

his view on Gilbert's monograph on Lake Bonneville, appears to be certain that the cavern is a product of the Wisconsin glacial stage. Gilbert knew of only two glacial stages, but it is now believed that there were four or even five; and the Bonneville high water may have occurred during one of the earlier ones. The writer is of the opinion that it corresponds more nearly to the Aftonian interglacial stage, and the finding of the camel skull is evidence for this view. The cavern should be explored. It probably constituted the den of some ancient carnivore and the camel may be found to have been associated with other early Pleistocene remains, not with ranch cattle or even recent native mammals.

As a corollary of his determination of the age of the Bonneville beds Gilbert referred the Fossil Lake vertebrates to the latter half of the later glacial epoch. I shall be greatly interested in reading Dr. Romer's defense of that proposition. How will he account for a percentage of at least 50, perhaps of over 65, of extinct animals? Where in deposits overlying Wisconsin drift will he find such a high proportion of extinct forms? If he can support his thesis he will have four more camels to his credit. Furthermore, would not the climate at Fossil Lake during the Wisconsin stage have been rather cool for some of those camels, those peccaries and that ground-sloth? He appears to believe also that the fossils found at Frederick, Oklahoma, are of a late date. I shall be delighted to listen to his elucidation of the geology and paleontology of that region, where some hundreds of feet of deposit have been swept away since those animals lived there and here he will have to explain why all the species are extinct. He is mistaken in thinking that my study of the Iowa Pleistocene led me to believe that camels ceased to exist after the first glacial stage. It was there that I learned that they existed during that stage. Failure to find them in other deposits that could be demonstrated as of later age has been my reason for concluding that they did not long survive the first interglacial stage.

Furthermore, I do not rely on camels alone for my views of Pleistocene history. There are probably fifty species of important vertebrates with which camel remains are commonly associated which appear to have become extinct at the same time. If Dr. Romer holds the opinion that all the fossil vertebrates found at the localities he mentions lived only a few thousand years ago, will he not tell us what kinds of animals lived during the early Pleistocene and where their remains have been collected?

The writer will continue to hope that the geologists, the paleontologists and the anthropologists who do not like his opinions on Pleistocene geology, paleontol-

ogy and anthropology will speedily collaborate and impart to us their conclusions and their reasons therefor.

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### CENTERS OF RESEARCH

UNDER the above title, Professor S. R. Williams, in *SCIENCE* for July 20, deploras "the paucity and mediocrity of the research produced by some of the graduate schools of our large universities," and suggests that the remedy for this deplorable condition is to centralize the direction of research in each department under one man, permitting, indeed, the other members of the staff to carry on their own research if time and circumstances permit, but denying them the privilege and stimulus of directing students in research.

With Professor Williams's judgment that much that passes for research does not measure up to the standards of good scholarship there will be little disagreement. But his analysis of the cause of this condition is far from convincing, and from his proposed remedy there should be sharp dissent. He suggests that if one were to set down a list of research centers and classify them according to whether the work sent out is done under the leadership of one man or of several, the results will be surprising. I have tried this for the field of botany, and I am sure that the results would be surprising to Professor Williams. Such a list must, of course, be very largely a matter of personal opinion, but personal opinion is scarcely sufficient to justify a proposal for a radical change in the organization of American universities. It is at least probable that the underlying difficulties with American scholarship are to be sought for in social and economic conditions far more fundamental than matters of departmental organization, and there is no convincing evidence that the substitution of dictatorships for such measure of democracy as we now enjoy would materially remedy the situation. This is not to deny that great teachers and investigators may and should dominate an individual department. They have done so in the past by virtue of their own innate qualities, and there is no reason to doubt that they will continue to do so on the same grounds. But that is a very different thing from a proposal to centralize such power in men who, even if they be good investigators, may be narrow-minded, selfish or autocratic. Even assuming that such a policy of intellectual fascism might result in certain local gains in efficiency, it is difficult to see how the loss of freedom and initiative on the part of the great mass of subordinate workers could result in anything but a further lowering of the general standard of scholarship.

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