
NOTES ON THE BLISTER MADE BY
ERIOPHYES PYRI NAL.

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The blister for which the blister mite is responsible is a condition where the thin epidermis of the leaf is raised from the underlying tissue.

We know, when examined in June, that these blisters each have a little hole in them, and are inhabited by mites. The natural inference is, that the mites have burrowed beneath the epidermis through this hole. On the other hand, we know that when examined in May, before the leaves are fully developed, that many of these blisters have no holes in them, and many have holes but no mites in them. Moreover, the idea of the mite forcing an entry through the epidermis, is entirely out of keeping with the type of mouthparts pertaining to these mites. These consist of a pair of reduced palpi, between which protrude the short needle-like stylets, which are about one fifteenth of the diameter of those of an aphid. These stylets can indeed make a puncture, but a puncture that is as small relatively to the mite, as the proverbial needle's eye is to the camel. It would be as reasonable to assume, that the mouthparts of an aphid are capable of directly making a hole through the leaf, by which the aphid could pass through from one side to the other, as that the mite can accomplish a similar performance through the epidermis. We also know that similar mites with similar mouthparts can do little more than irritate. Some incite the epidermal cells to grow complementary cells in the guise of deformed hairs, masses of which form what is called an "erineum" that give the family name **Eriophyidae** to these mites. Others, by exciting a subdivision of cells, produce strange galls of various types compared to which the blisters we are considering are very simple contrivances. The irritation that the blister mite appears to inflict on the cells of the growing leaf appears to merely cause their enlargement. In approaching this question of the mites' entry through the epidermis in an indirect fashion we shall for the moment divert attention away from the mite and the leaf and turn it to the twigs.

Everyone is acquainted with the little corky spots on the twigs which are its lenticels. These, under the magnification necessary for examining the mite, appear as very rugged eruptions of tissue that have broken through the epidermis. These lenticels are to the twig what the stomata are to the leaves, namely, respiratory organs. The stoma is, however, a highly specialized epidermal cell with a slit-like aperture which opens and shuts with great nicety, very different to the porous eruption of cells that forms the lenticel.

The lenticels originate beneath one or more stomas of the epidermis when due to some unexplained stimulus certain cells of the underlying tissue commence to divide and proliferate which cause this mass to break through a stoma.

Returning to the leaf with this information about lenticel formation, we shall find that a somewhat similar rupture of the epidermis can occur by the mite stimulating the cells of the underlying tissue beneath a stoma to enlarge. This underlying loose tissue of the mesophyll of the leaf is an aggregation of cells among and around which air spaces abound. An expansion in the size of these cells must expel the air from these interstices which, contrary to expectations, does not escape through the stoma. This specialized cell is so constructed that it automatically balances the pressure of the air within and without, by two shutters. Any unusual air pressure exerted from within would close the lower shutter, preventing egress yet opening the shutters on the surface; and vice versa.

Our contention may be summed up as follows: The mite incites cell enlargement of the loose mesophyll cells which expel air from between them, the air pressure created closes the stomata, raises the epidermis from the underlying tissue and the epidermis subsequently ruptures at a stoma; air pressure in this case taking the place of the complementary tissue which ruptures through the epidermis to form a lenticel.

We have a mounted slide of a portion of the epidermis over an unruptured blister, which shows some of the stomata of the epidermis much enlarged with the shutters wide open on the surface and completely shut below. Our sections of blisters show also the cells of the mesophyll of the leaf greatly enlarged in the vicinity of mites.

What the stimulus is that enlarges these cells we cannot conjecture. We have observed the mite standing on its abbreviated head as though possibly irritating the aperture of a stoma or the cells beneath.

There is little doubt that it is in some such way that these holes in the blisters are made, but when made the mite does not immediately enter. The first generation of mites from the eggs, each make a number of these blisters which can best be incited during the period of leaf growth. Sometimes one or two eggs are found in a blister, just beneath the orifice, which suggests that the mites with their peculiar method of oviposition may drop these through the aperture without wasting the valuable time of blister-making by a needless entry and exit. All we know for certain is that the blister forms without an entrance, that the entrance holes are not due to burrowing, and that these blisters remain uninhabited for many days.