

- II. "Researches on the Structure, Organisation, and Classification of the Fossil Reptilia. Part III. On Parts of the Skeleton of a Mammal from Triassic Rocks of Klipfontein, Fraserberg, South Africa (*Theriodesmus phylarchus*, Seeley), illustrating the Reptilian Inheritance in the Mammalian Hand." By H. G. SEELEY, F.R.S., Professor of Geography in King's College, London. Received October 24, 1887.

(Abstract.)

The author describes a slab showing impressions of the fore-limb and some other bones of the skeleton, which indicate a plantigrade animal as large as a wolverine. Its general affinities are with flesh-eating types. The humerus approximates to that of *Thylacinus*. The ulna and radius at their proximal ends are like those of Lemnroids and Carnivores, but the forms of the distal articulations are different. The carpus appears to include three central bones. Part of one of the digits appears to have been lost and renewed. The animal is regarded as a primitive type which cannot be placed in any ordinal group which has been defined.

- III. "Further Contributions to the Metallurgy of Bismuth." By EDWARD MATTHEY, F.S.A., F.C.S., Assoc. Roy. Sch. Mines. Communicated by Professor G. G. STOKES, P.R.S. Received October 20, 1887.

§ 3. *Bismuth: its Separation from Copper*.—In the paper upon this interesting metal, which I had the honour of bringing under the notice of the Royal Society in February last, I referred to the difficulties with which the treatment of bismuth is surrounded when associated with other metals—by any very rapid or comprehensive process.

During the conduct of my operations in the reduction of bismuth from its ores, and its subsequent refining, I have frequently found this metal to contain a small proportion of copper, an element most detrimental even in small traces, and hitherto I believe, only eliminated by a wet process, costly in practice and tedious in operation. It is necessary by such method to dissolve up the whole of the alloy and precipitate the bismuth in the usual manner—a bulky operation, and one requiring a considerable amount of time. It became therefore advisable, in order to treat cupreous bismuth rapidly and upon a commercial scale, to effect this separation, if possible, by means of a dry process.

In this I have succeeded.

Having observed, in conducting experiments with bismuth and its sulphides, that sulphide of bismuth becomes very easily impregnated with copper, I made the simple experiment of fusing the cupreous bismuth with bismuth sulphide, and found it possible by this means to remove every trace of copper, the sulphur readily combining with the metallic copper.

In this absorption a proportion of bismuth is reduced equivalent to the amount of copper taken up in the operation.

The residual bismuth and copper sulphides thus produced amount to but a small proportion in comparison with the quantity of alloy treated, and the bismuth is readily recovered by subsequent reduction and refusion.

Large quantities of alloy can be treated at one operation, and the bismuth so freed from copper is available for commercial purposes. I have found it better, when bismuth is associated with other metals, such as arsenic, antimony, lead, tellurium, &c., as well as with copper, to separate all these metals (see former papers) before attempting to remove the copper by the foregoing method.

The operation has been conducted successfully upon many thousands of pounds of similar alloy, and the following figures will show the results obtained in one case, as an example:—

Weight of cupreous bismuth treated = 314 lbs. containing 0·10 per cent. of copper, equal to approximately 0·3 lb.

From the operation described I obtained of bismuth	lbs.
free from copper .....	282
Of bismuth subsequently reduced and refined from the skimmings .....	29·9
And bismuth left in residues for further treatment with larger quantities (by determination) .....	2
	<hr/>
	313·9
	lb.
Copper from the skimmings .....	0·2
Copper left in residues .....	0·1
	<hr/>
	0·3 lb.

Thus the whole of the copper and of the bismuth, within a small fraction, is accounted for, the latter being obtained as commercially pure bismuth *and wholly free from copper*.

As the above operation shows, the first separation frees 90 per cent. of the bismuth *at once* from the copper associated with it.

It may be as well to state that I have effected complete separation with bismuth containing proportions of copper varying from one-tenth of 1 per cent. to 1 per cent. by the above process.