of Mr. Hutchinson, who has written a powerful letter to the *Times*. In this letter he sets forth how easy it would be to arrange to use the clinical material at the docks in connection with an institution which is at present appealing to the public for funds, viz. the Post-Graduate Medical Polyclinic in Chenies Street, Gower Street. Mr. Hutchinson points out that lectures will probably be delivered at the Albert Docks by professors living in the immediate neighbourhood of Harley Street, and be listened to by students living in the neighbourhood of Gower Street; hence much time will be lost both by teachers and taught, who could obviously come together, for everything except actual bed-side teaching, upon more convenient premises, viz. those of the Post-Graduate College. On the other hand it is contended, on the part of the promoters of the Home Secretary's scheme, that what is required is a school entirely devoted to the study of tropical medicine, where students shall do nothing else, and shall give their whole time to this branch of medicine. It cannot be denied that living in the atmosphere of a subject is greatly conducive to the quick acquisition of a knowledge of it. How this result is brought about is not quite so clear; it seems to be a kind of intellectual osmosis. Apparently what the Home Office want is to run their candidates quickly through somewhere where they can quickly gain a good knowledge of tropical medicine, and be then able to materially aid colonisation. They do not want the time of their candidates wasted in going here for lectures, there for clinical cases, and somewhere else for bacteriology. Whether the extra expense involved in concentrating all the requisites for this special education under one roof will be money spent to the greatest advantage from the point of view of general medical education, is perhaps questionable. The scheme will, however, appeal to the commercial and philanthropic interests involved as business-like, and will probably receive their support. It is to be hoped that neither the local interests of medical cliques on the one hand, nor the colossal dignity of the College of Physicians on the other, will prevent the whole medical profession co-operating to the attainment of a thorough knowledge of tropical medicine by all those who intend to be concerned in its practice.

SOILS FOR ARTIFICIAL CULTURES.

AN increasing amount of experimental work on the growth of plants is being done by means of cultures in artificial soils. It is quite clear that the success of investigations so conducted must largely depend on the perfect suitability of the soil for the production of a full and normal growth. Little attention is, however, frequently given to this point. It is, in fact, often assumed that a pure quartz sand watered with a nutritive solution supplying phosphates, sulphates and chlorides, of potassium, calcium, magnesium and iron, is a fit and proper soil, and that any deficiency of luxuriance in plants grown in such a medium is due to some special circumstance unconnected with the general conditions of the experiment.

Whether some plants are capable of reaching a fair development when placed under the conditions just described is hardly the question; the point on which I wish to lay stress is that such a soil is in several respects a most unnatural medium for plant growth, and is thus generally unsuited for purposes of investigation.

The salts just named are often spoken of as constituting a "full mineral supply," and the conditions described are reckoned as quite suitable for the culture of a leguminous plant, which derives its nitrogen from the atmosphere, if only the organism producing nodules on the roots is also introduced. It is quite true that the salts in question, if applied to an ordinary arable soil, would furnish an

adequate supply of the ash constituents demanded by the plant; but in this case the form in which they would reach the plant would be entirely different from that which occurs in the case of the artificial soil of quartz sand.

In the natural soil, containing calcium carbonate, hydrate silicates, and hydrate ferric oxide, all the alkali salts applied as manure are decomposed; their acids combine with the lime of the soil, and their bases are held in feeble combination on the surface of moist silicates and ferric oxide, from which they are easily extracted by the acid sap of the root hairs. What an immense difference this must make to the plant! In the first place, there is no hurtful excess of saline matter in the soil. The potash has been precipitated upon the surface of the soil particles, while the acid it was formerly combined with has been carried off united with lime in the drainage water. In the next place, the plant is well provided with bases with which the organic acids which it is constantly producing can combine. This is surely a most important point. What can a plant do that is fed on chlorides and sulphates in a mass of pure quartz? How can it get rid of the acids, and obtain bases to supply its own wants? It must be, at least, a very slow and painful business. In a natural fertile soil, not only are the alkalies, as already mentioned, largely supplied to the plant as bases, but the soil water itself always contains a quantity of calcium carbonate dissolved in carbonic acid.

That a plant does require this supply of bases is evident from the character of plant ash. The ashes of plant leaf and stem are always of an alkaline character; those from leguminous plants are highly alkaline, and consist chiefly of carbonates, the residues of the salts of organic acids which have been destroyed on ignition.

The immense improvement in the luxuriance of an artificial culture in sand which is observed when a nitrate is added to the nutritive salts employed, is not to be entirely attributed to the supply of nitrogen thus given. The nitrate is, in this case, the only salt which can supply the plant with a base, and its addition to the soil thus greatly improves the general conditions of growth. The nitrate acts in this way because the nitric acid is employed in the plant for the production of nitrogenous organic matter, and its base at once becomes available for combination with organic acids.

For most experiments there is no necessity for employing the favourite mixture of quartz sand and soluble inorganic salts. Any fertile sandy soil may be used as well, and can be as thoroughly sterilised if sufficient care be taken, but it should not be dried or burnt if its special chemical properties are to be retained. If the nearly complete absence of organic matter is desired, the sand can be taken two feet below the surface.

If an artificial soil is needed, the quartz sand should in every case be mixed with 2-5 per cent. of calcium carbonate. Powdered felspar is an excellent addition to an artificial soil. The mixture must also have a sufficient power of holding water; the sand must, therefore, be fine. If the conditions of the experiment do not forbid it, some humic matter should be supplied. Mr. Mason, who has been very successful with cultures in artificial mixtures, adds 1 per cent. of moss-litter to his soils. The water in natural soils always contains carbonic acid. This point also must not be forgotten, especially when no addition of humic matter has been made. R. WARINGTON.

NOTES.

ON Monday at Osborne the Queen held a private investiture of the Orders of the Bath, St. Michael and St. George, and the Star of India. Sir William Roberts-Austen, K.C.B., and Sir William Thielton-Dyer, K.C.M.G., had the honour of knighthood conferred upon them. Sir Charles Cameron received the decoration of the civil division of the third class of the Order of the Bath.