

are sometimes placed in the sections in such a way that the edges are left so near to the separators that the bees fasten them to the nearest point. Another mistake arises from the giving of the rack of sections to the colony whilst the latter is yet too weak to fill the super or too early in the season before enough nectar is forthcoming for wax secretion. At such times the bees often "amuse" themselves by biting away the foundation, leaving great holes in the remaining sheets, which later become twisted and consequently produce badly shaped combs.

AUSTRALASIAN BEE-KEEPER

The outstanding feature in the issue of the Australasian Bee-keeper just to hand is an exceedingly interesting paper on "Nectaries," by A. D. Hardy, F.L.S., Botanical Officer of the States Forests Department of Victoria. The author ventures that nectar is more important than pollen to the bee farmer, on the ground that artificial food can be substituted during a famine of pollen, and the writer would like to know a satisfactory substitute for pollen.

"It is probable that pollen came into existence earlier in the history of plants than nectar, as we believe that the earliest formed plants, other than the bacteria and some very simple algae, were spore-bearing, wholly-submerged, aquatic forms, and these had no flowers, nor need of nectar. The pollen grain is a spore—a little spore, while the seed of the plant is a great spore in the now recognized two phases of the life of flowering plants. But nectaries are not only restricted to flowering plants. All those plants the pollen of which is distributed wholly by the wind (grasses, etc.) and cunningly contrived mechanical arrangements (as in the explosive flowers) produce no nectar, which is absent also in very many plants the flowers of which are known as "pollen flowers," e. g., "poppy," *Papaver*. It has been suggested by a specialist in this department of botany that nectaries as organs of excretion were produced by insects, and the idea is acceptable to many, including

myself. We know of the response to stimulus of other kinds. The intermittent pressure of a boot on certain parts will produce corns. The smell of a lemon or savoury foods at times causes a flow of saliva, etc. Therefore, it is quite within the bounds of probability that insects in search of tender parts of plants found them not in the bark of the stem, nor in the leaves protected by cuticle, but in the newly opened flowers, and there probed or gnawed at the juicy tissue. Just as a flow of sap towards a wound in the bark of many acacias, etc., will continue for a considerable period, so the sugary juice would flow to make good the loss caused by the insects feeding. And this repeated frequently would, through countless generations, become a habit, till at last, as have nectaries present in the unopened flower-bud, though not producing nectar until necessary.

"Now, honey glands or nectaries, as we have already noted, are restricted to those flowers that are resorted to by animals (self-fertilized flowers, such as some violets, have no nectar) and these are variously classified. Flowers favored by certain animal visitors are spoken of as "loving those animals, and we have groups known as "bird-loving," "bat-loving," "snail-loving," "insect-loving," etc. And of the insect-loving flowers we have such as "butterfly- and moth-loving," "fly-loving," "bee-loving" flowers."

The author then describes some of the intricate arrangements of flowers and their adaptation to the nectar gathering insects, as the bee. He furthermore assumes that "sometimes the honey bee, attracted by the smell of nectar issuing from the wound made in the corolla by the humble bee, partakes of the treasure in a 'take-freely-what-the-Gods-offer' spirit, acquiring the habit from which it is but a step to the practice of biting a hole in an uninjured flower; and so the honey bee, too, becomes occasionally a thief, or, rather, since there is no concealment of the deed, a highway robber!"

Three types of flowers are then considered, one having the nectar exposed, another having the nectar concealed in a receptacle, and the third with the nectar

protected by special means, otherwise open tube, in the *Cobea scandens*, etc., in some detail.

The writer closes with accepted rules, barring c

"Pollen flowers are generally of star-shape, or, in some cases, "radically symmetrical" to visitors.

"Nectar flowers are generally specialised, and with the concealed by projections, nectaries, hairs, etc., or in some cases, not star-shaped, but may be portions only in one direction (asymmetrical). Such flowers; snapdragons (*Antirrhinum*), larkspur (*Delphinium*), etc., etc.

"Reddish, blue and violet are preferred by bees, hoverflies, which are highly attracted," writes Knuth, who is the world's greatest authority on the subject; but we have a large group of bee-loving flowers of which the great bulk have pale yellow flowers; some are greenish (*E. cornuta*), some crimson, scarlet, pink, marginata, *E. calophylla* (sometimes)."

This author would seem to think it is the "smell of the flowers" which attracts the bees, quoting from Knuth, "Insects are attracted from a considerable distance by smell. A flower which approaches (one or two yards) attracts them near; they finally settle, the marks, serve to point to the nectar."

"We may note that flowers are often white, and most conspicuous in the garden to the usually strong agreeable, of such flowers attracting insects, for experimenters have watched them without hesitation to flowers though they seem somewhat when they arrived there. In some cases of mutilation, flowers are unattractive (if the mutilation of the removal of the stripes, spots, etc.), at least