the crucible, is ladled out into moulds. Thence it is taken to the refinery, where it is cuppelled in the usual way. The block of metallic zinc recovered in the condenser is removed, and used over again in the first part of the process. All the oxide of lead and dross formed in the different processes are taken to the reducing-furnace, mixed with coal-dross, and reduced to the metallic state. The refuse from this furnace still contains some lead, and is put through the slag hearth, a blast furnace fired with coke, the fumes of lead oxides from which are condensed in what is known as Johnson's patent condenser, and are all recovered. The lead from the slag hearth, containing a number of impurities, as copper, antimony, iron, or sulphur, is taken to the improving furnace—a furnace built in exactly the same way as the dezincifying pan. About 20 tons of this lead are heated for a period generally from four or five days, but the time varies according to the amount of impurities present. The oxidised impurities, as they are formed, float to the surface, and are skimmed off by the workman, who is made to keep the lead perfectly clean, so as to have a fresh surface always exposed to the action of the flame. The dross skimmed off is first of a black color, but gradually becomes lighter as the operation goes on, until it shows nothing but yellow oxide of lead. When this appearance is noted the pan is tapped into moulds, or into the desilverizing pot, where it is treated with zinc, and the silver extracted as in the manner before described. By this process the lead can be desilverized and turned out in the shape of market lead in thirty hours from the time it is put in process ; the loss in working being not more than 1¼ per cent., and the amount of oxide of lead formed is very much less than that formed in any of the other processes, thereby effecting a very considerable saving in the working expenses. It makes an excellent quality of sheets, pipes, red-lead, and litharge, and has even been used for the manufacture of white-lead. There is, however, one product it cannot be used for by itself, and that is the manufacture of chemical lead. Your President gave us a very interesting paper on this subject last session, showing that the reason of its not being suitable for this was on account of its extreme purity. I understand that Mr. James Napier, Jr., of this Society, has made a number of experiments in the same direction, and found that by adding to it a small percentage of copper or antimony, or both, a good chemical lead can be obtained. That all the silver is thoroughly taken out may be seen from the fact that there is an excess of silver obtained on the large scale to the extent of nearly 2 per cent. over the assays. An analysis of the market lead gave—Antimony, 0.0015, and silver 0.0004 per cent., a trace of copper, but no iron or zinc ; from which it will be seen that the lead refined by the zinc process is almost chemically pure, and to this is due the finer quality of the products manufactured from it.

THE TERRESTRIAL PROGRESSION OF THE BRAZILIAN "CAMBOTA," *CALLICHTHYS ASPER.*

To the Editor of SCIENCE :—

Letters from Mr. John C. Branner, who was engaged upon the geological survey of Brazil under the late Prof. C. F. Hartt of Cornell University, contain extracts from letters to him from Mr. Joseph Mawson, Bahia, describing some habits of the siluroid fish, *Callichthys Asper*, there known as "*Cambota*." These habits have probably been observed and described already, but as they are not referred to in Günther's Catalogue of the Fishes in the British Museum the account of a recent observer may be interesting to the readers of "SCIENCE."

"During the rainy season the fish live in fresh water pools. When the pools dry up in the dry season, they bury themselves in the mud and remain there until the rains return the following year. They are noted for overland excursions. It is said that they are often met with going from one pool to another.

I have had six of the fish in a narrow-necked tin of water, with some sand and mandioca meal at the bottom, for five days, and they continue active and vigorous, especially the smaller ones. These examples measure from 5 to 10 cm. in length, and I have seen them much larger. I have had them out in the garden several times. I find that they move best on smooth damp ground, and are embarrased by sticks or other inequalities. They can jump a little vertically, but their progress on land is effected entirely by a quick wriggling motion of the body which is nearly flat upon the ground. The paired fins (pectorals and ventrals) are extended laterally, and seem to bear little if any weight; but they move slightly, and appear to serve to steady the body.

Last night I heard a peculiar sound, and on looking around I saw one of the fish travelling about the room. He had escaped from the tin which was in my bed-room, had fallen from the table to the floor, and travelled along the corridor, about 12 meters (about 40 feet) to the *sala*. I watched him travelling for two hours, during which time I estimate that he moved at least 90 meters. Toward the end of the two hours he seemed to flag a little, but in the earlier part his method and speed were fairly seen. He seemed to start with a sudden movement of the head or the barbels, then wriggled briskly for 5 to 10 seconds, advancing about a meter. Then he would rest for about 10 seconds, and start as before. This was kept up during the whole two hours, and I left him still moving. This morning, five hours later, I found him dead. While he was moving I spilled some water on the floor, but he crossed it ; hence I concluded that it was mud rather than water of which he was in search. The fish are eaten and considered good food."

It may be added that some examples of these fish were brought me by Mr. Branner, and found to be the *Callichthys asper*. The species of the genus are easily recognized from the fact that the trunk is covered by only two rows of large scales, a dorsal and a ventral series.

The ability of *Callichthys* to withstand a somewhat protracted deprivation of water, which it shares with other fishes of South America and India, with the North American Ganoids *Amia* and *Lepidosteus*, and with some other Ganoids and Dipnoans, is probably accounted for by the observations of Prof. Jobert of Rio Janeiro, published in the *Annales des Sciences Naturelles*, sixth series, V. and VII.

ITHACA, Dec. 21, 1880. BURT G. WILDER.

ASTRONOMY.

A PROBABLE VARIABLE STAR.—On Nov. 25, Swift's Comet was compared with the star No. 4339 of Lalande, by Mr. Talmage at Mr. Barclay's Observatory, Leyton, the magnitude of the star being estimated 8, as it was also by Lalande. Argelander in the *Durchmusterung* gives it 6.4 and Heis made it a naked eye star 6.7, but erroneously identifies it with Lalande 4359. It escaped observation in the Bonn Zones and may be worth occasional examination as likely to prove an addition to our variable star list.—*Nature.*

WINNECKE suggests that Hartwig's Comet is identical with the comets of 1382, 1444, 1506, 1569 and that it therefore has a period of 62⅓ years.

THE asteroid picked up by Peters on Oct. 10, is identical with that discovered by Palisa on Sept. 30.

M. TRIPIER is expected to take charge of the Observatory of Algiers in April, 1881.

DR. COPELAND at Dunecht, using Prof. Pickering's device of a prism introduced between the eyepiece and