

the ponds on Mill Hill and the high ground of Totteridge, which have a very restricted drainage-area, and must owe their replenishment to the same cause as the dew-ponds of the South Downs.

7. LAND FORMS.—Another important communication, bearing on Geology and Geography has been brought before the Geographical Society by Professor W. M. Davis (*Geographical Journal*, September, 1909). He has, in a discourse on “The Systematic Description of Land Forms”, sought to persuade geographers to introduce concise methods of description and to employ precise terms for types of feature. For this purpose a knowledge of geological structure as well as the forces of erosion is necessary.

8. A NEW JURASSIC AMMONITE.—A description of a new species of Ammonite, of the genus *Stepheoceras*, was contributed by the late Dr. J. F. Whiteaves to *The Ottawa Naturalist* (May, 1909). The specimen was obtained from rocks, presumably of Jurassic age, in the Nicola Valley, British Columbia.

9. TIN DEPOSITS IN THE MALAY PENINSULA.—In a paper on “The Origin of Tin Deposits”, read by Mr. J. B. Scrivenor, before the Perak Chamber of Mines, 1909, the author concluded that the tin deposits in the Malay Peninsula conform with tin deposits elsewhere in having as their source a mass of igneous rock containing a high percentage of silica. The importance of fluorine as a reagent in the processes that led to the formation of cassiterite was emphasized, while, on the other hand, it appeared that boron was not essential in those reactions.

10. TIN MINING AND WATER SUPPLY, FEDERATED MALAY STATES.—We have received the Annual Report for 1908, of Mr. Scrivenor, Geologist to the Federated Malay States. He deals with the question of water supply, and with the expectation that at a depth beneath the alluvial mangrove mud of the Perak River there might be found sand saturated by springs from the bed-rock of the valley. A trial-bore at Bagan Datoh has, however, encountered brackish water at a depth of 150 feet. The tin-mining receives special attention, and the Lahat ‘pipe’ is described as an instance of a lode-deposit which is being converted *in situ* into a detrital-deposit. The alluvial ore-deposits are likewise dealt with.

CORRESPONDENCE.

ON THE USE OF THE TERM ‘LATERITE’.

SIR,—In the September number of the GEOLOGICAL MAGAZINE, p. 431, Mr. J. B. Scrivenor has written objecting to the restricted and definite use of the term laterite as advocated in the *Bulletin of the Imperial Institute*, 1909, vol. vii, p. 134. Mr. Scrivenor claims that the word laterite “has been used in the Malay Peninsula for many years by a large body of engineers for what are essentially masses of iron oxide replacing portions of weathered rocks, and filling fissures in such rocks near the surface”. He also claims that “laterite is an engineer’s rather than a geologist’s term, covering rocks of varying

composition". The word has, however, been consistently used as a scientific term, and its meaning, at least so far as geologists are concerned, should be decided not by the loose usages of engineers, but by the way in which it was first defined and subsequently used by the best authorities.

The term laterite was introduced in 1807 by F. Buchanan in his *Journey from Madras, through Mysore, Canara, and Malabar*. He describes the occurrence of iron ore at Angadapuram in the hills west of Calicut on the Malabar coast, and in vol. ii, p. 436, remarks as follows:—"In all the hills of the country the ore is found forming beds, veins, or detached masses in the stratum of indurated clay, that is to be afterwards described, and of which the greater part of the hills of Malabar consists."

It will be seen that Buchanan clearly regarded the indurated clay as distinct from the iron ores. On p. 440 he continues: "What I have called indurated clay . . . is one of the most valuable materials for building. It is diffused in immense masses, without any appearance of stratification, and is placed over the granite which forms the basis of Malayala. It is full of cavities and pores and contains a very large quantity of iron in the form of red and yellow ochres. In the mass, while excluded from the air, it is so soft, that any iron instrument readily cuts it, and is dug up in square masses with a pickaxe, and immediately cut into the shape wanted with a trowel, or large knife. It very soon after becomes as hard as a brick, and resists the air and water much better than any bricks I have seen in India. . . . As it is usually cut into the form of bricks for building, in several of the native dialects it is called the brick stone (*Itica cullu*). . . . The most proper English name would be Laterite, from *Lateritis*, the appellation that may be given to it in science."

The laterite thus described by Buchanan is the clay-like material which occurs extensively in India as the product of one type of tropical or subtropical weathering of crystalline rocks, containing aluminous silicates, and which is essentially characterized by the presence of hydrated alumina. It has, as Buchanan says, the power of hardening on exposure, and for that reason it has been extensively used as road metal. It is to this material that the word laterite has been for many years mainly applied in India, not only by geologists, but also by engineers.

The recognition of the fact that laterite is essentially characterized by the presence of free hydrated alumina is due to Professor Max Bauer, who worked on the laterite of the Seychelles (*Jahrbuch für Min.*, etc., 1898, vol. ii, pp. 192-219).

The conclusions arrived at by Max Bauer were confirmed and amplified by Sir Thomas Holland, late Director of the Geological Survey of India, in a paper "On the Constitution and Dehydration of Laterite", published in this Magazine (Décade IV, Vol. X, 1903, p. 59), and have been almost universally adopted among Continental geologists.

We find, therefore, that Buchanan, who introduced the term laterite, attached to it a significance which is in strict agreement with modern

scientific usage; and the loose application of the term to ordinary ferruginous clays, iron ores, etc., is wholly unwarranted.

From a scientific standpoint, Mr. Scrivenor's suggestion that the term bauxite should be applied to laterite in the sense here defined is not justifiable. Bauxite is a mineral name, signifying a hydrated alumina of fairly definite composition. Laterite is properly a rock name, signifying the product of a special kind of weathering; it is a complex product, essentially characterized by the presence of free hydrated alumina, but usually containing also notable amounts of titanium and iron oxides, whilst free silica is generally present, and hydrated silicate of aluminium is not necessarily absent. The amount of iron oxide is very variable; but when it becomes excessive it usually separates out in the form of concretionary iron ore. In defining the word laterite, however, Buchanan, as we have already seen, clearly distinguished such iron ore from the laterite in which it occurred; and in no case did he apply the term to material resembling that referred to by Mr. Scrivenor as "masses of iron ore".

The term laterite is used in a loose way not merely for material which is essentially iron ore and which should be described as such; it is also used by some people as a name for any ferruginous clay, sand, or gravel which may occur at or near the surface in tropical and subtropical countries. Such uses of the term are unscientific, and cannot properly be adopted by geologists, any more than they can adopt the engineers' use of the term granite to cover all holocrystalline igneous rocks, including syenite, diorite, and gabbro.

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"AN EGYPTIAN OASIS."

SIR,—In your review of this work (p. 477) you call special attention to Mr. Beadnell's suggestion, that a lake in the Kharga district may have been due to the letting loose of artesian waters through denudation of the once overlying impervious beds. This interested me much, as I had attributed to the same cause the formation of swallow-holes and valleys. (See "Ightham", Homeland Association, 1907, pp. 127–30, and also more fully in *Geographical Journal*, September, 1908.) It is, therefore, gratifying to have my views independently confirmed by one who has had such intimate experience of flowing artesian wells as Mr. Beadnell.¹

I may say that before my views were published I put them forth in correspondence with some leading geologists, and they were strongly contested by some and not really accepted by any. Those who attended the Loose Valley Excursion this year of the Geologists' Association in July saw an area near Maidstone where, as I consider, this suggested method of valley formation is particularly well shown.

F. J. BENNETT.

WEST MALLING.
October 7, 1909.

¹ See also Capt. H. G. Lyons, *Quart. Journ. Geol. Soc.*, 1894, vol. 1, p. 541.