Much confusion, both to the students of distribution and of pedigree cultures, has resulted from this lack of formulated criteria. Some may question the possibility of such criteria.

After such detailed studies, in which special emphasis has been placed upon geographic origin, one naturally expects certain criteria, perhaps more or less peculiar to the ecological relations of crawfishes, to be formulated, but such are not stated.

Two important papers should perhaps be mentioned in this connection, as they are not listed in the bibliography: Harris, 'An Ecological Catalogue of the Crayfishes belonging to Genus Cambarus' (*Kans. Univ. Sci. Bull.*, Vol. II., pp. 51–187, 1903), and Steele, 'The Crayfish of Missouri' (*Univ. of Cincinanti Bull.*, No. X., pp. 1–54, 1902).

A certain amount of statistical data could have been used to advantage. As this method of measuring variation, used with judgment and moderation upon critical phases and at critical localities, will aid such investigations. For example, if representative lots of *bartoni* from the northwestern, central and eastern parts of the state had been measured, the rate of dwarfing could have been determined. A similar comparison between the western and eastern variation of *diogenes* would be of value. Such variations as these are very common and signify to some that very frequently the *species is too large a unit* for the study of geographic distribution, that local variations or races are of great importance and that in further investigation the forms peculiar to definite habitats should receive recognition and detailed investigation.

In conclusion it should be said that such excellent work, perhaps the most important general zoological work yet published by the Carnegie Museum, should be continued, as the subject has reached such a degree of development that to stop now would be unfortunate, to say the least. The region to the south and west should now be considered, not only because of its proximity to Pittsburg, but primarily because it is apparently in that direction that a most wonderful evolution of crawfishes has taken place, or is taking place. Then with the modification of original conditions through the 'improvement' of streams for navigation, water power and supplies, the construction of canals, contamination by industrial refuse and sewage, we have additional urgent reasons for an early continuation of such investigations so that 'vanishing data' will be preserved for future generations. The Carnegie Museum is not a provincial institution, and does not necessarily limit its activities to the state of Pennsylvania, and it is hoped that this work will be continued, as the present study has clearly shown that the most important part of the problem still awaits detailed investigation.

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SCIENTIFIC JOURNALS AND ARTICLES

The Journal of Comparative Neurology and Psychology for March contains a report of the convocation week meetings held in New York city during the winter, including abstracts of most of the papers read before the various societies in the fields of neurology and animal behavior. The leading article is a memoir on 'Light Reactions of Volvox,' by S. O. Mast. The light reactions were studied under rigidly controlled conditions in the 'light grader' devised by the author. Among other results, it was found that the direction of motion in *Volvox* is regulated by the relative light intensity on opposite sides of the colony regardless of the ray direction. Orientation is not the result of 'trial and error' reactions, as in *Stentor, Euglena* and other forms. *Volvox* colonies make no errors in this process. There is no evidence of motor reaction in a *Volvox* colony, taken as a whole. Orientation is, however, brought about by motor reactions in the individuals which constitute the colony. Weber's law holds approximately for the light reactions of *Volvox*.

The American Naturalist for April has for its leading article a discussion of 'The Geographic Distribution of Closely Related Species,' by Robert G. Leavitt. The question is considered from a botanical standpoint and the author's conservatively stated conclusions

are in favor of the mutation theory of the origin of plant species. 'The Coincident Distribution of Related Species of Pelagic Organisms as illustrated by the Chætognatha' is by Charles A. Kofoid, who shows that there is a tendency for two species of a genus of this group to occur in one locality and not elsewhere, and considers that this casts some doubt on the universality of operation of isolation in the evolution of species. E. A. Andrews describes at some length 'The Attached Young of the Crayfish, *Cambarus clarkii* and *Cambarus diogenes*' and considers their bearing on the question of the evolution of the species.

The American Museum Journal for May is mainly devoted to an article by Clark Wissler on 'The Douglas African Collection' recently acquired by the museum through the generosity of some of its friends.

The Bulletin of the Charleston Museum for April contains an account, by Ezra Brainerd, of 'A Visit to the Grave of Thomas Walter,' one of the earliest of American botanists and the author of Flora Carolina. A pleasant result of this visit has been the taking of steps for the preservation and protection of the grave.

The Peabody Museum of Natural History, Yale University, has just issued Guide No. 1 on 'The Evolution of the Horse Family,' by Richard S. Lull, and based on the valuable material mainly brought together by Professor Marsh, and recently admirably arranged and labeled by Dr. Lull.

SOCIETIES AND ACADEMIES

THE AMERICAN CHEMICAL SOCIETY. NEW YORK SECTION

The seventh regular meeting of the session of 1906–'07 was held at the Chemists' Club, 108 West 55th Street, on May 10.

The following papers were presented:

The Causes of the Corrosion of Iron and Steel: W. H. Walker.

With the ever-increasing use of iron and steel, the conditions which limit the life of structures made from these materials, assume great importance. To few subjects have been devoted so much elaborate investigation with such conflicting results. Of the many papers which have been published and theories advanced as to the cause of corrosion, the three following are of special importance: Calvert, after a series of experiments came to the conclusion that ordinary corrosion or rusting of iron could take place only when all of the three reagents, carbon dioxide, water and oxygen were present. This opinion was universally accepted until in 1903 Whitney showed that corrosion was a purely electrochemical phenomenon and would take place in water in the absence of both oxygen and carbon dioxide, although for the formation of the so-called rust, oxygen was necessary. A year or so later Dunstan and his co-workers published the results of their work from which they concluded that Whitney was at fault and that iron was not corroded by water in the absence of oxygen and carbon dioxide. They believed the action of oxygen on iron to be a direct one, with the intermediate formation of hydrogen peroxide, and that in ordinary corrosion electrochemistry does not play a part. Following this paper came one from Moody, of Kensington, England, who took issue with both Whitney and Dunstan and describes experiments which he thinks conclusively prove that no corrosion of any kind takes place in the total absence of carbon dioxide.

Work recently carried on at the Institute of Technology substantiates Whitney's claim in so far that there is a slight corrosion of iron in pure water although if oxygen and carbon dioxide be most carefully eliminated, the presence of dissolved iron can be detected only with the greatest care, and possibly if these two constituents were absolutely removed, no iron would be dissolved. There is a tendency, however, for iron to pass into solution and for hydrogen to precipitate out in a way analogous to the action of iron in a copper sulphate solution. Unless oxygen or some other substance be present to unite with the hydrogen when set free upon the surface of the iron, the action, if it starts at all, very soon ceases. To remove this hydrogen and thus accelerate the action is the function of oxygen in corrosion.