lished the observation. The things necessary to produce it appear to be:—(1) a dry film of dust on surface of water; (2) a layer of fine globules of moisture on the film; (3) a dead calm, that the globules be not shaken into coalescence; (4) the sun shining brightly at a low angle through a clear atmosphere. EDWARD HEWITT.

Municipal Museum, Vernon Park, Stockport, November 11.

Weather Changes and the Appearance of Scum on Ponds.

IF the scum referred to (NATURE, November 5, p. 7) be organic in character—algal, for instance—it would contain bubbles of gases.

Would not these bubbles tend to enlarge, from the expansion of their contained gases, on a lowering of barometric pressure, and the mass, becoming specifically lighter, to rise?

"Platanus orientalis" says "any decided change of weather." The above explanation would hold good only for a change of weather indicated by a falling barometer.

H. J. GLOVER.

Stationers' School, Hornsey, N., November 6.

Earthquake at Kashmir.

IT may perhaps be of interest to note (I do not find the fact recorded in NATURE) that on April 18, 1902, there was a sharp earthquake shock over North-west India and Kashmir, about 2.30 a.m. (local time).

O. ECKENSTEIN.

34 Greencroft Gardens, London, N.W., November 13.

A NEW THEORY OF THE SOIL.[1]

IT has long been recognised that the chemical composition of the soil affords a very imperfect index to its fertility, partly due to the fact that only recently have methods of analysis been devised to discriminate between the total plant food in the soil and that which is active and likely to be immediately available for the plant, but chiefly because the physical texture of the soil and its power of maintaining a supply of water to the growing plant is a much larger factor in crop production than its store of nutrient material.

But though the part played by the chemistry of the soil has doubtless been much exaggerated and requires to be studied more in connection with soil physics, it has been reserved for the chemists of the United States Bureau of Soils to deny its action entirely, and put forward a theory which considers all soils to be effectively the same from the chemical standpoint.

Briefly stated, the thesis developed in the *Bulletin* before us is as follows:—dissatisfied with the want of correspondence between the results of any of the methods of soil analysis in which the soil is attacked by either weak or strong acids, Dr. Whitney and his associates have fallen back on the aqueous solution obtained by shaking 100 grams of the soil with 500 c.c. of water and allowing it to stand for twenty minutes. For the rapid quantitative examination of the very weak solution thus resulting they have worked out various colorimetric methods, and in this way have been able to analyse several hundred soils of the behaviour of which in the field something was known.

From these results the authors come to the conclusion "that with occasional exceptions the composition of the soil solution and the concentration is about the same in all cultivable soils." "All our principal soil types, in fact, practically all cultivable soils, contain naturally a nutrient solution which varies within comparatively narrow limits with regard either to composition or concentration, and which is usually sufficient for plant growth. Apparently, therefore, all soils are amply supplied with the necessary mineral plant foods, and these plant foods are not in themselves a matter of such paramount importance to the agriculturist, for their supply as regards the plant is determined by the supply of soil moisture which the crop can obtain from the soil." The authors further suggest that fertilisers, if they have any effect in increasing the crop, do so in the main by altering the physical texture of the soil or by stimulating the root range of the plant. So novel a point of view from men with the experience of Dr. Whitney and his colleagues demands a careful consideration of the evidence in its support.

On the theoretical side the authors suggest that in the natural soil solution on which plants feed "the quantity of any constituent which can possibly enter the solution is . . . determined by definite equilibrium conditions with the but slightly soluble mineral from which it is derived . . . it may very well happen that the addition of comparatively small amounts of a readily soluble potassium salt to a soil would simply force back the dissociation and solubility of the potash minerals with no consequent gain of potassium to the soil solution." In support of this view the authors describe an experiment in which powdered potash felspar when shaken up with water is shown to yield a feebly alkaline solution, as indicated by phenolphthalein. On adding, however, a little soluble potassium salt the colour of the phenolphthalein is partly discharged, which the authors consider to indicate that some of the potash derived from the felspar has been forced back to the solid phase. We would suggest the consideration of another experiment; take a very weak solution of potassium phosphate, add a drop of phenolphthalein solution, and run in dilute alkali until a distinct colour appears; now add a little solution of some neutral salt, sodium or potassium chloride; the colour will again be partially discharged, although the salt added is strictly neutral.

In the latter experiment there is no question of the intervention of a solid phase; both experiments are, we think, equally explicable on the dissociation hypothesis, but the one does not bear the interpretation put on it by the American chemists.

Turning now to the analytical figures, we cannot agree that, except in a very general and average sense, they support the authors' case that the composition and concentration of the soil solution are about the same for all soils. Taking first of all the determinations of nitric acid, they are seen to vary within the widest limits, as is evident from the following summary of the results for four of the soils:—

	No. of analyses	Nitric acid. Parts per million of dry soil		Mean
		Highest	Lowest	
Windsor Sand ...	34	26·62	0·56	5·69
Norfolk Sand ...	98	23·76	0·67	3·81
Leonardtown Loam	62	62·00	trace	12·71
Sassafras Loam ...	80	38·40	0·50	7·79

Furthermore, if the number of the determinations falling within successive equal limits be plotted into a curve, the resulting figure is highly irregular, and shows nothing of the maximum about the mean which characterises the curve of error. The nitric acid figures are thus entirely opposed to the authors' thesis; they show no tendency to a constant value, but extreme accidental variations, *i.e.* due to factors independent of the classification here adopted. But in fact too

[1] "The Chemistry of the Soil as related to Crop Production." By M. Whitney and F. K. Cameron. U.S. Department of Agriculture, Bureau of Soils, No. 22. Pp. 71. (Washington, 1903.)