29. M. peronæo-calcaneus. Origin: from lower part of shaft of the fibula. Insertion: into the upper surface of the calcaneum. 0·01 oz.

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## XXXVII.—*Observations on Raphides and other Crystals in Plants.*

By George Gulliver, F.R.S.

[Continued from p. 117.]

*Vitaceæ* and *Araliaceæ*.—In the last communication ('Annals' for Aug. 1865) it was stated that raphides abound in all the plants, therein specified, which I had examined of the order Vitaceæ, while every species of the allied or related orders, of which comparative examinations were made, proved to be devoid of this raphidian character. I have had an opportunity, through the courtesy of a botanical friend, of dissecting a dried fragment of the receptacle-stalk of that most curious plant, *Pterisanthes* (*Vitis Pterisanthes*, Mic., *β. borneensis*), a bit of the dried leaf-blade and fruit-shell of *Bersama abassynica*, Fresen., and a part of the dried leaf and flower of *Natalia lucens*, Hochst. (*Rhaganus lucens*, E. Meyer). To the same genus, I have been told, *Bersama abassynica* is referred by Hooker and Bentham.

*Pterisanthes*, like *Vitis*, *Cissus*, and *Leea*, abounds in true raphides and sphæraphides. The raphides of *Pterisanthes* are about $\frac{1}{400}$th of an inch long and $\frac{1}{16000}$ thick; the average diameter of the sphæraphides is $\frac{1}{1600}$th of an inch. The *Bersama* and *Natalia* are destitute of true raphides, but contain numerous crystal-prisms, about $\frac{1}{250}$th of an inch long and $\frac{1}{2286}$th thick. These may be well seen in the leaf and inner membrane of the fruit-shell of *Bersama*, and in the leaf, calyx, petals, and pedicel of *Natalia*. The prisms have four equal faces, and their ends slope off either from angle to angle or from face to face.

Thus species of all the genera adopted by Lindley under the order Vitaceæ—*Cissus*, *Vitis*, *Pterisanthes*, *Leea*, and *Rhaganus*—have now been examined, though too often in imperfect or unsatisfactory fragments; and in every one of these plants true raphides were found, except the *Bersama* and *Natalia* (*Rhaganus*), in which raphides are replaced by crystal-prisms. It may be recollected that a like phenomenon occurs in the last order (Roxburghiaceæ) of the raphidian class Dictyogenæ, as described in the 'Annals' for June 1865.

Of Araliaceæ and Vitaceæ, the comparative structure in the leaves and some other parts has already been described ('Annals' for August 1865). I have lately examined fresh leaves and twigs of *Aralia spinosa*, and a bit of a dried leaf-blade of *A. racemosa*.

These plants, like their congeners of the same order, abound in sphæraphides, but are destitute of raphides. Nothing of the kind can be more beautiful than the sphæraphid tissue ('Annals,' Sept. 1863), extending beneath the cuticle of the whole leaf and in the bark, of *A. spinosa*. These sphæraphides are about $\frac{1}{1777}$th of an inch in diameter; they are somewhat larger in the bark, and larger still in the pith.

"If," says Prof. Lindley, "the Vine is compared with *Aralia racemosa*, the relationship of Vitaceæ to it will be too obvious to be mistaken. Suppose that *Aralia racemosa* had an adherent calyx, erect ovules, with stamens opposite the petals, and it would be a *Vitis*." But now, while recognizing the similarity or identity of the sphæraphides of Araliaceæ and Vitaceæ, we perceive that *Aralia* would require also the raphidian character to be a *Vitis*. This difference is so remarkable that it may be very easily and quickly seen by a comparison of the cells in the leaves and other parts of the species before named of *Vitis* and *Aralia*. Indeed the contrast in this respect between these plants forms a very pretty microscopic object, and for this purpose the leaves of *Vitis apiifolia* and *Aralia spinosa* answer admirably.

*Calleæ*, *Orontieæ*, and *Acoreæ*.—We have already seen, under the head of the raphidian order Araceæ ('Annals,' May 1865, p. 381) how raphides could not be found in *Acorus calamus*. In a fragment of a dried leaf of *Gymnostachys anceps* I found a few raphides or raphis-like objects; but this scarcely affects the fact of the deficiency of raphides in Acoreæ, and their profusion in the members of the two other tribes of Orontiaceæ—a remarkable difference, which may be well seen by a comparison of *Calla*, *Monstera*, *Pothos*, and *Orontium* with *Acorus* and *Gymnostachys*.

*Hæmodoreæ*, *Conostyleæ*, and *Velloziеæ*.—Besides the species formerly mentioned as affording numerous raphidian cells, my dissections of *Hæmodorum planifolium*, *Anigosanthus rufus*, and *A. humilis* show a more or less abundance of raphides in all these plants. But *Vellozia* is probably devoid of raphides; for I could not detect them either in the withered leaves or bark of an old dead trunk of this plant. Hence a comparative examination of the cellular structure of the Conostyles of New Holland and the Vellozias, as well as of all the other species now placed by botanists under Hæmodoraceæ, appears to be very needful and likely to increase our knowledge of the natural affinities of this curious order. After describing some analogy between the stems of *Pandanus* and *Vellozia*, Prof. Lindley judiciously says, "Don proposed to make an order of the Vellozias; but, till their structure and that of the Bloodroots shall have been thoroughly investigated, this step would be premature."

*Pandanaceæ.*—This order, like all the rest of Lindley's Aral Alliance, abounds in raphides. Besides the plants noticed in the 'Annals' for May 1864, I have lately examined a leaf and the bark of *Pandanus odoratissimus* and the root and a leaf of *Freycinetia imbricata*. In the leaf of the former plant raphides swarm, and occur more or less plentifully in the mesophlœum, endophlœum, and alburnum; of the latter plant raphides are very abundant in the root, but less so in the leaf.

Thus, as far as these observations warrant the inference, *Pterisanthes* and *Leea* have the intimate structure of a *Vitis*, while the two species of *Rhaganus* (*Bersama* or *Natalia*) depart from that structure, but agree well together. *Acorus* and *Gymnostachys* are deficient in the raphidian character of their allies; and the Velloziæ differ in like manner from Hæmodoreæ, Conostyleæ, Pandaneæ, and Cyclantheæ.

Edenbridge, Oct. 14, 1865.

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XXXVIII.—*Note on the Cretaceous Deposits of Australia.* By Frederick M'Coy, Professor of Natural Science in the University of Melbourne, and Director of the National Museum of Victoria.

Messrs. D. Carson and J. Sutherland, of Collins Street, Melbourne, recently placed in my hands, for our public Museum, a series of specimens which they collected on the western bank of the Flinders River, at the base of Walker's Table Mountain, nearly in the middle of the continent, in lat. 21° 13′ and long. 143° 25′. The examination of these enables me to announce for the first time with certainty the existence of the Cretaceous formations in Australia. Mr. Gregory doubtfully indicated Cretaceous fossils in his last paper to the Geological Society, but without any generic or specific recognition of fossils of that age; and his materials, when referred to by the officers of the Geological Society, were only quoted as Mesozoic. Mr. Selwyn also alluded formerly to a specimen of an Echinide in flint, given to him as found in gravel in sinking a well at Prahran, near Melbourne, having been identified by me as the European Cretaceous *Conulus albogalerus*; and I had a flint *Ananchytes ovatus* of the same age, given to me as found at Richmond, near Melbourne also; but both of those specimens were unsatisfactory, as far as the proof of their having really belonged to any Australian stratum. I can now, however, recognize the Lower Chalk; and this nearly fills up the great series of marine Mesozoic formations supposed to be absent in Australia when I left Europe, but most of which I have recog-