



FIG. 1361. —Pistil of wheat magnified.

removing all the anthers from that flower before they are mature, and by preventing it from being afterwards brought from other flowers, on air-currents or insects, by covering the flower with fine gauze. Sometimes it is necessary to remove the anthers and cover with gauze before the flowers open, as in the case of wheat, etc. Having secured a pistil free from pollen, it is pollinated by applying to its stigma pollen grains taken from the plant selected for that purpose. The hand-pollinated flower is again covered to exclude any possible interference with what has been done, and the operator waits for the ripening of the seed.

From seed obtained in this way we may expect plants combining in some proportion the several qualities of each parent. Sometimes the seedlings show such combination, or only some of them, or all may appear like one of the parents, or a part like the one and a part like the other; yet when plants are raised from seed of these seedlings they "often break away into various forms and combinations"; or such break may not take place until the third or even some subsequent generation. In experimenting with the progeny of hand-pollination, it is important to so isolate them that their flowers shall not be fertilized by pollen of ancestors. Often the desired result is secured, when the seedlings manifest the characteristics of one of the parents, by pollinating flowers of such with pollen from the other parent.

Here as elsewhere success is not achieved without labor, patience and skill. Mr. Burbank says, "sometimes hybridized or crossed seedlings" (when the progeny of two species, they are called 'hybrids'; when of two varieties of the same species, 'cross-breeds') "show considerable or even great variation for weeks and then change at once to one or the other of the original types; or they may show no change from one or the other parent forms until nearly ready to bloom or bear fruit, when they suddenly change in foliage, growth, and general appearance."

It is to the enthusiastic lover of Nature that she reveals her secrets. His eye catches her slightest hints, his patience never tires with her seeming waywardness; from unexpected results he often learns his most valuable lessons. The beginner will find more encouragement if he selects pure species for his experiments. Our cultivated plants are largely the result of selection, cross-breeding or hybridization, or a combination of all three; hence the result of working with them is often a return towards primitive forms. Hand-pollination between species as they exist in nature will eventuate in due time in new forms; when this occurs, then with wise selection and careful isolation patiently carried out, satisfactory results will reward patient perseverance. Many of the forms will not be of any use; Mr. Groff's seedling gladioli of 1897 gave him 150,000 new varieties, and he expects some 200,000 more this year from the material now in hand. Not very many of these are likely ever to find a place in florists' catalogues.

Mr. Saunders, speaking of his new grain creations, says, "after selecting the most desirable type or types from a cross, all other forms are discarded,