days later than usual; the Lilac was in bloom on the 5th of May, 11 days earlier than usual; and Strawberries were ripe on the 14th of June, one day earlier than usual.—*London Times.*

E. J. LOWE.

On the Electro-Plating of Metallic Articles with White Metals, Aluminium and Silicium, from Clay, Stone, and Sand.

By G. Gore, M.D.

It has long been known to chemists that all kinds of clay, stone, and sand, of which the crust of the earth is composed, consist of metals combined with oxygen, carbonic acid, sulphuric acid, and other non-metallic elements, forming therewith oxides, carbonates, sulphates, &c.; thus clay is an oxide of aluminium, sand an oxide of silicium, limestone a carbonate of the oxide of calcium. But the separation of the metallic bases from the non-metallic elements with which they are combined, has been a matter of so great a difficulty, that but few chemists have put themselves to the trouble of accomplishing it, and those who have done so have made use of the most powerful means and reducing agents, such as large voltaic batteries, potassium, &c., and have then obtained them in a state of alloy or combination with mercury. Sir Humphrey Davy, the discoverer of most of these bases, in his experiments on the decomposition of the alkalies and earths, used a powerful battery, consisting of 500 pairs of plates, and then succeeded in obtaining them combined with mercury, from which they were afterwards separated; Wohler and Berzelius, in their discoveries of the means of separating the metals aluminium and silicium from their respective compounds, clay and sand, used a high temperature and potassium, and then, succeeded in obtaining them in the condition of dull metallic powders, nearly invisible.

By a means recently discovered, and described in the March number of the "Philosophical Magazine" for this year, I have succeeded in depositing the metals aluminium from clay, and silicium from sand stone, each in a perfect metallic condition, by dissolving pipe-clay, common red sand, pounded stone, &c., in various chemical liquids, and passing currents of electricity from ordinary small voltaic batteries through the solutions.

My attention has since been directed to produce simple processes, whereby any person not possessing a knowledge of chemistry may readily coat articles with those metals, and cause the discovery to be immediately applied to human benefit in the arts and manufactures, and the following are the results of my experiments:—

To coat articles of copper, brass, or German silver, with aluminium, take equal measures of sulphuric acid and water, or take one measure each of sulphuric and hydrochloric acids and two measures of water; add to the water a small quantity of pipe-clay, in the proportion of five or ten grains by weight to every ounce by measure of water (or ½ oz. to the pint), rub the clay with the water until the two are perfectly mixed, then add the acid to the clay solution, and boil the mixture in a covered glass vessel one hour. Allow the liquid to settle, take the clear, supernatant solution, while hot, and immerse in it an earthern porous cell, containing a mixture of one measure of sulphuric acid and ten measures of water, together with a rod or plate of amalgamated zinc; take a small Smee's battery, of three or four pairs of plates, connected together intensity fashion, and connect its positive pole by a wire, with the piece of zinc in the porous cell. Having perfectly cleaned the surface of the article to be coated, connect it by a wire with the negative pole of the battery, and immerse it in the hot clay solution; immediately abundance of gas will be evolved from the whole of the immersed surface of the article, and in a few minutes, if the size of the article is adapted to the quantity of the current of electricity passing through it, a fine white deposit of aluminium will appear all over its surface. It may then be taken out, washed quickly in clean water, and wiped dry and polished; but, if a thicker coating is required, it must be taken out when the deposit becomes dull in appearance, washed, dried, polished, and re-immersed; and this must be repeated at intervals, as often as it becomes dull, until the required thickness is obtained. With small articles it is not absolutely necessary, either in this or the following process, that a separate battery be employed, as the article to be coated may be connected by a wire with the piece of zinc in the porous cell, and immersed in the outer liquid, when it will receive a deposit, but more slowly than when a battery is employed.

To coat articles with Silicium. Take the following proportions: three-quarters of an ounce, by measure, of hydrofluoric acid, a quarter of an ounce of hydrochloric acid, and forty or fifty grains either precipitated silica or of fine white sand, (the former dissolves most freely), and boil the whole together a few minutes, until no more silica is disolved. Use the solution, exactly in the same manner as the clay solution, and a fine white deposit of metallic silicium will be obtained, provided the size of the article is adapted to the quantity of the electric current; common red sand, or indeed any kind of silicious stone, finely powdered may be used in place of the white sand, and with equal success, if it be previously boiled in hydrochloric acid, to remove the red oxide of iron or other impurities.

Both in depositing aluminium and silicium, it is necessary to well saturate the acids with the solid ingredients by boiling, otherwise very little deposit of metal will be obtained.

Among the many experiments I have made upon this subject, the following are a few of the most interesting:—Experiment 1. Boiled some pipe-clay in caustic potash and water, poured the clear part of the solution into a glass vessel and immersed in it a small earthen porous cell, containing dilute sulphuric acid and a piece of amalgamated zinc; immersed a similar piece of bright sheet copper in the alkaline liquid, and connected it with the negative pole of a small Smee's battery of three pairs of plates connected the zinc plate with the positive pole, and let the whole stand undisturbed all night: on examining it next morning I found the piece of copper coated with a white silver-like deposit of metallic aluminium.

Experiment 2. Obtained from a railway cutting in the town, a small piece of the sand rock upon which Birmingham is built, boiled it in hydrochloric acid, to remove the red oxide of iron, washed it clean with water, and dissolved it by boiling in a mixture of hydro-fluoric acid, nitric acid, and water; immersed in this solution, a porous cell with dilute acid and zinc as before; connected a piece of brass with the zinc by a wire, and suspended it in the outer liquid, which was kept hot by means of a small spirit lamp beneath; after allowing the action to proceed several hours, I found the piece of brass beautifully coated with white metallic silicium.

Experiment 3. Took one part, by weight, of the same sand stone, after being purified by the hydrochloric acid, and 2½ parts of carbonate of potash, fused them together in a crucible until all evolution of gas ceased, and a perfect glass was formed: poured out the melted glass, and when cold dissolved it in water and used this solution in the same manner as the former ones, allowing the action to proceed about twelve hours, when a good white deposit of metallic silicium was obtained.

Experiment 4. Took some stones with which the streets of Birmingham are macadamised, pounded them fine in a mortar, boiled the powder in hydrochloric acid, to purify it from iron, washed it well in water, and dissolved it by boiling an excess of it in a mixture of ¾ oz., by measure, of hydro-fluoric acid, ½ oz., of water, and ½ oz. each of nitric and hydro-chloric acids, until no more would dissolve; used the clear portion of this solution in the same manner as the former liquids, and readily coated in it a piece of brass with a beautifully white deposit either of aluminium or silicium.

From these and many other experiments which I have tried, it is quite clear that common metal articles may be readily coated with white metals, possessing similar characters to silver, from solutions of the most common and abundant materials, and thus bring within the purchase of the poorer classes articles of taste and cleanliness which are at present only to be obtained by the comparatively wealthy.

The following specimens accompany the communication, and may be seen at the society's house;—

1st. One specimen each of sheet copper and brass, coated with aluminium from "Pipe-clay," according to process described.

2nd. One specimen each of sheet copper and brass, coated with silicium, from silica and sand, according to process described.

3rd. Specimen of Birmingham sand rock.

4th. Specimen of ditto, purified by hydro-chloric acid.

5th. Specimen of sheet metal coated with silicium from Birmingham sand-stone.