II. "On a new Locality of Amblygonite, and on Montebrasite, a new Hydrated Aluminium and Lithium Phosphate." By A. O. Des Cloizeaux. Communicated by Prof. W. H. Miller, Foreign Secretary R.S. Received November 27, 1871.

(Abstract.)

A mineral found in 1862 at Hebron, Maine, U. S. A., after a mere tentative examination by Professor Brush, who announced the presence in it of lithia in considerable quantity, resembled the amblygonite of Penig so closely as to lead to its being looked on as amblygonite. The crystalline system and birefringent optical characters of this mineral were determined by the author in 1863. In 1870 a mineral found in the tin vein of Montebras (Creuse), though resembling the amblygonite of Hebron, appeared to the author to differ from it so far as to justify his designation of it under the name of Montebrasite. Towards the close of 1871 he received another specimen from Montebras, which presented all the characters of the American amblygonite, and which consequently was easily distinguished from the montebrasite. Subsequently, analyses by Pisani, v. Kobell, and Rammelsberg, and optical observations by the author, proved the identity of the montebrasite of Montebras with the amblygonite from Penig. But this is not the case with the amblygonite from Hebron, nor with that from Montebras, which had been analyzed by Pisani. These differ from the amblygonites of Saxony and Montebras (which last he had previously named montebrasite) by the absence of soda, by the preponderance of lithia, and the presence of a notable amount of water, while at the same time they contain almost equal proportions of phosphoric acid and alumina.

The differences which these two minerals present in their physical and chemical characters are sufficiently decided to compel our treating them as distinct species. The name amblygonite should be retained for the sodolithic species first discovered at Penig by Breithaupt, and the white or violet-tinted lamellar masses abundant at Montebras will be included under it; the hydrated and entirely lithic species comprising the laminar specimens and the crystals from Maine, as well as some greenish masses from Montebras, should be embraced under the name montebrasite.

The amblygonite of Montebras has only been met with in laminar masses with a faint tinge of violet. These masses exhibit two cleavages presenting nearly the same degree of facility, making with one another an angle of 105° 44′. Close observation shows that the sharpness of the reflected images is generally a little greater on one of the cleavages than on the other; and this induces one to suppose that they do not both belong to equivalent crystallographic planes. The study of some of their optical properties, though presenting certain special difficulties, arising from the small extent of the transparent portions and the presence of

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numerous twin plates, even in the specimens that to all appearance are the most homogeneous, has proved that the laminar masses of montebrasite must be referred to the triclinic system. The optic axes are situated in a plane which divides into two very unequal parts the acute angle of 74° 16′ of the two cleavages. This direction is entirely different from that found for montebrasite of Hebron and of Montebras, in which the plane of the axes lies in the obtuse angle of 105° formed by the two principal cleavages.

The appearance of the bars traversing the central ring of each system indicates very distinctly a twisted dispersion, as well as a small amount of inclined dispersion, which is characteristic of a crystal belonging to the triclinic system.

In November 1871 the author received a specimen from the middle of a mass of amblygonite from Montebras resembling the mineral from Hebron. It has three principal cleavages, *p*, *m*, *t*, which the author recognized in the mass from Hebron, the angles between which are $p\,m = 105°$, $m\,t = 135°$ to $136°$, $p\,t = 89°$ to $89°\,15'$.

By means of artificial twins formed of two plates, each of which had been worked perpendicular to the two cleavages *p* and *m*, and which were united by their faces *p*, it appeared that the plane of the optic axes is situated in the obtuse angle *p m*, and traverses the edge $\frac{p}{m}$, but that it is not quite normal to *m*, since it gives angles of about 82° with *m* and 23° with *p*. The character of the coloured rings shows that in montebrasite of Montebras, as in that from Hebron, there coexists with the horizontal a well-marked inclined dispersion; and these are peculiar to crystals of the triclinic system.

Analyses by M. Pisani.

	Hebron.	Montebras.
Fluorine	5·22	3·80
Phosphoric acid	46·65	47·15
Alumina	36·00	36·90
Lithia	9·75	9·84
Water	4·20	4·75
	101·82	102·44
Specific gravity	3·03, Pisani.	3·01, Pisani.
	2·99, Damour.	2·977, Damour.

Wavellite, in the form of thin coatings, forms a layer over almost all the fissures that occur in the amblygonite of Montebras. In cavities in these coatings are found long thin needles, which have enabled the author to correct the older measurements of this mineral.

M. Pisani has ascertained that the variety from Montebras yields :—

Fluorine	2·27
Phosphoric acid	34·30
Alumina	38·25
Water	26·60
	101·42
Specific gravity	2·33

February 27, 1873.

WILLIAM SPOTTISWOODE, M.A., Treasurer and Vice-President, in the Chair.

The following communication was read :—

"On Leaf-Arrangement." By HUBERT AIRY, M.A., M.D. Communicated by CHARLES DARWIN, F.R.S. Received January 21, 1873.

(Abstract.)

Assuming, as generally known, the main facts of leaf-arrangement,—the division into the whorled and spiral types, and in the latter more especially the establishment of the convergent series of fractions, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$, $\frac{13}{34}$, $\frac{21}{55}$, $\frac{34}{89}$, $\frac{55}{144}$, &c., as representatives of a corresponding series of spiral leaf-orders among plants,—we have to ask, what is the meaning that lies hidden in this law?

Mr. Darwin has taught us to regard the different species of plants as descended from some common ancestor; and therefore we must suppose that the different leaf-orders now existing have been derived by different degrees of modification from some common ancestral leaf-order.

One spiral order may be made to pass into another by a twist of the axis that carries the leaves. This fact indicates the way in which all the spiral orders may have been derived from one original order, namely by means of different degrees of twist in the axis.

We naturally look to the simplest of existing leaf-orders, the two-ranked alternate order $\frac{1}{2}$, as standing nearest to the original; for it is manifest that the orders at the other extreme of the series (the condensed arrangement of scales on fir-cones, of florets in heads of *Compositæ*, of leaves in close-lying plantains, &c.) are special and highly developed instances, to meet special needs of protection and congregation: they are, without doubt, the latest feat of phyllotactic development; and we may be sure that the course of change has been from the simple to the complex, not the reverse. This point will be illustrated by experiment below.