

ACCLIMATIZATION OF PLANTS.

BY ELMER GATES.

By subjecting some plants, grown in a greenhouse, to gradually increasing degrees of cold, I killed off all of the entire number except two or three from which I propagated a new crop. I again increased the cold until all but several were killed, and found that about five degrees more cold was required. The experiments were made upon plants of the same age and degree of development. The plants upon which I obtained the best results were such as the *Phaseolus multiflorus*, the *Phaseolus vulgaris*, the *Lathyrus odoratus*, and the *Nasturtium officinalis*.

The results of experiments upon these and other plants give an average of about four degrees of acclimatization to cold each generation, provided that all except a few are killed off by a carefully graduated increasing cold each generation. By gradually increasing the heat, so as to kill off all the individuals of each generation in another series of the same kind of plants, and propagating new crops from the survivors I was able to increase the acclimatization to warmth about three degrees each generation after the first.

It is necessary to artificially regulate the temperature so as to produce the exact degree of cold or heat required, (and no more nor less,) to kill off all of a crop each generation except two or three. In Nature no such systematic progress can be made, because the temperature is apt to kill off the entire crop, or not a sufficient number of them to produce regularly increasing results.

The stainings of the cellular tissues of plants that had been thus acclimatized to greater cold differed from those of the plants that had not been acclimatized to greater heat. Remembering that these stainings are qualitative analyses, these experiments demonstrate that adaptability to climatic conditions is the result of a different metabolism, and such adaptations produce new chemical compounds in the tissues.