V.—ORIGIN OF PIPE ORE.

By J. P. LESLEY, of Philadelphia.

THE following account of the discovery of an underground lake in Algeria went the rounds of the newspapers in July, 1879.

The Tlemcen *Courier* (Algeria) describes a wonderful discovery recently made at the picturesque cascades of that place. Some miners had blasted an enormous rock near the cascades, and, on removal of the débris, found it had covered a large opening into a cave, the floor of which was covered with water. Constructing a rude raft, and providing themselves with candles, the workmen sailed along this underground river, which, at a distance of 60 mètres, was found to emerge into a large lake of limpid water. The roof of the cavern was very high, and covered with stalactites, the brilliant colours of which sparkled under the light of the candles. Continuing their course, the workmen had, at certain places, to navigate their craft between the stalactites, which, meeting stalagmites from the bed of the lake, formed enormous columns, which looked as if they had been made expressly to sustain the enormous arches. They thus reached the extremity of the lake, where they noticed a large channel extending toward the south, into which water quietly made its way. This is supposed to be a wide fissure which has baffled exploration hitherto at Sebdon, and which connects the cascades with that locality, and thus with the mysterious sources of the Tafna. It is possible that here they have found an immense natural basin, supplied by powerful sources, and sending a part of its waters towards the lake, while the rest goes to Sebdon. The workmen estimated the distance underground traversed by them at three kilomètres, and the breadth of the lake at two. They brought out with them a quantity of fish, which swarmed round the raft, and which were found to be blind.

Whatever exaggerations may have been indulged in by the reporter of the discovery described above, I think that it is worthy of the thoughtful attention of geologists, for several reasons:—

1. It offers a rational solution of the problem how the roofs of wide caverns in limestone regions have been, and still are, supported.

2. It supports the views which I have repeatedly published respecting the prime agent for determining the topography of the earth's surface, viz. the dissolution of the limestone formations, the letting down of the over-rocks, and the gradual withdrawal of the outcrops from each other on opposite sides of anticlinals; and in steps determined by the limestone formations.

3. It clears up the chief obstacle to a rational theory of the genesis of our pipe-ore deposits; and this is why I invite to it the attention of my fellow-geologists in Great Britain, hoping to get from them expressions of assent or dissent.

In the larger limonite mines of Pennsylvania, botryoidal ore masses occur, the origin of which has never been explained. The older mines are now open quarries, hundreds of yards long and wide, and from 50 to 150 feet deep; of irregular shapes; surrounded by walls of massive limestone; and floored with mud and standing water. They are vast pots in the Lower Silurian or Siluro-Cambrian Magnesian Limestone formation, No. II. of our old survey, the Calciferous and Chazy formations of the New York and Canada reports. Many of them have been excavated to their beds; all the iron ore removed, and the mine abandoned. Others still hold unknown quantities of limonite beneath the mud floor, as shown by trial bore-holes.

The clay which filled (and partly still fills) such a mine is

in some cases nothing but the decomposed limestone rock in place, or rather the intercalated impure limestone layers reduced to clay. In other cases the clay has been brought from the neighbourhood into the pot with, or without, lignite. In all cases it is rudely stratified; some of the layers being full of shot ore and ball ore; others being nearly pure white, yellow, or black clay. Usually the quantity of ore increases with the depth; solid floors of ore occur; or the bottom of the pot is filled with solid ore.

Up through this ore-bearing clay-mass rise steeples of pipe ore, the tops of which are struck by the miners at various distances beneath the sod. Some of them projected from the forest-covered soil, as humps of pipe-ore, and led to the discovery of the mine; others were not encountered until the quarry floor had been sunk 10, 20, or 50 feet. But in all cases the pipe-ore mass is a steeple, enlarging downwards with ever-broadening base, and standing finally on the limestone foundation at the bottom of the clay. Oftentimes several steeples unite their bases, like a clump of trees. Some of them have been 100 feet high, and proportionately wide at the base.

The common idea has been that they are concretionary masses, derived from the moist iron-bearing clays.

I have long held that all these limonite deposits have been made in caverns. I now suggest that the broader caverns had their roofs supported (for a time) by masses of stalactite (now removed by erosion) and stalagmite; and that the stalagmite piers have been metasomatized into pipe ore, and remain standing in the surrounding clay.

1008, CLINTON-STREET, PHILADELPHIA,

July 29, 1878.

NOTICES OF MEMOIRS.

AMMONITES OF THE MEDITERRANEAN AND JUVAVIAN TRIAS. By
DR. ED. VON MOJSISOVICS.

[Proceed. Imper. Geol. Instit. Vienna, April 1, 1879.]

(Communicated by Count MARSHALL, F.C.G.S., etc., etc.)

GENERAL CONSIDERATIONS.

THE forms united in one genus must agree in their least variable characters (disposition and form of the lobes, form and structure of the shell, length of the body-chamber, and form of the margin of the aperture). In continuous genetic series, the limits between the primary genus and those descending (?) from it must necessarily be traced somewhat arbitrarily. Forms or groups of forms, of sporadic occurrence, not possessing indubitable characters of known genera, are generally best considered as constituting independent genera. Isolated forms, notably aberrant in one direction from the generic type, are provisionally ranked among the primary genera.

ARCESTIDÆ.

The genera *Cladiscites*, *Joannites*, and *Sphingites* being eliminated,