

## The Tentative Program of the University of Oklahoma Biological Survey\*

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From the time of the organization of the University of Oklahoma and the Oklahoma Agricultural and Mechanical College occasional contributions have been made from these institutions to the knowledge of Oklahoma fauna and flora. The Geological Survey of Oklahoma has also published some papers and some few collections of Oklahoma animals and plants have been made and reported upon by other institutions within and without the state. However, it is only within the last few years that it has been possible to begin a scientific and systematic study of the animals and plants of the region. The Department of Zoology since 1923 has conducted summer expeditions in various parts of Oklahoma with the purpose of making a reconnaissance survey, which will provide a basis for further more intensive work on the resources of the state. These field parties have dealt with vertebrates chiefly, and at the same time have devoted what attention was possible to the insects; no other important group, however, has received the attention throughout the state which it should have. It is proposed to continue these summer field parties not only for the purpose of covering the state in a reconnaissance survey but for conducting experiments on life histories, reactions, adaptations, studies of genetics, parasitology and other fields which will provide a foundation for future biological research. The Department of Botany has during a quarter of a century made extensive collections of the flora of the state, but due to two disastrous fires the collections have been lost. A state herbarium of more extensive character than heretofore possible is now in the process of formation. Those in charge of this herbarium are also members of the Survey and the beginning which has been made in the gathering together of Oklahoma flora is available to all the survey. Original studies on the vegetation of Oklahoma have also been part of the program of the Botany Department and the beginning thus made forms the basis for further study.

The biological resources of Oklahoma present a series of unique problems, since this area lies at the meeting place of northern and southern fauna and flora, of eastern and western, of grass and forest land, of high and low rainfall, and contains regions which in

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\*Contribution from the Zoological Laboratory of the University of Oklahoma. Second Series, No. 78.

every way simulate desert conditions, others which are salt plains, some high plateaus, and the large southeastern portion of the state is heavily forested. In addition the land slopes from a general height of over 2000 feet in the west, not including the Panhandle, to less than 500 on the east. In the Panhandle the altitude reaches 4000 feet and other unusual conditions also are found. Thus there is presented an almost endless variety of biological habitats and certainly a range of animal and plant species hitherto totally unexpected exists here.

The collection and identification of these specimens has proceeded very slowly, due partly to the fact that settlement in much of Oklahoma is recent. Even now, however, little is done by outside agencies. Note a recent report of the U. S. Biological Survey in which reference is made to control operations of the pocket gopher carried on in several western states and in Kansas, Colorado, New Mexico, and Texas, but nothing is done or said about the conditions in Oklahoma. Of course collections have been made from time to time in restricted localities in Oklahoma and both the University and the A. and M. College have gathered important information on these points. It is a fact, however, which may be taken as illustrative of the need of survey work in Oklahoma that until five years ago the only collection of reptiles from Oklahoma found in any of the great museums of the country was a small series of forms in the American Museum of Natural History taken years ago from near Sapulpa.

For several years now the Zoology Department of the University has been conducting field investigations and extending its collections as rapidly as possible. Reports of these activities have been given before Section "A" of the Oklahoma Academy of Science and published in its proceedings. It has seemed desirable to effect a new and broader organization for studying those problems which are strictly biological survey problems in distinction to those others of laboratory experimentation which are attracting the attention of biologists at the present. It is hoped that special funds for a biological survey may become available in the near future and a more intensive study of the biological resources of the state be made possible and that these may be published with more speed and more extensively distributed than has heretofore been possible.

The purpose of the newly established biological survey of the University of Oklahoma is to gather information which will lead to a better understanding, conservation, utilization, and control of the biological resources of Oklahoma. It is fully understood that the beginnings in this program must be small and that cooperation must be secured in many directions. The importance of the problem is so great, however, that it has been felt unwise to delay the establishment of an organization whose primary purpose is its study. The last two aims mentioned, that is, the utilization and control of our resources are so closely connected with economic biology in those phases which it is the distinct province of the Agricultural College to engage, that it is not now wise to place much stress on this por-

tion of the program, although it will certainly not be the policy of the survey to neglect any form of life simply because it is primarily of economic interest.

The presence and distribution of animal and plant life in any region depends upon many environmental factors which are often classified into climatic, soil, and biological factors, as for example the density of the population of a particular species under investigation, the presence of other animals and plants upon which it feeds and which feed upon it, and numerous climatic factors. Among these latter of primary importance are humidity and temperature and then secondary factors such as wind, floods, and snow or ice which may render food difficult to obtain. The factor which is perhaps most importance, however, is the presence and distribution of the foods particularly adapted to the organism in question. Animals feed upon plants and other animals and these are found in the wild and in the specially prepared fields where man has sought to grow and increase the food supply for his own use.

The increased agricultural activities of mankind have provided increased and in many cases new sources of food supply for hosts of organisms which have as a result increased at a rate almost beyond comprehension. As agriculture and the industries progress, the conditions of nature undergo rapid and constant change, and when it is considered that the net result with respect to animal and plant forms in a given region is due to the interaction of very many factors, it is seen that a change in any one factor modifies the entire community in greater or less amount. The factors due to the activity of man in his attempt to render the land more suitable for his own inhabitation are of all the most important. Obviously then, if we would understand nature as an environmental influence of our own we must set ourselves to know the animals and plants of the region and also to know the environmental conditions under which they occur.

These conditions indicate the nature of the early program for the Biological Survey, the better understanding of our wild life resources. There is no lack of appreciation of the other purposes, namely the conservation, utilization, and control, but our beginnings must of necessity be small and our program not too varied.

The special projects which are now under way or are contemplated for the immediate future are: 1. A continuation of the summer field expeditions of the Zoology Department for the purpose of increasing the knowledge of Oklahoma vertebrates and insects and gathering ecological data; 2. Intensive ecological studies about Norman and other accessible regions, including a study by quantitative methods of animal succession and animal population; 3. The study of the effect of rodents upon grazing lands, using the "Exclosure methods" developed by the U. S. Biological Survey; 4. A study of the relation of different environmental conditions such as the nature of the soil, type of vegetation, etc. to the "run off," that is, the proportion of total precipitation which fails to sink into the ground and become biologically effective; 5. The inauguration of systematic botanical collection in all parts of the state by expedi-

tions from the Department of Botany, and through cooperation of its students and other botanists; 6. The publication of simple directions for collecting and preserving flowering plants; 7. The revision and publication of a manuscript flora of Oklahoma prepared some years ago by Dr. G. W. Stevens for the Geological Survey; 8. A preparation of a check list of Oklahoma plants as a preliminary step to the publication of this flora; The making of a series of aerial photographic maps of some of the strategic habitats in Oklahoma, and this before further disturbance of the native vegetation has taken place. These maps will form a basis for the analysis of such habitats in terms of floristic composition, plant succession, and the environmental factors which are operative; 10. A study of stream pollution in Oklahoma; and, 11. The preparation of a bibliography of all publications bearing on Oklahoma fauna and flora.

It is obvious that some of these projects will take a long time for completion, but we are ambitious to have as much work as is possible done on them as time and the support available will permit.

Already there are several agencies in Oklahoma devoting their attention to conservation, utilization and control of some of our wild life resources. The State Fish and Game Commission has for its aim the conservation and encouragement of true sportsmanship in relation to that portion of Oklahoma wild life which comes within scope of the game laws. The State Board of Agriculture through the activities of the state forester is attempting to make available for utilization the forest lands of the state. The State Agricultural and Mechanical College long ago embarked upon a program of study of economic biology especially with reference to forms either beneficial or harmful to agriculture in its broadest sense. The newly organized Biological Survey is not ambitious to supersede any of these agencies in their activities but hopes to cooperate with these as well as with agencies outside the state and with individual scientific investigators to the fullest possible extent. Many of the problems of economic biology are of fundamental import, not only because of their economic importance, but because of their general scientific significance and every encouragement should be offered to their study. Science not only in this state but in the nation at large has now reached the place where cooperation is essential to progress and the Biological Survey desires to cooperate to the full. We hope to engage in certain problems with the help of collectors in Oklahoma and adjoining states. We especially hope that in the future as opportunity may offer we may enter into cooperative relations with other institutions and agencies on special projects which may from time to time come up.

We wish immediately to secure the cooperation of all biologists of the state bringing together a complete bibliography of all publications relating to the taxonomy and distribution of Oklahoma plants and animals. A very useful beginning has been made in this project, but many articles are in obscure publications which only chance may bring to our attention. We are very anxious to have the aid of all who have such knowledge in making a complete and

exhaustive bibliography of Oklahoma taxonomy. Correspondence is invited in regard to this matter.

The services which the University Museum of Zoology is at present prepared to offer are available to the Biological Survey in its endeavors to establish cooperative relationships with other individuals and agencies including museums in other states. Although a few years ago the museum, while including quite a number of forms, could not be said to be representative of the state at large, we may now claim with entire propriety to have a state museum. The collections are in no sense exhibition collections and it is not possible to attempt anything in the way of exhibition until an adequate building is provided, but the museum does have at the present time very large study collections especially of the vertebrates including birds, reptiles, amphibians and fish amounting to over 70,000 specimens. These collections are actually representative of the fauna of the state and can be used by persons interested in the identification of their own specimens by comparison. The museum is at present prepared to render expert services in identifying or having identified by specialists working in collaboration with members of the staff the groups of vertebrates just mentioned as well as some groups of invertebrates including mussels. Coleoptera, Orthoptera, and dragon flies, and of course specimens of many other groups can be given identification accurate enough for all purposes except those of the expert systematist.

The collections are now housed according to the best modern procedure in so far as space and temporary quarters make this possible. The museum hopes to receive specimens from individual collectors and collaborators and can assure all such persons who cooperate with it that the specimens will be permanently preserved in an approved manner; and they may be sure also that almost any good specimens that can be sent in now will add to the knowledge of Oklahoma fauna, at least as to distribution and probably in other ways also.

The University is attempting to provide facilities for caring for study collections illustrative of Oklahoma fauna and to make a museum that will be in the broadest sense a state museum. There is no attempt to discourage other museums but there is an attempt to provide permanent facilities for the care and preservation of collections that shall in a true sense be typical representatives of Oklahoma forms. The University also attempts to establish and maintain on a similar basis a state herbarium to provide the same sort of cooperation with regard to plants that the museum is hoping to establish for animals.