represented the *mother-cells*, whilst the divisions of this mass have been *secondary*, *tertiary*, &c., *cells*. Lastly, the spermatozoids themselves have simply been the last generation of cells, separating themselves almost in the manner of vegetable spores.

When I made my observations on the *Torrea*, I sought with the greatest care to discover whether there were any envelope around the masses destined to be resolved into spermatozoids, and notwithstanding their unusual size in this worm I have never been able to perceive the least trace of such a covering. Neither have I been able to distinguish the walls of cells during the division. Since that time I have, many times, instituted researches of the same kind, and invariably with the same result. The spermatogenous masses have always appeared to me to be composed of a perfectly homogeneous substance, and never to present any indication of a cell-nature.

If to these observations are joined the *positive facts* which I have pointed out in the *vitellus* of worms and of the mollusca, the *negative* results which I have just recorded acquire, as it seems to me, a real value. Thus the cell-theory had been applied, very happily as it seemed, to the segmentation or division of the *vitellus;* but this doctrine necessarily succumbed before the fact that the most marked lobes, those in which both the *nucleus* and the *cell* could not fail to have been the best characterized, spontaneously fuse into one another. If, then, theoretical conceptions are discarded in favour of observation, the views which I have just explained will I hope be adopted; and it will be acknowledged that in this case at least the cell-theory should be abandoned.

On the Influence of Dilute Sulphuric Acid *on the* Deposit Layers *of the* Cell-wall *in its earliest condition.* By Dr. T. Hartig. (Botan. Zeitung, March 30, 1855, p. 222.)

In a previous paper in the same journal the author has shown that the continued multiplication of cells in the ligneous and alburnum layers, is effected by a twin pair of parent-cells belonging to each fibrous ray, the inner one of which throws off a series of sterile secondary cells towards the medulla, and the outer a similar series towards the bark.

Each of the parent-cells, which correspond in size, form, and structure, consists of a thin cell-wall and a double ptychode-sac; the cell-wall itself consists of an internal and of an external cell-membrane, between which is deposited a

greater or less number of astathe layers, which swell up strongly in sulphuric acid. (Bot. Zeit. 1854, p. 51, Tab. 1, fig. 16-17, *a*, *b*).

The youngest of the secondary cells, both of the wood and of the alburnum, exhibit no difference; they correspond in size, form, and structure not only with each other, but also with the two parent-cells, with which they constitute the compound layer designated the 'cambium.' The first apparent distinction in the structure of the secondary cells destined for the ligneous substance, and of those belonging to the alburnum, is shown in the dotting—the dots in the former being always distinct, and in the latter always grouped in a cribriform fashion. (Bot. Zeit. 1854, Tab. 1, fig. 24).

In the part of the ray belonging to the ligneous substance it is the cell-fibres and lamellar-fibres, and in that belonging to the alburnum substance it is the telial-fibres which retain unaltered the cambial condition of their walls; no further thickening of the wall ever takes place in these cells. In the ligneous part of the ray it is the woody fibres, and in that part which belongs to the alburnum it is the true alburnum-fibres which exhibit a further thickening of the cell-wall, which is effected by the deposition of new layers on the inner side of the cambial-wall. These layers of the second and subsequent generations afterwards constitute by far the main part of the thickness of the wall, whilst the cambial-wall contracts to such an extent, that its original constitution of cell-membranes and deposit-layers, which in the course of its development was distinctly demonstrable, is no longer perceptible. In this condition I have myself, he says, several times confounded the cambial-wall with what, in other situations, I have correctly described as 'eustathe' (intercellular substance, but not in the sense in which Mohl understands that term), or as 'cell-glue.' Thus, for instance, in my Leben d. Pflanzenzelle, t. ii., fig. 27 *e*, it is not 'eustathe,' but the cambial-wall, contracted by sulphuric acid and no longer capable of expansion, that is represented.

In a former memoir "Upon the formation of the deposit layers," I have shown how these additional layers arise from the regeneration of the ptychode-sac.

The additional layers of the second and subsequent generations, both in the ligneous and in the alburnum fibres, in their youngest condition, assume a beautiful rose-red colour when brought into contact for some hours with dilute sulphuric acid. In the same section and under precisely similar influence of the acid the cambial-wall remains unchanged, both in the region of the ligneous and of the alburnum-fibres, as well

as in the *cambium* and in the telienchyma, where no part of the wall at any age is coloured by sulphuric acid, owing to the circumstance that the entire cell-wall in these situations is composed of the cambial substance. It may thence be justly concluded that an *original* chemical difference exists between the deposit-layers of the cambial wall and the additional layers of the second and subsequent generations; and that this difference is manifested at a later period in the resistance offered by this parietal layer to the expansive influence of acids and alkalies.

The period is but very brief, during which the additional layers of the second and subsequent generations are reddened by sulphuric acid. In a shoot of *Pinus austriaca* examined on the 7th June, in which the annual ring had begun to be formed in the early part of May, only the 16-18 outermost fibres of each ray were reddened, whilst the older, 18-20 fibres assumed a brown colour. This gives a period of 2 or 3 weeks as the time during which the reddening effect of sulphuric acid is manifested.

On the CYSTOLITES *or* CALCAREOUS CONCRETIONS *in the* URTICACEÆ *and other* PLANTS. By H. A. WEDDEL, Aide-Naturaliste in the Jardin des Plants. (From the Annales d. Sc. Natur. Ser. IV., tom. ii., p. 267.)

ABOUT the year 1827, J. Meyen discovered in the leaves of *Ficus elastica*, and of several other species belonging to the same genus, certain pedunculate corpuscles, constituted, as he supposed, of gum or of some analogous substance; he ascertained that these corpuscles increased by the superposition of new layers, and that ultimately they became covered with notches and elevations composed of a calcareous, crystalline material, soluble with effervescence in acids (carbonate of lime).

Long after this discovery by Meyen, M. Payen undertook the study of the same bodies, whose existence he demonstrated in a great many other plants belonging to the family of the *Urticaceæ*, and he concluded from his researches that their constituent material, which was regarded by Meyen as being of a gummy nature, was in fact *cellulose*, and that it was disposed, not in concentric groups, but in true cells united into racemose masses, each of which was destined for the secretion of a certain quantity of carbonate of lime. This view, which was adopted by several botanists, has been combated by others. Thus Schleiden, who was among the first to oppose it, appears