DISCUSSION AND CORRESPONDENCE

DOCTORATES CONFERRED BY AMERICAN UNIVERSITIES

To the Editor of Science: Your article "Doctorates conferred by American Universities" (Science, No. 973) is a valuable statement of facts from which you have wisely refrained from drawing conclusions. I fear that many of your readers will take it almost as a matter of course that those institutions which confer the largest number of doctor's degrees are the ones which are doing most for the highest education and for the progress of scholarship in America. This inference is not merely erroneous but is distinctly harmful. It is true that those institutions which succeed in collecting the largest number of students with the capacity and preparation necessary for doing work to some slight extent original, and which have teachers able and willing to inspire their students with the desire to do productive work are contributing most to the scientific advancement of the country. It is also true that *other things being equal* such institutions will produce each year the largest numbers of doctors. There is, however, another element of fundamental importance which is too often left out of account. The level of attainment and capacity of our doctors is, on the average, below that of German doctors, and these latter stand far below the doctors of several other European nations, such as France or the Scandinavian countries. In these latter countries the holder of the doctor's degree may, to use your phrase, be said to be "officially certified as competent to undertake advanced teaching and research work." In Germany and in this country such a statement must be taken in a decidedly Pickwickian sense, most doctors there being quite unable to stand alone scientifically. This is of less consequence in Germany, where the keen competition of the best doctors for academic promotion gives a sufficient incentive to further development beyond the usually rather low level of the doctor's degree. In this country such incentives are to a large extent lacking, and it is the duty of the strongest universities to raise the level of the doctor's degree distinctly above the standard set in Germany. Some of our strongest institutions are aware of this fact and try, even if as yet only in an uncertain and halting manner, to perform this duty in spite of the competition of the weaker institutions, some of which are glad to give the degree to men of doubtful qualifications. To expect uniformity of standard here would be Utopian; but it is important that in judging the relative success of different universities the quality of the output be given at least as much weight as the quantity. I, for one, hope the time is still very far distant when as large a proportion of our population take the doctor's degree as is the case in Germany.

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AIR IN THE DEPTHS OF THE OCEAN

Several months ago three communications relating to the manner in which the water in the depths of the ocean is aerated, appeared in Science[1] and a recent review[2] of them has served to call attention to this subject again. Before the question is finally dismissed it may be worth while to point out that the single factor, namely, diffusion, suggested in these articles as the sole agent involved, plays only a negligible rôle in the process of aeration. The atmospheric gases diffuse very slowly through water, the coefficient of nitrogen being 1.73, of oxygen 1.62, and of carbon dioxide 1.38. The rapidity with which oxygen is transferred is well illustrated by Hüfner's[3] computations for the Bodensee, which has a maximum depth of about 250 meters. His results show (1) that it would take oxygen about forty-two and a third years to pass from the surface to the bottom of this lake by the process of diffusion alone; (2) that it would take over a hundred thousand years for the quantity of oxygen which its waters at a temperature of 10° C. are capable of holding, to diffuse into a body of water of equal area and unlimited depth; (3) that, under natural conditions, with the depth limited to 250 meters, it would require over a million years for this body of water to become saturated at the above temperature if it had no

1 Vol. XXXIV., pp. 239, 562 and 874.

2 *Internat. Revue*, Bd. V., p. 448.

3 *Arch. für Anat. und Physiol.* (Physiol. Abteil.), 1897, p. 112.