

THE RUBBER RESEARCH INSTITUTE OF MALAYA

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KUALA LUMPUR,
FEDERATED MALAY STATES

July 18 1928

Dear Fisher,

In connection with your last note re "Capillary Forces" (now in the press) and the reply thereto which I shall shortly have to prepare, it would greatly assist me if you could find the time and inclination to enlarge a little on the meaning of your last paragraph. For your greater convenience I here reproduce it from the MS.

" A very simple reason may be given for rejecting the 'entry value', not necessarily from the interpretation of Haines' experiments on pressure deficiency, which may be largely influenced by this value, but certainly from the series of pressures at which the soil water is in physical equilibrium with the surrounding atmosphere. For the process by which, according to Haines, air enters or leaves the cells of the soil structure involves the dissipation of energy; a film of liquid is supposed to be pressed upon by the intruding air until it is ruptured, the air blows through the opening so formed; the energy which must be dissipated before mechanical equilibrium can be again established gives rise to a

series of oscillations, sufficiently sharp even to have visibly affected the manometer in Haines' experiments. It will hardly be denied, therefore, that such a rupture involves irreversible processes by which energy is dissipated; and it follows that the corresponding adjustment by reversible changes will take place at a lower value of the pressure deficiency. The agency for such reversible changes of air content being, of course, furnished by the air dissolved in the soil moisture."

You have no doubt removed in the final version the looseness of calling in my observed oscillations to support a conception quite different from the one they illustrated. But after a great deal of thought I cannot see at all in what way the above argument *disposes* of the entry value, nor why my measurements are put in a different category from "a series of pressures at which the soil water is in physical equilibrium with the surrounding atmosphere."

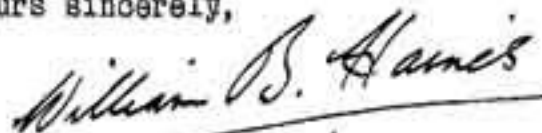
My argument has always allowed a good deal of latitude as to what the precise entry value may be in the theoretical case, but I have assigned it to a region about three times the value which you would give it. My view is therefore scarcely disposed of by showing that the value for reversible changes is merely *lower* than the case of *per saltum* changes which I have described. Disposal will only be effective when the difference is shown to be large enough to bring the value down to another region. I wish I could follow your point clearly enough to assess for myself the difference - perhaps you will help.

It would also help me a lot if you could describe the alternative mechanism by which you imagine the changes to be made reversibly. A totally different value of β . d. argues a totally different film distribution, and my difficulty has always been to conceive a film

shape within the confines of the pore space which shall be in equilibrium under the dual conditions of high moisture and low curvature. As you know, I consider the total curvature to be the lowest conceivable at the stage of coalescence. The appeal to the agency of dissolved air is very obscure to me. I understand of course the conditions under which isolated pockets of air in the soil interior may be made to grow or diminish, and the local p.d. changes to which this may give rise, but I see no way along that line of establishing a low p.d. value.

As your paragraph stands it would be easy for me to pass it over, were it not that I genuinely wish to fathom your objections. I mean that your generalisations will scarcely carry as much weight with the average reader as my own more objective descriptions. It is absurd to think that our disagreements on these simple matters can be long sustained if we can each extend the courtesy of understanding properly the arguments of the other. Since you have not hesitated to charge me publicly with misunderstanding your criticisms I trust you will help me over the particular points I raise. It might be regarded, after all, as a reciprocation of my own endeavour to save you from a similar charge by means of private communication.

Yours sincerely,

A handwritten signature in cursive script, reading "William B. Barnes". The signature is written in dark ink and is positioned above a horizontal line.

HEAD SOILS DIVISION