

say a stamen is a contracted petal as we may say of the petal that it is an expanded stamen; or that a sepal is a contracted foliage-leaf, as that a foliage-leaf is an expanded sepal."

The immediate successors of Goethe (for he had more influence than Wolff) were too much dominated by the mood and method of the "Naturphilosophie" to effect much progress. There was a plethora of speculation which often lost all touch with reality,—speculation as to "polarities" and "rejuvenescence", as to "the wave-pulse of metamorphosis" and "the spiral tendency of growth", and a host of similar verbalisms. As Prof. Vines says, the period "was fruitful in little else than wild theorizing", but it "fortunately culminated in a reaction to investigation and induction. On a sudden, as it were, a band of men arose, of brilliant ability and indefatigable industry, whose great achievements have revolutionized not only the department of morphology, but the other branches of botany as well; I need only mention the names of Schleiden, Von Mohl, Nägeli, Hofmeister, Robt. Brown, Irmisch, Hanstein, Alex. Braun." From these, through De Bary and Sachs, we pass naturally to Goebel and Bower, and other active morphologists of to-day.

In modern times the morphological equivalence of appendicular organs has been confirmed in three ways: (a) by careful observation of actual cases of transformation, *e.g.* of bud-scales; (b) by the microscopic investigation of apparently homologous parts; and (c) by more precise embryological evidence. There is no doubt that one kind of appendicular organ may be metamorphosed into another, or more generally, "that there is a genetic relation between the forms of the same member".

The direction in which the evolution has taken place—whether from foliage-leaf to reproductive-leaf or *vice versa*—remains the subject of discussion. Goebel, for instance, strongly maintains the older view that the spore-bearing leaf (sporophyll) is a metamorphosed foliage-leaf, while Bower maintains that the foliage-leaf is a metamorphosed sporophyll, which has become