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A Criticism of Degrees.

PROFESSOR R G STAPLEDON S work on all aspects of grassland development is well known, and his recent book *The Land Now and To morrow*, indicates that he sees his problems against the background of a nation s life In the January issue of *Science Progress* we find a stimulating article from his pen "Agricultural Research and Higher Degrees" The article is well worth consideration by Fellows of university senates, professors teaching post graduate students, or members of selection boards While the author deals with agricultural research mainly, his remarks apply to other higher degrees and, in fact, to the degree system

As an introduction, Prof Stapledon deals with the nature of agricultural problems and the way they should be solved One would like to quote this in full, but some short extracts must suffice

"The amount of high class and intricate research that must be undertaken with ultra practical aims in view is probably far greater than is fully realised by either the research workers themselves or by those who administer research funds This is realised far more fully by the farmer who, as a matter of fact, is always posing difficult conundrums to the scientist— conundrums, because of the soil and of agriculture, so difficult that it is seldom within the competency of a single specialist (the botanist, the chemist or the veterinarian) adequately to answer, or, in the majority of instances, to formulate a line of research most likely to lead to the correct and practical solution"

The problems of agriculture to a greater extent probably than of any other applied science are of an omnibus nature—in the sense that they are seldom within the province of any one department of science fully to solve

Two extraordinarily important facts follow from all this, both of which have a fundamental bearing upon the training of the men who are to become competent research workers in the agricultural field In the first place, almost more important than the actual solving of problems is the predetermination of the problems which, in fact, it is desirable to solve

'The truth is the successful agricultural research worker (successful as here predefined) needs to develop a certain sense and feeling towards his subject, for without that

he will never be able properly and in detail to pre define his problems As well as the sense and feeling, however, he must have the technical equipment of the best pure scientist in the particular field that he wishes to make his own More than all this, he must have that state of mind that makes it come natural to him to place all his cards on the table and to work gladly and enthusiastically as a member of a team "

Having thus defined agricultural problems and the conditions of their solution, the author then considers the case of the M Sc , the Ph D and the D Sc degrees in their relation to the making of a real research worker in agricultural science The author points out that the M Sc degree can be variously obtained and hence the degree does not imply any particular standard of attainment nor does the holding of the degree necessarily mean that the recipient has undergone any rigorous and supervised training in research The thesis demanded for the degree may be presented by a young man doing post graduate work immediately in continuation of his honorary degree and is perhaps most generally presented by men who already hold posts in a teaching or research department In the latter case, the candidate, if on the staff of a research department or institution, may have been engaged in team work The presentation of a thesis under sole authorship is hardly compatible with the highest ideals of the team spirit

The Ph D , unlike the M Sc is, says Professor Stapledon, intended only for students who pass straight on from graduating to undertake a prescribed piece of research under supervision The fact that the man who gains this degree is called 'Doctor and that in the eyes of the uninitiated the profound difference between the D Sc and the Ph D as a qualification is not known, is a drawback Moreover, the period allowed for preparation for the Ph D is usually two sessions, and Professor Stapledon points out that even if this period were extended to two full years it does not, certainly in the case of grassland science, give enough time for the conduct of a piece of research sufficiently widely based adequately to train a man in the research methods applicable to a subject so wide The inevitable result is that the only way to deal with a Ph D candidate in these wide subjects is to put him on to some tiny fragment of a worth while problem or to make over to him a mass of existing material that is being studied by a senior man or by a group of men in the particular department In the larger out of door subjects, therefore, the author says it is practically impossible as matters stand to accept, with a clear conscience, candidates for the PH D He goes on to remark that for a man who seeks only training and is not hampered by the restriction implied in the ultimate preparation of a thesis for a degree, two years is a sufficient time to give excellent training to a man interested in grassland problems His general findings regarding these three degrees may be noted —

The agricultural scientist cannot be separated in treatment from other applied scientists, and the applied scientists cannot in equity be separated from the pure scientists, but it would probably be better for all if higher degrees granted on the thesis basis were completely abolished The Ph D has served no really useful national purpose, and has carried with it innumerable psychological effects which have done neither the young doctors nor the universities any good, and should be abolished root and branch The M Sc is perhaps more innocent, despite the fact that it stands for too wide a range of attainment and qualification, and of research training Because many of the candidates for the M Sc already hold research positions, if this degree is to be retained the submission of papers or thesis of joint authorship should be considered as a merit and be definitely encouraged instead of being disallowed, for ability to collaborate is one of the outstanding necessities of the modern scientists

The D Sc stands in a different category, because it does not influence a man's training It may, however, influence a man's attitude towards team work and collaboration, and may so influence his attitude over a long run of years, during which time he is himself in a senior and influential position, and therefore, capable of considerable psychological mischief to the man himself, and therefore also of considerable mischief to the spirit that should animate a research institution "

Whether we agree or not with these final conclusions, there are many of us who would echo the remarks regarding the

narrowness of training which must perforce be given for the Ph D and the consequent inadequacy of men so trained for a broad outlook on research problems What can be expected, for example, from a candidate who has devoted two years to nothing but the study of the alimentary system of some unimportant insect? Has he been trained in such a way that as a future Agricultural Entomologist his degree is a hall-mark of real usefulness?

W B

The Age of the "Indus Valley Civilization".

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IN recent years so much vague speculation appeared in the Press on the age of the so called Indus Valley Civilization (a term that I shall keep provisionally, lacking something better) that it is, I believe, time to sum up the discoveries of recent years on the subject, especially in view of the fact that many of the speculators are not aware of the evidence that has been accumulating outside India Though much that can be said now about the age of the materials at hand, is still subject to correction, it must be understood, and will be proved in this article, that the main outlines are correct and final , minor adjustments are necessary and possible, and, more than that, most likely Revolutionary changes, however, are quite unlikely to turn up

The present article, brief as it is, is mainly a summary, and contains little original matter One or two discoveries made recently (in 1937) and published in preliminary reports, will be included for the first time in such a discussion , the rest ought to be known to serious students of the chalcolithic period of India

Recent evidence can be summed up as follows —

(*a*) Eighteen Indian seals found in Mesopotamia in ancient sites and described by Mr Gadd (see list of all articles and books referred to at the end of this paper) ,

(*b*) Frankfort s discoveries of seals, amulets, pots, and inlay pieces at Tell Asmar, described in *An Bibl I A 1932* ,

(*c*) One whole scarlet ware pot and several fragments found in 1937 by Frankfort in Tell Asmar, described in *Ill London News* ,

(*d*) A Sumero Babylonian inscription discovered by myself at Mohenjo daro, described in *Ind Culture* ,

(*e*) The discovery of the detailed connexion of bull worship and bull sacrifice as between India and Crete (by myself, *An Rep Arch Survey*) and the connecting link in Syria, described by M Andre Parrot in *Ill London News* ,

(*f*) Inner evidence from recent excavations at Harappa and Chanhu daro (mostly unpublished)

It is always difficult for universities to make reforms within their own borders and yet that is the only place from which university reform can start, and if the clear thinking which ought to be associated with universities is applied to this question of post graduate degrees and their values, then we ought to see some improvement both in the training given for such titles and in their real value

Starting with the last group of materials first, it must be made clear that there is a tremendous amount of material so far unpublished, relating to discoveries at Harappa and Mohenjo daro Most recent writers still refer to the few skulls examined after the excavations at Mohenjo daro, whereas a great amount of skeletal remains have since been discovered in Harappa and examined by anthropological experts It is not the task of this article to discuss the ethnic character of the peoples of that period, and it should suffice to say that recent examinations support the view that the skeletons belong to a very varied mixture of races As to Chanhu daro, Dr Mackay has published much of his materials At this place the Indus Valley Culture continued for a few generations longer than at Mohenjo daro or Harappa, and everything points to the fact that copper became more and more common with every generation We are, thus, at the very end of the Stone Age, and it is entirely impossible to push the date of this culture back to some hoary age On the other hand, neither at Chanhu-daro nor at any other