

given clearly the characteristic high note, audible at considerable distance. But since it has been spread out in the warm dry room, and received some handling, it has lost the sonorous quality.

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MORE ON SINGING SANDS

TO THE EDITOR OF SCIENCE: The comment of Mr. Richardson in a recent number of SCIENCE (November 28, 1919) on the singing sands of Lake Michigan, calls to mind some observations made a number of years ago that should be considered in connection with the hypothesis he advances to explain the singing quality of the sand.

These sands were encountered by us in connection with the soil survey of Allegan county, Michigan. The singing quality was particularly well developed within four to six rods of the lake shore. We collected a sample of several hundred pounds which was forwarded to the Bureau of Soils at Washington. After the material was in the sack on the beach, the singing quality could be developed by merely running the fingers through the sands.

The material was shipped by freight and stored in the basement of the building then occupied by the bureau. Some months later the material was looked up and examined. It had completely lost its singing quality. Of course it had dried out. There was no leaching and presumably no change in chemical composition.

It has seemed to me that this quality is associated with two primary factors namely: (a) Very well rounded and smooth particles, (b) A particular amount and condition of moisture. Neither a very wet nor a very dry condition suffices. We have noticed a slight tendency to this singing quality in walking over the sand dunes in that section of Michigan, if the foot is jammed into the sand so as to get below the very dry surface layer and into contact with the somewhat moist sand immediately below.

I am inclined to think the percentage of

moisture when coupled with the smooth, rounded particles is the chief factor in developing singing sand. That per cent. is somewhere in the region of the lento-capillary point or the margin between hygroscopic and free capillary moisture where, due to surface attraction of the sand particle, film movement is very sluggish. It might be defined as the first stage of film solidification.

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THE INITIAL COURSE IN BIOLOGY

THE botanists are more and more loudly proclaiming their academic rights as against the zoologists. In most American universities now there is a course in general biology, and it is given, often entirely, by the department of zoology. It is a very large course, running sometimes to several hundred students a year. It involves a large staff, assistant professors, instructors and assistants, and thus provides places for graduate students without fellowships. Sometimes it carries more patronage than all the other courses in zoology, botany and related subjects combined.

Naturally the botanists feel aggrieved, when they compare the few students who reach their courses, and the inadequacy of the assistantships for their support in botany, with the opulent conditions in the department of zoology.

Professor George E. Nichols has presented recently in SCIENCE data bearing on this matter, and has discussed with fairness and ability the question of the initial course in biology. The initial course in any field is a difficult subject: whether it should be designed primarily as introductory for those who intend to go further, or as broadly educational for those who can not.

I take it as axiomatic that there is a certain minimum of information regarding matters biological which every educated man ought to have, and that this would consist particularly in some knowledge of the living human body. In fact, however, a large number of students are passing through our universities, many are even taking courses in biology, who fail