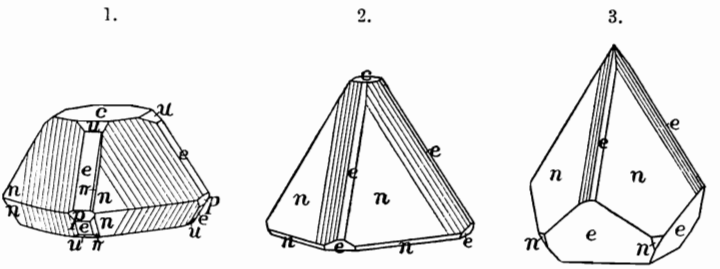
ART. XXVII.—*On Hemimorphic Wulfenite Crystals from New Mexico;* by CHARLES A. INGERSOLL.

THE crystals that will be described in this communication were found by Mr. William E. Hidden* at the Turquoise mines in the Jarilla Mountains, Doña Ana County, New Mexico, and were sent to Professor S. L. Penfield in the fall of 1892. They were implanted upon a brown siliceous gangue and were described by Mr. Hidden as occurring in seams in trachyte, associated with quartz, pyrite, chalcopyrite, malachite, gypsum, jarosite and kaolin. They were said to be of quite rare occurrence, only a very few having thus far been found, and are of especial interest on account of their peculiar hemimorphic and pyramidally hemihedral development.

* This Journal, III, xlvi, p. 401, 1893.

These crystals were small, measuring from one to two millimeters in diameter, white in color, subtransparent, and of a decided adamantine luster. Before attempting to measure any of them a careful blowpipe examination was made, and the mineral was found to be Wulfenite. Three crystals were selected as best representing the different habits of the mineral, and one of these (fig. 1) was chosen for crystallographic measurement. This was quite perfect, prominently hemi-



morphic in development, and more highly modified than any of the others. Its faces yielded remarkably distinct reflections of the goniometer signal, thus furnishing very accurate measurements of the interfacial angles. The forms that were observed, together with their hemimorphic occurrence, are as follows :

c, 001, 0 above and below.	*e*, 101, 1-*i* above and below.
n, 111, 1 " " "	*p*, 20$\bar{1}$, 2-*i* below only.
u, 102, $\frac{1}{2}$-*i* " " "	π, 313, $\frac{1\text{-}3}{2}$ above and below.

Of the above forms *p* and π were here observed for the first time ; moreover, they were found only on a single crystal (fig. 1).

The hemimorphic character of the mineral is shown in the occurrence of the *p* face, only in the lower portion of the crystal, as well as in the relative development of the other faces. The form π is present in the upper portion as a very narrow face, while below it is quite well developed. On all the crystals the lower *c* face is the larger, while the upper one is sometimes wanting (fig. 3). The development of the forms *n* and *e* on some of the crystals is very remarkable (figs. 2 and 3). A hemimorphic habit, similar to fig. 3, has already been observed by Breithaupt* on crystals from Berggieshübel in Saxony, which are described by him as being beautifully white, with adamantine luster.

* Handbuch der Mineralogie, II. p. 272, 1841.

The pyramidal hemihedrism is shown by a series of striations, resulting from an oscillatory combination of n with one of the adjacent e faces. This is found on all the crystals to the right of n only. Moreover, the form π is found only to the right of e. This development of hemihedrism in the pyramidal forms of Wulfenite is particularly interesting, since it has, hitherto, been observed chiefly in the prismatic zone.

The calculated angles in the following table were obtained from the fundamental measurement of Dauber,* $n \wedge n$, $111 \wedge \bar{1}\bar{1}1 = 131° 42'$, from which the length of the vertical axis, $c = 1{\cdot}5771$, is obtained.

	Measured.	Calculated.
$n \wedge n$, $111 \wedge 1\bar{1}1$	80° 25′	80° 22′
$e \wedge e$, $101 \wedge \bar{1}01$	115 16	115 15
$e \wedge n$, $101 \wedge 111$	40 12	40 11
$u \wedge u$, $102 \wedge \bar{1}02$	76 20	76 31
$e \wedge u$, $101 \wedge 102$	19 20	19 22
$p \wedge p$, $20\bar{1} \wedge \bar{2}0\bar{1}$	144 31	144 50
$e \wedge p$, $10\bar{1} \wedge 20\bar{1}$	14 42	14 47
$e \wedge \pi$, $10\bar{1} \wedge 31\bar{3}$	15 42	15 43
$n \wedge \pi$, $11\bar{1} \wedge 31\bar{3}$	24 30	24 28
$\pi \wedge \pi$, $313 \wedge \bar{3}\bar{1}3$	117 56	117 56
$\pi \wedge \pi$, $313 \wedge 31\bar{3}$	62 8	62 4

In the above table the measured angles have been taken as the mean of four readings. No accurate measurements could be made on c, owing to its vicinal development. The occurrence of the new forms p and π is proved not only from the above measurements but from their positions in the correct zones.

It is probable that the isomorphous minerals, scheelite, powellite and stolzite are also hemimorphic; but as yet no forms have been observed which indicate this.

In conclusion the author wishes to express his thanks to Professor Penfield for assistance rendered during the course of this investigation.

Laboratory of Mineralogy and Petrography,
Sheffield Scientific School, April, 1894.

* Pogg. Ann., cvii, p. 267, 1859.