Letters to the Editor.

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Transmutation of Elements.

PROF. A. SMITS, in a letter in NATURE of Jan. 2, 1926, announced the possibility of transmuting lead into thallium and mercury. In the December number of *Zeits. f. Elektrochem.* these experiments are described in more detail by Smits and Karssen. They used a quartz tube, furnished with two steel electrodes with carbon points, which dip down into the liquid lead. The amount of lead used is about 900 grams, which is kept liquid in a side tube all the time. When an experiment is performed, the tube is tipped and the lead is brought over into the main tube. The arc which is burning between two inner surfaces of lead is either continuous or intermittent, the main consideration being to obtain as high a current density as possible. The first method gave strong spectroscopic evidence of mercury and thallium after 10 hours' burning at ±35 amp. The second is the so-called sparking method, in which a current of 60-100 amp. can pass through the tube at the make of the arc, that is, when the tube is short-circuited through the liquid lead. Here all the mercury lines, even the very weak ones, were present after 9¼ hours' sparking.

I have been trying to check this work of Smits and Karssen, using a tube of similar construction, the dimensions, however, being smaller, as the amount of lead used was only 180-200 gm., and the bore of the tube where the arc was burning was $\frac{5}{8}$ in. The sparking method was first tried with an evacuated tube for 14 hours, with a current in the short-circuited tube of 60-75 amp., plus 21¼ hours with 80-90 amp. The lead was found to be pure by spectroscopic examination before the run started, and the spectra throughout the experiment, mostly photographed at 5-hour intervals, showed no mercury or thallium lines.

After a breakdown of this tube, a new run was started with new lead which, however, on very good spectrograms, showed slight traces of mercury and thallium. This time the arc was burning in $\frac{1}{5}$-$\frac{1}{7}$ of an atmosphere of nitrogen. First, an experiment with continuous current was performed for 25 hours, with current densities from 15 amp. to 25 amp., the latter value being maintained for 10 hours at about 38 volts. No appreciable change in the intensity of the mercury and thallium lines could be detected. The sparking method was again tried with nitrogen filling, without changing the construction of the tube or touching the lead. No mechanical devices were necessary, since the arc under a certain pressure and with a certain amount of lead present, will make and break itself as soon as the lead surfaces are brought to contact. This way of sparking should be very effective, as the arc runs through all stages of burning. After a 10 hours' run with 65 amp. to 95 amp. was performed, the scheme of connexions was changed, putting a condenser across the terminals, and a big inductance in series with the tube to protect the generator against transients. The current in the arc was now increased to 120 amp. short-circuited, and was about 60 amp. when the arc broke. With this arrangement a 12 hours' run was performed, but no increase in the strength of the mercury or thallium lines could be detected. The actual burning time of arc was a little less than half the time, and the number of contacts ranged around one a second. On increasing the current up to 150 amp., the tube broke after 2½ hours' run.

As will be seen, the currents compare with, and even exceed, those used by Smits and Karssen, and as the dimensions of the tube are smaller the actual current densities are higher. On account of the smaller amounts of lead used, the expected products of transmutation should be more easily detected, but in spite of these two favourable conditions no transmutation could be found.

It is the author's intention also to try out the second method by which Smits and Karssen claim to get positive results, namely, high potential discharges between lead electrodes in carbon disulphide.

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The Floods at Memphis.

THE news of the dangerous floods at Memphis, Tennessee, inevitably invites a comparison with its Egyptian namesake. The modern town was laid out in 1819 (soon after the evacuation of the surrounding territory by the Chickasaw Indians) by three men, John Overton, Andrew Jackson, and James Winchester, who gave it the name of the most ancient of the great capitals of Egypt because of the similarity in the geographical positions of the two sites. They realised that the American site enjoyed an advantageous position at the head of the navigable waters of the Mississippi, and from that they doubtless hoped—and time has amply justified their hope—to derive the great commercial future for their new city which a like position at the apex of the Nile Delta had secured for Egyptian Memphis throughout a period of three thousand years.

It seems possible, however, that the founders of the town had forgotten the implicit warning of Herodotus, who made his headquarters at Memphis when he visited Egypt in the latter half of the fifth century B.C. Speaking of the foundation of that city in the dim beginnings of Egyptian history, he tells us (as the priests had told him) how the river had originally flowed right under the western cliffs—as it might be the Chickasaw Bluffs in Tennessee—and how, in order to secure a larger area of low-lying irrigable land, the reigning king dammed the Nile and turned it into the middle of the valley between the two desert ranges, and then let it rejoin its bed at the apex of the Delta. He goes on to say that "to this day" (his day) the point at which the river was thus bent out of its old course was guarded by the Persians—then ruling Egypt—"with the greatest care," and was strengthened every year. "*For if the river were to burst out at this place, and pour over the mound* (i.e. *the dam*), *there would be danger of Memphis being completely overwhelmed by flood.*"

We have no exact information as to the nature of the defences thus so carefully manned by the Persians, though we may feel tolerably certain that they consisted simply in the earth banks which are almost as old in conception as the Nile mud itself and are still to be seen throughout the length of Egypt to-day. But the Greek historian's account has been verified and very happily supplemented by modern excavation. Herodotus tells us of a "camp of the Foreigners." Sir Flinders Petrie, who dug at Memphis for several years before the War, guessed that this referred to the mixed levies of the Persians; and in his first season's work he struck a building which, as he had calculated, turned out to be this very camp. It lay on the south-east edge of the