Notes on minerals from the neighbourhood of Binn (Switzerland)—Mispickel, Pyrites, Diopside, and Quartz.

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MISPICKEL.

CRYSTALS of mispickel are occasionally found in long brilliant tin-white prisms of simple habit in the cavities of the dolomite at Lengen-bach, near Binn; but they are more frequent as isolated crystals entirely imbedded in a rather compact mass of the dolomite. The crystals are elongated in the direction of the brachy-axis, and are terminated by two minute faces which give good images and prove to be the faces usually adopted as the prism $\{110\}$. The long faces are much striated parallel to their mutual edges of intersection; and the images were consequently so elongated in this zone that only roughly approximate measurements of the angles could be obtained. The brachydomes satisfactorily established were s $\{012\}$ and l $\{011\}$. On a very minute needle the faces of $\{021\}$ seem to be associated with $s\{012\}$, but the angles over homologous edges in which these faces meet the adjacent faces s differed by as much as $3°$. One crystal seemed to be an elbow-twin with (110) for twin-face, but the angles were not measured.

The angles on which reliance could be placed were on one crystal, $mm' = 68° 50'$, $ll' = 100° 45'$: on a second very minute crystal, $mm' = 68° 50.5'$, $ms = 72° 44'—73° 27'$, $ss' = 61° 40'—62° 34'$. The angles adopted to give the elements are: $mm' = 68° 52.5'$, $ms = 72° 55'$; hence $ss' = 62° 36'$ and $ll' = 101° 8'$.

On referring to Miller's table of angles in his edition of Phillips' 'Mineralogy,' 1852, it will be found that his three angular elements are (1) not consistent with one another, and (2) do not accord with the angles given in his table. Miller's two angular elements, $D = 29° 41'$, and $E = 49° 56'$, agree with those adopted by Professor Dana, whilst the third is given as $F = 55° 56.5'$ instead of $55° 52.5'$ as is required by the relation $\tan D \tan E \tan F = 1$.

Again, in the table we are given $mm' = 68° 48'$, $ll' = 100° 38'$, and $ee' = 120° 48'$; whilst the two angular elements first given above require

mm' to be 68° 15′, ll' to be 99° 52′, and ee' 120° 38′. The three angles given are consistent; for tan 34° 24′ tan 60° 24′ = cot D = tan 50° 19′. It looks therefore as if Miller had computed his table from the given angles, and had then in error copied his elements from another sheet of paper on which other elements had been tried.

PYRITES.

On the crystals of this substance from the Binn dolomite numerous faces are sometimes observed. On one of the crystals measured the following forms were determined: a {100}, $e = \pi$ {210} bright, π {120} rough and ill-developed, o {111}, μ {411}, m {311}, n {211}, β {322}, {544}, $s = \pi$ {321}.

The angles measured were:

$$
\begin{array}{ll}
o : (544) & 6°\ 8′ \text{ and } 6° 45′ \\
o\beta & 11\ 25 \\
on & 19\ 28 \\
om & 29\ 27,\ 29°\ 7′ \text{ and } 28°\ 49′ \\
o\mu & 35\ 12 \\
oa & 54\ 43 \\
os & 22\ 21 \text{ and } 22°\ 31′ \\
oe & 39\ \ 7
\end{array}
$$

DIOPSIDE.

Some good crystals of diopside of a pistachio-green colour imbedded in quartz are stated to be from mount Cherbadung, and doubtless come from the locality described in Hintze's 'Mineralogie,' vol. ii, p. 1063, as Thierälpeli, Tscherwandune. The crystals are sometimes long rectangular prisms with edges modified and several terminal faces; sometimes the prisms are short and not much larger than some of the faces at the ends. The angles measured accord very closely with those given by vom Rath for augite from Vesuvius. The forms which were observed are: {100}, {310}, {210}, {110}, {130}, {010}, {10$\bar{1}$}, {111}, {221}, {021}, {$\bar{2}$21}, {312}, and {$\bar{1}$32}. The faces were for the most part bright and gave very fair images; but the faces of {10$\bar{1}$}, {312}, {$\bar{1}$32} were dull, and had much the aspect of a face artificially ground but not polished.

PERICLINE, QUARTZ, AND SPHENE.

In September, 1901, a mineral-seeker from Binn found in the rocks on the south side of the Ofenhorn a cavity which was lined with large

crystals of pericline and quartz. With considerable labour these were extracted in large specimens, two of which weighed approximately 1 cwt. and $\frac{1}{2}$ cwt. respectively; the larger one is now in the British Museum, the smaller one at Cambridge. The crystals of pericline are of much the usual habit, and are much twinned according to the pericline-law. The faces are bright, but so deeply striated that I have not discovered any crystals which admit of goniometric measurement.

The crystals of quartz are limpid, but occasionally penetrated by and incrusted with chlorite. They are unusually rich in faces which belong more especially to direct rhombohedra and trapezohedra. As observed by Des Cloizeaux in his 'Mémoire sur la cristallisation et la structure intérieure du quartz,' 1858, the faces of the direct forms are bright, fairly free from striae, and slightly rounded; those of the inverse forms are small and much striated. The faces $r\,\{100\}$ and $z\,\{\bar{1}22\}$ are fairly large and irregularly developed.

The direct rhombohedra observed are: $\{100\}$, $\{13.\bar{2}.\bar{2}\}$, $\{7\bar{2}\bar{2}\}$, $\{3\bar{1}\bar{1}\}$, $\{31.\bar{1}\bar{1}.\bar{1}\bar{1}\}$, $\{11.\bar{4}.\bar{4}\}$, $\{5\bar{2}\bar{2}\}$, $\{17.7.7\}$, $\{733\}$, and possibly $\{29.\bar{10}.\bar{10}\}$, $\{9\bar{4}\bar{4}\}$.

The inverse rhombohedra are: $\{\bar{1}22\}$, $\{\bar{7}55\}$, $\{\bar{3}22\}$, but the measurements from which the two last symbols were derived were not very trustworthy.

The direct trapezohedra are: $u\,\{8\bar{4}\bar{1}\}$, $y\,\{10.5.\bar{2}\}$, $x\,\{4\bar{2}\bar{1}\}$. On two crystals a well-defined image was obtained between those of x and y inclined at $53°\ 26'$ and $53°\ 42'$ respectively to z: this face may be either $(22.\bar{11}.\bar{5})$, or $(14.\bar{7}.\bar{3})$. The former makes with z an angle $53°\ 41 \cdot 5'$, the latter one of $53°\ 11 \cdot 5'$.

The inverse trapezohedra are: $t\,\{11.\bar{4}.2\}$, $\mu\,\{2\bar{2}1\}$, $\{8.\bar{10}.5\}$.

The trigonal bipyramid $s\,\{4\bar{2}1\}$ is also present on most of the crystals, and is striated in a direction parallel to the edges in which it meets faces of the inverse trapezohedra.

The prism faces $\{2\bar{1}\bar{1}\}$ are usually of considerable length, and the crystals are sometimes doubly terminated.

The crystals of sphene are of the chlorine-green colour common to those which come from the Central Alps, and many of them are twins with (100) for twin-face. Adopting Des Cloizeaux's and Dana's axial system, the forms observed are: $\{100\}$, $\{102\}$, $\{001\}$, $\{111\}$, $\{021\}$, $\{310\}$, $\{110\}$, $\{\bar{1}32\}$, $\{\bar{1}12\}$. There was nothing exceptional in the crystals or the angles.