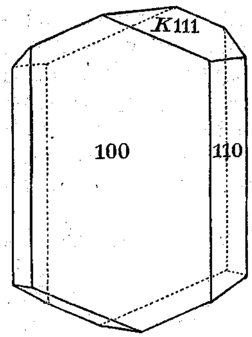
of silver emetic in water like that of cream of tartar and other salts of tartaric acid is very greatly increased by heat, and we were easily able to obtain good crystals of the compound in large quantities by dissolving the precipitate, obtained as Wallquist describes, in boiling water, and allowing the solution to cool. The crystals are colorless and have a very brilliant, almost an adamantine, luster.

From the reaction by which silver emetic is formed we should infer that the composition of the salt would be expressed by the symbol

$$Ag, SbO, H_2 \equiv O_4 \equiv (C_4H_2O_2) \;.\; H_2O.$$

This compound would theoretically contain 26·34 p. c. of silver, and, as a mean of three analyses, we obtained for the amount of silver in the crystals 26·30 per cent, as previously stated.

The crystals of silver emetic rapidly blacken in the light and are very easily decomposed by heat. This decomposition takes place at about 200° C. with a slight explosion. A very fine carbon dust is blown out of the crucible and a residue is left behind, which under the microscope is seen to consist of spangles of metallic silver mixed with an amorphous powder. Almost the whole of the powder dissolved easily in a solution of tartaric acid, and it evidently consisted of Sb_2O_3. In one experiment we weighed the silver emetic and the product, and found that 0·8460 gram. of the salt left 0·5304 gram. of residue. If the residue consisted solely of silver and Sb_2O_3, theory would require 0·5200 grams, and it can be seen from this how perfect the decomposition was. It is obvious therefore that were this compound occluded as we at first feared, it would have made itself evident on drying the precipitates.



Mr. W. H. Melville, assistant in this laboratory, has made the following crystallographic measurements of the crystals whose formation and reactions we have described.

Angles between normals.

$(111) \wedge (100)$ 70° 19⅓′
$(111) \wedge (\bar{1}\bar{1}1)$ 70° 17′
$a : b : c = 1 : 1{\cdot}386 : 0{\cdot}571$

		I.	Measured.
100	110	54° 12′	54° 19′
111 ∧	110	54° 51′	54° 54′

The pinacoid planes were irregular and the angles can only be regarded as approximate.

System Trimetric with hemihedral habit.

Observed planes + ϰ | 111 | | 100 | | 110 | | 011 | ?

In the following table the crystallographic ratios are compared with those of the acid tartrates of rubidium, cæsium and potassium, formerly measured by us, and which have the same general form and hemihedral habit.

	Vertical.	Macro.	Brachy.
Acid tartrate of cæsium	0·661	1	0·694
Acid tartrate of rubidium	0·695	1	0·726
Acid tartrate of potassium	0·737	1	0·711
Silver emetic	0·412	1	0·721

1880 AMJS 3rd Ser. Vol. 19

ART. LV.—*The Sternum in Dinosaurian Reptiles;* by Professor O. C. MARSH. (With plate XVIII).

THE presence of a sternum in Dinosaurs has long been in doubt, as hitherto this element has not been found in position, or identified with certainty among the known remains of the group. The evidence in favor of an ossified sternum in these reptiles rests mainly on a single bone, found, in the Jurassic of England, with the remains of *Ceteosaurus*, and described by Phillips.* Owen subsequently accepted this determination, and reproduced the original figure of this supposed sternum.† A few other specimens have been referred, with doubt, to the sternum of Dinosaurs, but apparently without any particular reason for the reference.

The Yale Museum has recently received a nearly complete skeleton of *Brontosaurus excelsus*, one of the largest known Dinosaurs. This huge skeleton lay nearly in the position in which the bones would naturally fall after death, and fortunately the entire scapular arch was in excellent preservation. The coracoids were in apposition with their respective scapulæ on each side, and between them lay *two* flat bones, that clearly belong to the sternum. This discovery, as interesting as it was unexpected, removes the main uncertainty about the scapular arch of Dinosaurs, and likewise indicates a new stage in the development of this structure, not before seen in adult animals.

These two sternal bones are suboval in outline, concave above, and convex below. They are parial, and in position nearly or quite joined each other on the median line. The anterior end of each bone is considerably thickened, and there is a distinct facet for union with the coracoid. The posterior end is thin, and irregular. These bones are shown in position

* Geology of Oxford, p. 268, 1871.
† Palæontographical Society, p. 31, 1875.

on Plate XVIII, figure 1, and one of them is more fully illustrated in figure 2. The inner anterior margin of each bone is smooth and rounded, and gives no evidence of union with an episternal element, which the vacancy there suggests. The amount of cartilage between these two sternal bones, or posterior to them, is not indicated by the present specimens. They were evidently separated by cartilage from the coracoids.

The nearest analogy among living forms to this double sternum may perhaps be found in immature birds. A close resemblance is apparent in the scapular arch of the young American Ostrich, represented on the same plate, figure 3. If the ossification of the sternum were permanently arrested at this stage, it would afford almost precisely the structure seen in the genus *Brontosaurus;* and this is evidently the true explanation of the fossil specimens here figured.

It is more than probable that, in many Dinosaurs, the sternum long remained cartilaginous, or so imperfectly solidified that it is not usually preserved. Several specimens of the genus *Camptonotus*, found nearly in their natural position, were apparently destitute of an ossified sternum. The large size, and doubtless great age, of the specimen of *Brontosaurus* above mentioned may perhaps have been the cause of its more perfectly developed sternum.

Yale College, New Haven, April 11, 1880.

ART. LVI.—*On the Southern Comet of February*, 1880; by B. A. GOULD.

ON the evening of February 2nd, before the twilight was fully past, my attention was drawn to a remarkable streak of light in the southwest, which extended through about 18°, at an angle not much inclined to the vertical. Its lower extremity was perhaps 20° above the horizon, and the brightness was in no part much, if indeed any, greater than that of a star of the $5\frac{1}{2}$ magnitude. It seemed to taper in both directions, fading away at each extremity, and to be between 1° and 2° wide in the middle. A moment's reflection assured me that what I saw must be part of the tail of a comet, the lower portion being obscured by haze and its nucleus being below the horizon, which was concealed by a bank of clouds. No time was lost in preparing for an accurate drawing of its position, but the mist and clouds obscured it completely within a very few minutes, before any delineation could be made. Messrs. W. G. Davis and C. W. Stevens did, however, plot from memory upon the index-map of the Uranometry a sketch of its position and form, which seemed correct to both.

Inquiries the next morning showed that the same phenomenon had been observed on the evening of February 1st, by several persons, and one assured me that he had noticed it on the evening of Saturday, January 31st. All had supposed it to be connected in some way with the burning of grass or bushes, an occurrence which is here so frequent as to attract little attention, but which caused me useless labor and inquiry on more than one occasion during the first year of my residence in this country.

In the evening the ray or streak was about 30° long, and a little brighter than on the previous night, and it had moved laterally northward. Still, a careful search, beginning immediately after sunset, failed to discover the head, or indeed any increase of brightness in the vicinity of the horizon, although the direction of the tail seemed toward the position of the sun. Careful drawings were independently made, on this and each subsequent evening during its visibility, by Mrs. Gould and Mr. C. W. Stevens; the maps Nos. 2 and 3 of the Uranometry affording an excellent means for very minute delineation.

On the 4th I saw the head for a few moments in the twilight. It scarcely seemed brighter than Encke's comet appeared under similar circumstances at its last perihelion; but it was much larger and had a coarse and undefined aspect. No nucleus was visible. There was no opportunity to discover any comparison-star, before it was lost in the mists of the horizon; but a rough position was obtained by means of the setting-circles of the equatorial. This gave, for $5^h\ 27^m\ 55^s$ of Cordoba sidereal time, R.A. $22^h\ 24^m\ 10^s$, Decl. $-31°\ 29'{\cdot}1$. The altitude of the comet having been less than $2°\ 42'$, no great reliance can be placed on this determination, which was moreover crude in other respects.

On February 5th, I obtained tolerably good comparisons with an undetermined star, the approximate position of which is $22^h\ 41^m\ 40^s$, $-32°\ 27'$ for the mean equinox of 1880·0; and from that date to February 19th, there were but two evenings on which observations were not secured, the sky having been especially propitious during that period. The tail, which I think was brightest February 6th or 7th, although then not more brilliant than the Milky Way in Taurus, maintained its inordinate length of from 35° to 40° until it faded from view, which took place only five days before the head became invisible in the $11\frac{1}{4}$ inch equatorial. Indeed it was with the greatest difficulty that I was able to observe it on the 19th, when it was only to be recognized as a slight whiteness in the field, unnoticeable without special attention. No nucleus was visible at any time during the whole duration of its visibility, nor was there any definite form or even perceptible outline to