

VEGETABLE MORPHOLOGY A CENTURY
AGO. — LINNÉ AND WOLFF.

"Um die geschichte der wissenschaften aufzuklären, und den gang derselben genau kennen zu lernen, pflegt man sich sorgfältig nach ihren ersten anfängen zu erkundigen." — GOETHE.

In order to clear up the history of the sciences, and to learn to know with exactness the progress of the same, we are wont to give careful attention to their earliest beginnings.

To students of natural science no term is more familiar than 'morphology,' and no doctrine more commonly accepted and understood. Pre-eminently reasonable and natural, the morphology of plants in particular appeals to the simplest understanding. Every schoolboy who has prepared his perfunctory herbarium, or accomplished his stint in plant-analysis, knows something of the meaning of a flower, can tell something of its natural history, — how that bract and sepal and petal, stamen and carpel, are but so many modifications of an ideal leaf, so many varied expressions of a single thought. Likewise the facts to be cited in proof of such assertions are familiar to every-day experience. Who has not gathered pond-lilies, and noted how, by the steps of imperceptible transition, Nature passes on from green sepal to perfected anther? 'Double' flowers of all sorts grow in country gardens, and in springtime the woodland offers anemones which are both 'double' and green. Even proliferation is widely known in fact, if not in name.

To all these morphological facts, strange and curious as they certainly are, no one ever attempts to apply any other than the accepted explanation: no other is conceivable, none other is needed. And yet much of the ease with which such explanations are received must be considered due to the habits of thought now prevalent in the world, to the very atmosphere in which to-day men are called to think, to judge. In all the world of thought, ideas of transition are so ripe, that unity or community of origin, even of objects most dissimilar, excites small surprise: it is the natural supposition. A different atmosphere, different habits of thought among men, would change completely the simplicity of many a modern page. It is, then, not surprising that a century ago morphology, as we know it, had not so much as found a name; that, with the same facts before them, the best minds in Europe were struggling to the perception of this simple theory, which the schoolboy may now appreciate and understand. The first perception of natural truth, like the opening-up of unknown lands, is a discovery, dim enough when seen in prospect, however easy when once accomplished. Linked with the botanical

discovery here to be considered are three most brilliant names, two the brightest of their century, — Linné, Wolff, Goethe; not that all contributed equally to the establishment of the truth, but that to each the problem came, and for it each found answer. What answer to the floral problem each of these great men could give, it is our purpose here briefly to set forth, considering first the labors of Linné and Wolff, later those of Goethe.

But Linne did better than this toward the solution of our problem. In his '*Philosophia botanica*' of 1751, he, among other things, makes the following propositions:—

"Principium florum et foliorum idem est,"

"Principium gemmarum et foliorum idem est,"

which, so far as it goes, would seem a clear statement of the truth; but it is doubtful whether the author, as he wrote, appreciated the full import of his words. Certainly his immediate followers and pupils did not. He stood face to face with the truth, but recognized it not, and turned away from it, and from the only line of thought which could possibly lead to light, only henceforth to wander in vain speculations and obscurities pertaining to his theory of prolepsis,—a theory understood neither by his contemporaries, his successors, nor possibly even by himself.

But while Linné was thus hopelessly lost in the mazes of his own imaginings, another mind, working in an entirely different field, took cognizance of the problem. A young student, afterwards known to fame as Caspar F. Wolff, away in central Germany in Frederick's university of Halle, had caught the spirit of genuine scientific research, and in his thesis for graduation in 1759 published an exact, succinct, and perfectly clear statement of the modern doctrine of vegetable morphology. Wolff had ideas of his own concerning generation in all the organic world, more particularly in the world of animal life. His taste lay in the line of anatomy in its ordinary scope; and the reference in his thesis to matters botanical was entirely apart from the chief purpose of his dissertation, simply incidental for the sake of completeness; and perhaps, with the propositions of Linné, above cited, before him, he had no thought of propounding any thing new to botanical science. In perfect harmony with his subject, Wolff undertook to elucidate the origin of the various organs of a plant, and in so doing was struck with the extraordinary similarity everywhere patent. Regarding the involucre of the 'compound' flower as calyx, he perceived easily the intergradation of foliage and sepals; the ripened capsule, with bursting sides, afforded evidence of the foliar nature of the carpels; that the seed is largely made up of leaves, appears when it germinates, and the cotyledons assume and perform, to some extent at least, the leaf's function; sepals and petals are often interconvertible, and stamens not infrequently show transition to petals: consequently in the entire plant, so far as immediate analysis

goes, we find nothing but root, stem, and leaves.

As Wolff's thesis had to do with generation, and not at all with botany, it is a matter of no surprise that he regarded all this simply as introduction, and went on with his '*theoria generationis*,' alleging that the formation of flower and fruit is due to failing energy in the plant; that all modifications have origin in the gradual withdrawal of vegetative power, which diminishes in amount as growth continues, and finally vanishes altogether. What Wolff hoped might be science, has been forgotten; what he lightly esteemed,