the homely names that speak of affection or of familiarity. When flower-lovers notice it at all, it is just "The White Campion," and nothing else. But all the same, it is a plant with character, and behind its drabness lie points of considerable interest and possibilities of loveliness. Perhaps this explains a curious fact about its names. The majority of wayside plants possess a number of common names, which are all brought to a focus, as it were, in one definite, unvarying Latin name, for which botanists are responsible. This plant, however, has but one usual homely name, while the botanists have not agreed very well about its formal name, and we find it described as *Lychnis vespertina*, *Lychnis dioica*, and *Silene pratense* among others, for reasons which will later appear. However, the first name seems now to be the one settled for it.

But, like Cinderella, the White Campion has a fairy godmother, who visits it late in the day, and this fairy godmother is called "the Shades of Evening." The time of the fairy visit is as the sun is setting and his rays are gently sliding across the earth, not striking it fiercely. The greyness that is creeping up is the fairy wand, and at its touch the flowers lift themselves. The joy of life seems to enter into them as the petals lose their shabby creases and spread, and as they spread each blossom puts on a bridal dress of gleaming whiteness. The dull green stalk and the rough, uninteresting leaves disappear in the kindly covering of night, and only the flowers shine out like stars on the darkening background of the hedgeside. Even the fact that they are comparatively few in number is now an advantage, for each stands out separate and distinct. It is for this reason that botanists call the plant *Lychnis vespertina*, for it is indeed a "torch of the evening."

Two further gifts are yet bestowed by the fairy

godmother: the gift of sweet scent—for not only are the flowers brilliant in their pure whiteness, they also are fragrant—and the gift of sweet honey, which lies in the tissues round the centre of the flower at the base of the petals. And thus is our plant Cinderella fitted out for her campaign to attract. And the Fairy Prince is in waiting. He takes the form here of softly flying moths to whom the gleam, the scent, the honey, make an irresistible appeal, and one by one the flowers are visited with ardour through the hours of darkness. And so the night passes—the flowers charming, the moths visiting—but as the morning dawns and the sun again lights up the earth, the fateful hour comes for the plant as it did for Cinderella, the gleaming petal dress becomes draggled, the scent dies away, and soon it is once more the little drab. Just now and then, unlike Cinderella, it has a respite, for if the day be dull and the sun hidden, its flowers may linger on and the plant carry over part of its beauty until the next night's quickening.

Now, when we come to examine carefully the flowers of several White Campion plants, we find a remarkable fact: *they are not all alike,* though at first sight they appear to be so. Each has a strong, ten-ribbed calyx, inclined to stand out a little from the petals. The petals are five in number, quite separate one from another; their long, thin lower part forms a rough tube, and is supported by the calyx; above the calyx they spread out as a ten-lobed silver disk. But, when we open the flowers on one plant, we may find there are only stamens within; in the centre there is no seed-case, and they seem hollow and incomplete. We pass on to another plant and within is a substantial oval seed-case, and spreading from it are five big upstanding rays, but there are no stamens around it. So we say the blossoms are incomplete, and that one is a male flower and the other is a female flower, in contradistinction to such flowers as the buttercup, the foxglove or even the stitchwort, which is of its own family, the *Caryophyllaceæ:* these are complete,

or, as we say, "hermaphrodite." It is to this single-sexedness of the flower that the plant owes its Latin name of *Lychnis dioica* (*dioica*, "of two sexes"). "I have seen flowers," wrote Alphonse Karr, in his well-known "Tour Round My Garden," "which contain in their corollas both the husband and wife; I have seen others which bear them separated, but upon the same plant; there are, however, trees and flowers which only produce separately males or females, and these are frequently planted by chance at a great distance from each other. There would be no lovers, no marriages, no reproduction, but the air takes upon it the charge of bearing the caresses of the husband to his spouse in the form of those little yellow bags which contain a fructifying powder. Bees and other insects which fly from flower to flower are little messengers who carry perfumed kisses from the bridegroom to the bride; it is thus they repay the hospitality they receive in the rich corollas and nectaries filled with delicious honey; and thus the wife receives in her bosom

the message of her absent husband." Less fancifully put, it all comes to this, that the White Campion, in order positively to ensure cross-fertilisation, has taken the drastic measure of separating the sexes as widely as possible on different plants. Just now and then, however, it appears to forget its stringency, and we get flowers which contain both stamens and ovary.

In the male flowers the stamens stand in two rings, but they are not mature all at once. First the outer ring is ready and discharges its pollen, while those of the inner ring are shorter, and wait. Next night they, too, grow to full strength, and as their brethren fade they take their place in dispatching loads of pollen upon the messenger moths. As for the female flower to which the loads are sent, it is worth a moment's pause to look at the ovary and its five columns. Not often do we see five such fine ones. In the young flower they all stand within the petal tube side by side close together, but as the flower matures they grow well above the tube and

spread out as a five-rayed star in the centre of the flower, each pale green ray passing above and between the petals. It would not be easy for those spreading rays to miss the pollen loads inadvertently brought by the moths when they pay their night visits to sip the honey deep below them.

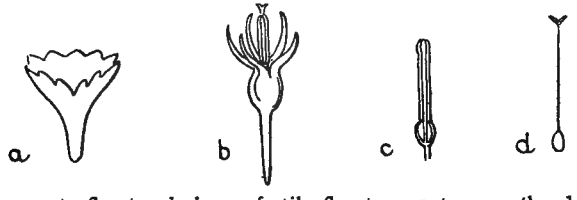
As a result of the visit the seed-case swells. As the days pass it dries and becomes brown, then one fine day it opens at the top by five little teeth which turn back, and out of the little openings thus formed the seeds are jerked as the stems are swayed by the wind. One says " one fine day " advisedly, because if the day be wet the teeth do not open or, if open, when rain comes on they roll back and close the openings. Thus the seeds are saved from being drowned in their case and water-logged, for if that happened they could never be jerked out and dispersed.

This, then, is the life of our plant Cinderella; not an uneventful one or one lacking in romance, after all, for appearances are often deceitful.

THE CORNFLOWER

CENTAUREA CYANUS

A JOY to the artist—the brilliance of its blue is almost unparalleled in plant life; an interest to the botanist—so much that is noteworthy lies in it; a nuisance to the farmer—both



a, outer empty floret. *b*, inner fertile floret. *c*, stamens (heads joined, filaments distinct). *d*, stigma, style, ovary.

in its life and in its death; that is the epitome of the Cornflower's character. In olden days it was known under yet another aspect to the physician, for "there is not any part of the herb but it rather worketh miracles than ordinary cures in green

CORNFLOWER

wounds," asserted Gerard, and other physicians of the sixteenth and seventeenth centuries confirm him and, moreover, add other virtues.

Its blueness has given it many a country name, such as "Blue-cap," "Blue-bonnet," "Blueball," "Blueblaw," "Blue Poppy" (from growing with the red poppies among the corn), and, commonest of all, "Blue-bottle," from the shape of its flower-heads. The purity of its colour, as well shown in our photograph, has raised it to the dignity of being a standard, and nowadays one speaks of "cornflower-blue" to describe a special tint.

The plant grows about two feet high, and is well-known as a somewhat tiresome cornfield weed. Its lower leaves are long and often deeply lobed, but the upper ones are narrow and quite plain in outline. The blooms grow solitary and of necessity upon long stalks to raise them among the wheat. The stalks, as also those of the leaves, are particularly hard and tough, and liable to injure the sickle cutting the corn. Hence, another of its

country names is "Hurt Sickle," and an old poem runs:

"Blue-bottle, thee my numbers fain would praise,
And thy complexion challenges my praise,
Thy countenance, like summer skies, is fair—
But, ah! how different thy vile manners are.

"A treacherous guest, destruction dost thou bring
To th' hospitable field where thou dost spring;
Thou blunt'st the very reaper's sickle, and so,
In life and death, becom'st the farmer's foe."

Each bloom is a colony of flowers—not a single individual—and this colony is bounded by a wall of overlapping dark bracts, each bract being edged with small teeth. A glance shows that the colony is made up of two sets of individuals—one very gay, very blue, and very large in comparison, in a ring outside, a second set, smaller and purplish, within. Naturally, we give our attention to the more conspicuous set first. In each of these the delicate blue tissue of the united petals is shaped like a funnel whose margin is irregular, as the diagram shows, but when we peer within it is all

disappointment, for the dainty envelope is absolutely empty. They are all a mere pretence of flowers, their attractive appearance is their only recommendation.

We pass on to the very different little florets in the centre. Small, and without brilliance, they are nevertheless each a complete flower. The second diagram shows one of these florets. The purplish, insignificant petals—the shape of an urn upon a long pedestal—spread out into five small rays at top. At the bottom of the pedestal tube is a honey sac. There is no scent, however.

Above the five petal rays the stamens project as a long, dark pillar, really a tunnel, with five very short filaments below in the petal urn, to speak of the five stamens whose united heads form the tunnel. Through the centre of this tunnel runs the ovary column, the little one-seeded ovary being away below the petals. The top of this column ends in a fork, and just under this fork is a ring of very small hairs forming a circular brush. Now, the interesting point in this flower is that the stamens

are sensitive, and if they happen to be touched they suddenly contract; the tunnel (into which, by the way, the pollen dust has been poured) shoots back over the circular brush and along the ovary column. Naturally, all the pollen is swept out in this sudden movement.

Prof. Haberlandt, of Graz, who has made a special study of the power of sensation in plants and the various organs of sensation that they possess, points out that in the Cornflower the sensitive spot in the stamens is just that part that is covered by the circular brush of the ovary column. *No other spot is sensitive,* and if the stamens are touched with, say, a hair, on this spot they will at once contract—if below it or above, they take no notice. This interesting little experiment is open to anyone to try for himself. Doubtless the spot is one that is specially likely to be touched by insects as they scramble about the bloom, and the pollen that is shot out of the anther-tunnel necessarily, at least in part, adheres to them.

The last stage of this sensitive little floret's history is reached when the two branches of the column-fork roll back and touch the hairs below them, for on these hairs still lie traces of the pollen that was swept before them, and this fertilises them if, perchance, insects have failed to do so. The seeds are small and silvery-grey, and have a short purple crown of hairs to aid in their dispersal. Thus, then, does the Cornflower arrange for division of labour—the outer empty gay set of florets are merely dummies to attract, the inner compact set are the workers that produce the seeds.

The story of the Cornflower's specific name, *Cyanus*, is that Cyanus was a youth who, when the world was young, loved the blue Cornflower with a passionate adoration, and daily thanked the goddess Flora for this her priceless gift. When the Cornflower was in bloom he rarely left its neighbourhood. One day he died, and was found lying in a cornfield surrounded by his favourite flowers, and Flora, pitying, transformed his body into them.

Its generic name, *Centaurea*, which it shares with others, is derived from the Centaur Chiron, who taught mankind the healing value of herbs.

The Cornflower is the national flower in Germany, where it is perhaps more in evidence than with us. It is the flower by the aid of which Margaret strove to fathom whether Faust loved her truly, as she whispered :

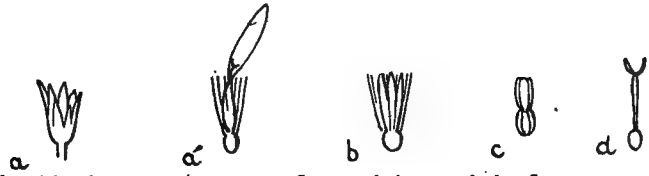
> " There is a flower, a purple flower,
> Sown by the wind, raised by the shower,
> O'er which Jove has breathed a powerful spell,
> The truth of whispering hope to tell.
>
> " Now, gentle flower, I pray thee tell
> If my lover loves me and loves me well ;
> So may the fall of the morning dew
> Keep the sun from fading thy tender blue."

The Cornflower belongs to the vast family of the *Compositæ* ; there is just a suggestion that it is really an alien from Western Asia and Southern Europe that has become naturalised here.

THE GOLDEN ROD

SOLIDAGO VIRGA AUREA

TALL slender wands, green below, but blazing with clusters of golden stars above, wave in the hedgerows and add their quota to the prevailing golds of the late days of August. It is the



a, sheathing bracts. *a'*, outer ray floret. *b*, inner tubular floret. *c*, stamens, heads joined, filaments distinct. *d*, stigma, style, ovary.

Golden Rod, signal of the passing of summer's prime and herald of the advent of autumn. A story that is an amusing commentary on human nature is attached to this plant, a story which, Gerard suggests, well justifies the old English proverb, "Far fetched and dear bought is best for ladies."

Now, in the days of Queen Elizabeth, and probably long before that, this plant had a great reputation for healing wounds—its very name, *Solidago*, is a corruption of "*in solidum ago vulnera*" ("I consolidate wounds")—and for this purpose it used to be imported in a dried state from abroad and sold in the London markets, as much as half-a-crown an ounce being paid for the powder made from it. But, alas for its reputation! One day someone discovered that it was actually growing wild—a mere weed!—in Hampstead Wood, "even as it were at our townes end," and then no one had any longer the slightest belief in its powers, and, in fact, no one would give even half-a-crown a hundredweight for it then, "which plainly setteth forth our inconstancy and sudden mutabilitie," laments Gerard. After a bitter gibe at "phantastical Physitions," he adds, "This much have I spoken to bring these new-fangled fellowes backe againe to esteeme better of this admirable plant than they have done, which, no doubt, hath the same vertue now that then it

GOLDEN ROD

had, although it growes so neere our owne homes in never so great quantitie." Gerard himself was quite consistent, and in his own practice kept it ever in the foremost rank of "wound drinks"; and it seems to have recovered its prestige later, for Culpepper, writing in the days of Oliver Cromwell, speaks again of it as a sovereign wound herb. He also gives a very curious property of the plant; he says that a decoction made from it "helps to fasten the teeth that are loose in the gums." One wonders how he arrived at this conclusion. It seems a little too far-fetched for his favourite "Dr. Experience" to have taught him.

As a genus the Golden Rods belong in the main to North America; no fewer than eighty-five different kinds have been counted there, and fields, many acres in extent, are converted by them into veritable "fields of the cloth of gold." But though many of these plants find a place in our English gardens, only one kind of Golden Rod—the *Solidago virga aurea*, i.e. literally the Solidago Golden Rod—

grows wild in our lanes and woodlands, and this prefers the poorer soils, and is specially noticeable in hilly districts. From the little tufted root which lasts on year after year arise straight, stiff, unbranching stems. Down by the root are larger leaves with stalks, but higher up the stem the leaves are long and narrow, with slightly toothed edges and no stalks to speak of. It is worth noticing how carefully these leaves arrange themselves with regard to the direction of the light, so that they may all get their share of the sun and there be no undue shadowing one of another. In some of the garden Golden Rods this arrangement becomes a perfect and most definite imbrication, and the long, narrow leaves droop, one slightly overlapping the next, with the same regularity of pattern that one finds in the tiles on the house roof.

The blossoms are distinctly misleading to the casual non-botanical observer. Each appears to be a single five-rayed flower, with perhaps somewhat complicated internal arrangements, for five yellow

rays project in a ring, just as if they were the petals of some well-known flower, round a yellow stamen-suggesting centre. It is only when one gathers a Golden Rod stem and begins to pull a blossom to pieces that one realises one's mistake. For each of the blossoms is not a single flower at all, as it seems to pretend at the outset, but a select little colony whose members divide themselves for all practical purposes into two great classes, a very small class that is specially set aside to attract—there are only about five or six aristocrats all told—and a much larger and much less distinguished class that is all herded closely together in the centre of the blossom. The first class, however, is not wholly and solely ornamental, as in the cornflower; we can just discover a tiny fork appearing out of each of the little tubes into which the yellow rays roll down by their base. This is the top of the column from a most minute seed-case, which contains a single still more minute seed. A slight notching can be detected at the tip of each ray, which speaks of the union of the

five petals which originally composed it; we call these female flowers. In the centre of the ray florets are tubular florets, each a perfect little flower, as in the daisy, and not lacking one of its essential organs as the ray florets do in both Golden Rod and daisy, despite their greater size and attractiveness. For in the tiny tube five stamens stand so closely pressed together that the heads are now completely joined into a ring, and they stand on the seed-case and form a ring round its column. These are hermaphrodite flowers—i.e. both male and female.

In most of these composite flowers—the Golden Rod is a member of the *Compositæ* family—the procedure is the same, the anther heads have their opening on the inside, so, when they open, their pollen contents collect in the chamber formed by their united heads. The floor of the chamber is the, as yet closed, top of the ovary column. Presently, by the column growing fast, this floor is carried up right through the pollen chamber. (Notice the

difference from the cornflower's method, where the stamen-heads contract instead of the ovary column growing.) Naturally, the pollen dust is swept before it and out on to the exposed surface of the flower, and there it lies. Through the hours of daylight hosts of insects—flies, wasps, bees of all sorts—pay visits ; all are equally welcome, for all help to spread the pollen over the individual blooms, and maybe carry it to adjacent blooms or even adjacent plants. It is only when the ovary column has grown up through the anthers that its brush-like tip divides and opens out a sensitive receptive surface for pollen dust. So it always needs an inner ring of florets to fertilise an outer one. This, then, explains why the outermost ring of rays has no stamens—there would be no work for them, since there is no ring outside them to open receptive surfaces and silently ask for pollen, and the plant is not going to risk the waste of much material on the off-chance that it might possibly be of advantage to florets on other blooms.

Then the blooms wither, but are quickly changed into small, rather dingy, feathery balls, feathery because each minute seed is crowned with a ring of single hairs, and the golden wand becomes a long-handled feathery brush. Soon the little ball breaks up, the last stage of communal life has arrived, and the individual members (now the fruits) of which it is composed have for the first time in their existence to start off alone and unattended on a voyage of discovery for a home.

There is an old tradition that the Golden Rod is also a divining rod, and that, in right hands, it can point to hidden treasures of gold and silver.

THE CROSS-LEAVED HEATH

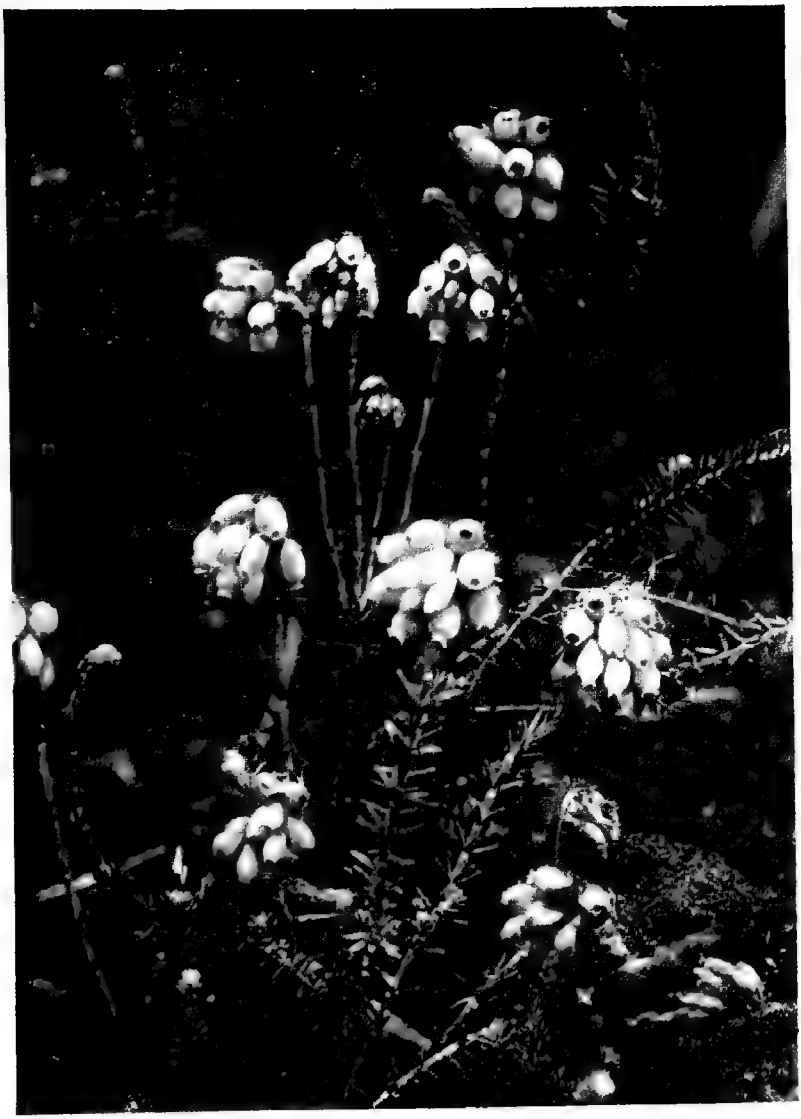
ERICA TETRALIX

THE Heath—the rosy carpet of the moor, the radiant garment of the mountain—seems to suggest legend and story, and yet legend and story in connection with it are singularly lacking. Fairies

a, sepals. *b*, petals. *c*, stamen. *c'*, stamens enlarged. *d*, ovary, style, stigma.

and elves should surely be closely allied with it, and yet, barring a sort of superstitious feeling that there is such a relationship, no tangible foundation for it can be found in fairy-lore. That the feeling should be so strong and the basis for it so slight is rather remarkable. And yet, perhaps, the explana-

tion may be found in the fact that the romance of the Heath is far older than legend and fairy tale, and lies in eras which even tradition cannot reach. For the Sherlock Holmes among the botanists, deducing much from little evidence, aided and abetted, too, by the geologist on this occasion, says that the Heath is the flower of a lost continent, a continent whose existence is highly mythological. Plato spoke of this land as Atlantis, other chroniclers refer to it as Lyonesse, and it was supposed to have lain out in the Atlantic, joining Ireland, the Scilly Isles, Spain and the Azores. Here the Heath was a native, and from thence it spread somewhat eastward. Then came a great subsidence—of the actual catastrophe tradition can tell nothing—and only a patch of land here and there remained above the waters, but the Heath was left on all, and certain rare species found only in Cornwall, Ireland and Spain speak of the vanished land-links. All the species—and there are four hundred of them—still belong to the region of the Atlantic, and are known



CROSS-LEAVED HEATH

only on the western part of Europe (though they have run round the coast of the Mediterranean) and South West Africa. They have never travelled to the continents of Asia and America, except when directly taken by man. In Australia they are also unknown as indigenous.

In Great Britain only five out of these four hundred can claim this country as a native home, and of these, three keep strictly to very limited areas in Cornwall and Ireland. The remaining two, namely, the Scotch Heath (*Erica cinerea*) and the Cross-leaved Heath (*Erica tetralix*), the subject of our picture, alone range over Britain. (The common heather or ling, whose tiny flowers are arranged in long spikes, was once included among the Heaths, but now is considered a separate genus.) The Scotch heath and the Cross-leaved Heath have flowers that are alike in structure, though in the first-named they are a reddish-purple and are arranged in long handsome spikes; in the second-named they are pinker, somewhat larger, and gathered

into clusters at the top of the stalks. In both cases they are much larger than the flowers of the ling. The Cross-leaved Heath is so called because the leaves, grouped in fours, form a series of crosses all down the stems. The leaf-edges turn downwards, and are fringed with tiny hairs; sometimes these hairs carry glands, and indeed, the whole plant is covered with a soft down. Although each leaf is very small it is still further subdivided into many minute segments.

The flower is a very interesting example of a piece of floral mechanism and well worth special attention. The rosy-pink corolla, bell-like, hangs mouth downwards; it bulges somewhat round the centre, but draws together at the mouth and finishes off with four little teeth which speak of the four petals that have gone to its making. The clapper of this flower bell is represented by the ovary column, whose sticky end almost closes the mouth of the bell. Round this mute clapper hang eight stamens, their filaments following the curving lines of the

corolla, and the peculiarity of their heads at once arrests our attention, for each has two long horns—one from each of its pollen boxes—and these stretch upwards and outwards into the bell. Hence, about a third of the way up from the mouth, there is a radiating circle of sixteen horns almost blocking the bell. Again, each pollen box of the sixteen has an oval opening on its outside near the tip—that is, at the end nearest the bell-mouth—but since all the heads are pressed together in a circle the pollen cannot possibly fall out through any of them. Up at the top of the bell, honey is manufactured and stored in glands. Now heather-honey is proverbial, and many bee-keepers who live near moors make a special feature of it. It has a peculiar flavour of its own, and is somewhat dark in colour, but whether or no it is preferred by many honey-eaters, it is certainly particularly appreciated by bee honey-drinkers. On sunny autumn days a moor will seem alive with the buzzing of both wild and hive bees as they fly from flower to flower.

Now follow the movements of one of these bees as it settles on a spray. There is no alighting platform provided by each flower, as there is in the mimulus, or in the viper's bugloss, but no matter, the neighbouring clustering blossoms do just as well, and, clinging to them, it probes up into the bell. And the first thing that happens is that it knocks its head on the sticky end of the "clapper" at the mouth, so at once some of the pollen dust on its head from the previous flower is rubbed off and sticks on to the "clapper." Then it pushes its proboscis up the bell to find the yielding barricade of the sixteen horns, but easily thrusts them aside and gains the honey quarter. This is the moment predestined by the plant, for directly a horn is pushed the anthers (or pollen boxes) are disturbed, the ring is broken, and the little openings are left exposed. Out pours the pollen, for it had only been kept in by the wall of the adjacent anther, and the head of the bee is once more dust-coated. Meanwhile the honey has been carefully stored away

by the bee in what Maeterlinck calls its "Community stomach," and it now backs out and passes on to another flower. It has attained its end, the flower has done the same, both are satisfied.

As a point of minor interest, it may be noticed that the pollen grains in the Heath are united together in fours, known as tetrads. Kerner suggests that after two days, whether the flower has been fertilised or not, the stigma withers and can no longer receive pollen; the stamens begin quickly to grow and push their anthers outside the flower. Every movement of the wind now will cause the pollen to fall, and the grains will be borne on the wings of the wind to other expectant flowers. Thus the plant makes a bid for the assistance of both insects and wind. The day of the flower is now over, but the pink corolla merely dries as it hangs, retaining much of its colour. The fruit is a dry little capsule containing several seeds, which eventually escape by four openings that appear in its walls.

Kerner points out that the heaths are plants that require a considerable amount of organic matter in the soil if they are to flourish—bare rock has no attraction for them—and, further, that their own roots unaided do not supply them with the necessary food from the rich soil. An intermediary is required, and this is found in certain fungi which attach themselves to the roots and do the work of absorption for them, but in return they receive back elaborated substances which have been worked up in the leaves out of these same simple salts handed on by the fungi. It is a case of partnership for the mutual benefit of both plant and fungus.

Tradition says that a wonderful heather beer was made in olden days by the Picts, who jealously guarded the secret of its making. When the whole tribe was practically exterminated by a certain Kenneth the Conqueror, a father and son were the only survivors, but were taken prisoners. Kenneth promised them their lives if they would tell him the secret of the beer, which he greatly loved. They

refused, and he then had the son put to death before his father's eyes. The father was still obdurate, but Kenneth was so struck by the old man's bravery that he spared his life, though the secret was never revealed.

The Latin name *Erica* is said by some to be derived from a Greek word signifying heath or heather; others assert that it is from a word meaning "to break," because it was used in old medicine to break up stone in the bladder.

In the reign of William and Mary it was made a crime to set fire, between Candlemas and Midsummer, to any "grigg," or heath on a common, and whipping and imprisonment were the penalties ordained for disobedience.

The family of the *Ericaceæ* is a large one; among its members may be counted the rhododendron, azalea, bilberry, cranberry, arbutus, wintergreen, and the parasite known as monotropa or yellow-bird's nest.

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