and new leaves in the spring. In the tropics various factors may be effective at various times, which may also be said of the warmer desert regions, where rain may induce the production of foliage at any time of the year. (*Fouquieria*, Cannon, 22).

The loss of foliage in areas of marked seasonal change is a response to environmental stimuli, found in conditions which are usually and on the whole unfavourable for growth or for the physiological processes which take place in the leaf. If it happens, as in exceptional years it will, that such or analogous unfavourable conditions intervene at unusual times, general defoliation will ensue just as promptly and completely as at the usual time. Only last year (1913) in Nebraska, an almost unprecedented period of high temperatures and meagre rainfall, together with low relative humidity, caused, in addition to a far-reaching prejudice to crops, a marked shortening of the usual vegetative period. Herbaceous plants hastened to fruitage, and "early leaf maturity and leaf fall was common among native and exotic forest trees." During the late summer, after the drought had been broken, refoliation occurred, but the new leaves were small (Pool, R. J., 23). Klebs (24), cites a similar occurrence in Germany during the summer of 1910, caused by dryness in July and August, followed by refoliation, and speaks of the case as a natural experiment on a large scale to support his contention that the periodicity of trees expressed in leaf-fall is a response to external conditions, and not, as Volkens (25) has argued, especially in regard of tropical plants, a periodic phenomenon independent of the external environment, and dependent on inherited and inherent causes. The basis for this view was Volkens' failure to observe any relation between the march of climate and defoliation, as, *e.g.*, in *Ficus fulva*. Klebs insists, however, that the time of defoliation may be shifted by disturbance in surrounding conditions, and cites, among others, the fact that tropical plants could be made to shed their leaves in the very short time merely by a reduction of light.

However the attack on this problem may turn out, it is worth while to indicate that a conclusion, such as Volkens arrives at, is a sort of mental anæsthetic, which, like the vitalistic theory, lulls the mind and inhibits vigorous and critical attack. As Klebs very rightly puts it, every life-process depends in some degree upon the external world, and it is only by experimental methods that we can hope to come at a right analysis of this complex relation.

(To be continued)