MICROSCOPY OF LATERITIC SLAGS OR MAN-MADE LATERITES

by Dr. R. Hamilton (1)

Some very striking details in the landscapes and scenery of West African savannas are in addition to their termite mounds their vast ironstone crusts and the scattered huge ironstone boulders. These things were of course also well known to all savanna dwellenssince time immemorial. They are quite familiar with them, not only from observation and farming but also from its various uses. One of its most important uses was as an iron ore.

During many centuries in the history of these savanna people a multitude of articles were made from it for domestic, ornamental, trade or war purpose. For these purposesthe ironstone crusts and boulders are quarried and with a hammer.Then the most metallic lumps are picked out and finally molten and reduced in a simple "blast furnace" with charcoal. By this primitive melting and reducing of iron rich laterites two rather heavy products are formed i. e. an iron bearing silicate slag and a rather pure but crude pig iron. In this article the composition of the slag only is described. The study of the used pig iron is still under ore microscopic investigation and will be published later. In fact this pig iron is hammered into a very good carbon steel.

The slags are rough, hard and full of gas cavities (scoriaceous). Often they contain also some remains of charcoal but otherwise they look pretty similar to natural laterites (iron crusts). Because of this similarity they are sometimes called "artificial or man-made laterites". For the quality and properties of the crude iron these slags are very important and necessary.

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Their scouring and improving action on the metal is a matter of common knowledge.

The microscopy of these slags do reveal two quite different parts. One part is transparent, very pale greenish to almost colourless. It has a platy structure with well developed cleavages (fig. 1). This part is made up of a silicate (fayalite). It is a reaction product between the silicate and other impurities of the original laterite.

The other part is opaque, quite black and with a pine-tree like structure. Some small tubes or rods are also visible (fig. 2). This part consists only of iron oxides i.e. magnetite and sometimes a little haematite too. The proportion between both parts depends wholly upon the used laterites (iron crusts) i.e. whether they were very siliceous or more ferruginous. In other words it depends upon the SiO_2/Fe_2O_3 ratio.

COMMENTS ON THE MEANING AND USE OF A FEW SOIL TERMS

by Dr. R. Hamilton

It is always confusing and incomprehensible when a word is not used according to the plain and manifest meaning which it shows and represents or when its apparent meaning is obscured with arbitrary restrictions (climatic or vegetational etc.) which are not readable from the word itself. e.g.

Chemistry (paramount elements only !) i. e. soils rich in:	Loose(sub)[1] soils (suffix: "sol" or soil)	Hard(ened sub)[1] soils (suffix: "it" = lithos = =rock =hard !)
Al rootword: All + it = allit	allic soils = = soft bauxite[2]	allit = (hard) bauxite[2]
Fe rootword: ferri + sol or + it = ferrisol etc.	ferric soils = ferrisols	"ferrit (it) e"[3] = iron laterite[4] = =cuirasse
Fe + Al rootword: ferr + all + it = ferrallit	ferrallic soils = ferralsols	ferrallit = iron-aluminium laterite =cuirasse
Fe + Si + Al (=ferruginous kaoline) rootword: fer + si + all + + it = fersiallit	fersiallic soils = = latosols[5]	fersiallit = = "buchananite"[6]

1 a soil or profile is named after the characteristics of the subsoil, - not after the alike, grey and humic topsoils.

2 bauxite = soil material, either loose or hard, rich in alumina.

3 ferrit(it)e = hardening or hardened ironstone pan.

4 laterite hardened soil material with colour and hardness of brick (= "later"), i. e. irrespective of Buchanan's original meaning but in accordance with general use at present.

5 latosol = loose soil material with the colour of a brick(="later") - only.

6 "buchananite" = hardening or hardened soil material = Buchanan's original "laterite".

MICROSCOPY OF LATERITIC SLAGS

SUMMARY

In Africa laterites are everywhere and occur in various forms e.g. concretionary laterites, massive iron laterites (either hard or brittle), quartziferous (quartzy) laterites, scoriaceous laterites, tubular laterites, etc. All these types are real natural products. However these is one "slaggy type" strongly resembling some natural laterites which is not natural but a man made product. This is a "lateritic slag" made by the natives when melting iron rich real laterites into lumps of pig iron. Later this pig iron is hammered into useful steely (a good hard carbon steel with some manganese and silica and only traces of phosphorus and sulphur) tools and weapons.

The pig iron is easy to distinguish from the natural laterites but the lateritic slag not always. However both occur on small melting places where they lie about scattered or in heap and where sometimes even the remains of the primitive but very effective blast furnaces can be seen. Moreover some "lateritic slag" still contain pieces of charcoal from the melting process.

Under the microscope the difference between natural and "man made laterite" is quite evident as the mineral fayalite never occurs in natural laterites. But of course the minerals magnetite and hematite do occur in- both forms though sometimes differently crystallized.

LEGENDS TO FIGURES

Fig. 1.- Transparent platy silicates (fayalite) with a very good cleavage. All cracks are well marked by iron oxides.

Fig. 2.- An opaque pinetree like structure of iron oxides. This is an immature crystal of magnetite.

Fig. 1

Fig. 2