

The Need for Increased Funds

For Research at the University of Oklahoma

By LAURENCE H. SNYDER

It is now realized by all those concerned with the development of scientific, social, cultural, and economic progress, that practical applications and desirable advances in these fields depend upon research. The research is of two major kinds. One kind consists of basic fundamental research, in which problems are investigated because of their interest and challenge to the investigator, with no particular relation to any possible application. The other kind is applied research, specifically directed towards some desirable practical application. Both kinds are extremely important in the progress of a state or nation.

The importance of applied research is obvious. The value of basic fundamental research is less obvious, but it is just as real. Applied research depends upon fundamental research, and there must be a continuing pool of basic fundamental research to supply the ideas and discoveries which applied research uses.

Applied research is usually carried out by industry, business, and governmental agencies, or by universities acting for these agencies. But fundamental research is almost entirely dependent upon university sponsorship. Only in universities can research workers be completely free from immediate motives of profit or war. The universities of the country, largely, must replenish the necessary pool of fundamental research out of which practical applications can be built.

It is important that university faculties be enabled to continue and to expand greatly their fundamental researches. Too often those who provide the money for research think only of the obvious end result: the useful gadget, or process, or treatment, or cure. But research is like a tree. The practical applications are the fruits at the ends of the branches. They develop only in proportion to the attention given to the whole tree. The most important attention is to see that the roots, that is, fundamental researches, are not neglected. When the basic roots of fundamental research are not nourished, the fruits of practical applications wither and die. In some fields of human endeavor, we are dangerously close to such a situation now.

The University of Oklahoma has done

what it could to facilitate fundamental research, but its efforts have been pitiful in comparison with what might be done. The University has had a small fund, ranging from several hundred dollars to several thousand dollars per year, to allocate in small grants to individual faculty members for equipment in research. But with the development of modern research apparatus, it is not uncommon for a single piece of needed equipment to cost more than the entire annual research fund. Obviously a faculty numbering several hundred cannot be aided much by such funds.

Moreover, industry, business, and governmental agencies, which could do much to aid applied research, give their support largely to those university laboratories in which research fundamental to their applied interests is already under way. The most critical financial period for any fundamental research project is at its very beginning. It is essential that the University of Oklahoma, in this time of world crisis, initiate far more fundamental research than has been financially possible in the past. And much of it must be truly fundamental, to provide the basic discoveries which can lead to the practical applications of the future. Many of the practical applications of the next ten or twenty years have not yet been dreamed of, and only new basic research can bring them to light.

The University should have immediately at its disposal an annual fundamental research fund of \$50,000, gradually increas-

ing to at least \$100,000 annually. Such a fund would be expected to pay dividends in many ways. With fundamental researches actively under way on a large scale, money could be attracted from industry, business, and government to apply the results of the experiments to practical ends. The history of mankind is crammed with examples of applications of tremendous practical importance which have resulted from seemingly impractical research.

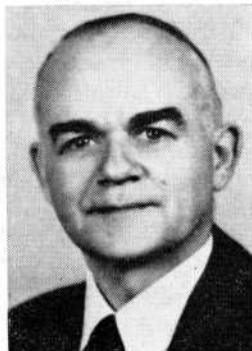
Under an expanded program of basic research, more and more graduate students could be trained in research methods, thus helping to fill the dangerously low pool of trained research men in this country.

Many of the discoveries and methods resulting from research could be expected to aid Oklahoma directly, by providing the foundations for practical advances in the state's industries, arts, crafts, business, governmental processes, and culture.

The University itself would become an increasing asset to the state both by attracting the most able students and by taking its rightful place among the great universities of the nation.

In basic research carried out by qualified investigators, we no longer ask the question, as Prime Minister Gladstone so naïvely did of Faraday regarding his basic work on electricity, "But after all, of what use is it?" Time has taught us the proper perspective on such questions, and the world now realizes its utter dependence on the re-

ABOUT THE AUTHOR



Dr. L. H. Snyder, Professor of Medical Genetics and Dean of the Graduate College, is a distinguished geneticist. He was president of the American Society of Human Genetics in 1949-1950. He is a member of the Executive Committee of the American Association for the Advancement of Science. In addition to many articles which he has published in leading scientific journals, he is the author of The Principles of Heredity, of which four editions have been published, and of Medical Genetics. Since joining the faculty in 1947, he has given every possible encouragement to graduate research by students and instructors alike.

sults of the inquiring minds of investigators in all fields.

With an adequate research fund, the University would begin at once investigations on many basic problems which urgently need solution. Among such problems may be listed the following as examples.

Chemistry and Biochemistry

In chemistry, we should be studying more fully than we are now able to do, the production and analysis of useful and more valuable chemical compounds from petroleum. Little is known now about the potential hydrocarbons from petroleum. New methods of extraction and production must be developed, but the results could be of immense value.

The search for potentially valuable organic compounds from the state's immense store of asphalt should be vigorously carried out.

Through the co-operation of our staffs in chemistry, pharmacy, and plant sciences, we should be expanding our study of valuable essential oils, useful drugs, and other compounds which can be cheaply obtained from waste-land plants and from the discarded portions of crop plants. The potentialities here are very great, including such possibilities as tannins from oaks, dyes from osage orange, oils from sage, drugs and medicines from crop plants, and so on.

We should intensify our studies of the poisoning of cattle by loco weed and shiner oak. We should expand our researches on the formulation of new and valuable drugs. In connection with some of the studies just mentioned, we are hampered by a lack of a petrographic microscope, which costs about \$2000.

Conservation

In the conservation of the natural resources of Oklahoma, urgent need exists for immediate basic research. We must study problems of land-use planning. The transition zone between the forest area of the Ouachita Mountains and the grasslands of the Sandstone Hills needs considerable study. In this area at the present time one will find farming, ranching, forestry, and some coal mining existing side by side. All are failing. Several of the farmers are using soil conservation methods but with little return from their investment. A complete study of the area needs to be made to determine the best land use. Such a study would need the assistance of people trained in forestry, soils, agriculture, hydrography, and other sciences, plus people with training in sociology and economics. The conservationists would correlate and integrate the work of all to plan for the best land use. The same problem is present in many other parts of the state.

The problem of land use along the headwaters of all streams in the state needs to be

considered. Such a problem would involve:

1. Study of the rainfall of the area—amount, type, distribution;
2. Study of the amount of run-off;
3. Study of the amount and kind of sediment moved;
4. Study of run-off control methods;
5. Study of economic factors of land use;
6. Study of effects on water supply down stream.

A solution to the problem would aid in the prevention of floods, cause a more permanent supply of ground water, and give urban areas a better and more dependable supply of water.

We need information on the utilization of raw resources. Greater usage for minor industrial minerals should be explored. The state is rich in limestone, dolomite, gypsum, granite, and other minerals. The fact that some uses for these have been found is not enough. They will not be properly utilized until the prospective user sees them in their relationship to fuel supply, railroad rates, labor supply, and markets. Co-operative studies in geology, economics, marketing, chemistry, and other fields ought to be worked out. Conservation means wise use—not non-use.

We should study the mining and shipping methods of such minerals as glass sand, asphalt sand, and asphalt limestone. Are the companies mining all of the economically useful part of one area before moving to a new field? What will be the effect of weathering and erosion in area now being mined? How much of the product is lost in shipping?

Uses for scrap lumber from the many small sawmills demands consideration. Today about 40% of the lumber sawed in the smaller mills is waste. Small industries to make rough furniture, fence posts, and other items should be developed. Specialists in industrial arts, economics, and marketing can combine their efforts to get the most from trees that are cut. The large sawmills, for example, use the waste for fuel, thus have no loss.

We must increase conservation education. There are at least five important steps in presenting a conservation problem. These are: (1) give adequate description of resource depletion, (2) provide historical perspective by comparing the present condition of the resource with the original and give a concise explanation of how the depletion took place, (3) present remedial practices which should be adopted, (4) cite places where similar practices have proved successful, and (5) if possible, set up demonstrational areas where the problem is being solved. In Oklahoma some work has been done in each of the above directions, however, it is far from complete. A de-

tailed study needs to be made and put into language the layman can understand. Conservation will continue to be an "orphan child" until the general public understands the need and is sufficiently informed to act intelligently.

Business

In business, there are many urgent research needs. Our Bureau of Business Research is doing all it can with its very limited budget, but there are many important investigations which should be started immediately. Once they are well under way, business itself could be expected to see their importance, and to support them. A few of the problems which should be studied are listed here, with some estimates of their cost.

We need to know the factors which control the economic development in Oklahoma. The industrial development of the various sections of the state has been uneven. Some areas are prospering, while others are declining. The state as a whole has failed to maintain an industrial growth comparable with that of the nation. The facts obtained in a study of this situation would provide the basis for rectifying it. With a study of each area of the state available, it would be possible for individuals in the areas and state-wide organizations to go to work on these problems and re-direct the economic interests of the peoples of the areas. As a result of this program, the state as a whole would be in a position to reverse the present unfavorable trend in economic development and the people of the state would be the final recipients of any gains which are achieved.

It would take a minimum of \$5,000 to study each of six areas of the state, and an additional \$5,000 to prepare a summary, making the estimated cost of this project \$35,000.

Economic analyses of each of Oklahoma's industries must be undertaken. During the past years some of Oklahoma's industries have prospered fairly well, and some have declined in importance. There is evidence, however, that few of the industries of the state have achieved a development which is comparable to their potentials. Furthermore, there are possibilities for other industries within the borders of the state than exist at the present. We need to examine each of these situations from a general economic viewpoint combined with a detailed statistical analysis of the causes of the particular situations.

The results of these studies could be used by industrialists presently operating in the state to improve the economic situations. Information would thus be provided to interest new capital investment in Oklahoma where industrial potentials are found. Such studies would provide information for

younger men seeking to become industrialists as to wherein opportunities existed for them in the state. Finally, the results would contribute a program of increased industrial development in the state, which would in the end increase the wealth of our economy.

It is estimated that these studies would cost on the average of \$2,500. There is a minimum of 25 industries which need to be studied. The estimated cost for this project would be \$62,500.

We need cost of living indexes for Oklahoma cities. At this time there are no figures on the trends in cost of living in Oklahoma. The Bureau of Labor Statistics has failed to include an Oklahoma community in its monthly and quarterly surveys. Information of this type is continually necessary in Oklahoma, as indicated by the number of requests received by the Bureau of Business Research for such data. We should make cost of living indexes for a large, medium, and small community of the state.

Cost of living data are used in negotiating wage contracts between management and labor. They also permit the consumers of a state to plan their budgets on the basis of variations in the cost of living. They permit the administrative officials in private and public positions to plan their expenditures in conformity with variations in living costs. They also permit a measuring of the inflationary influences that are creeping into a state's economy, which in turn enable industry to plan to meet this situation.

The initial costs of preparing these cost of living indexes would be \$30,000. Two thousand dollars a month would be required to keep them current. The cost of this project for the first year would be \$54,000 and a subsequent cost of \$24,000 annually.

We should have available trade-area surveys of Oklahoma communities. Each community in Oklahoma is interested in ascertaining its possibilities for industrial development and correcting maladjustments in its economy. The communities are interested in their market potentials and how these may be improved. The communities are interested in securing information concerning their general economic and business status, particularly with respect to how they compare with other communities. It would be the purpose of this project to obtain this information for the important communities of the state.

With such information available on a factual basis, the communities could then proceed to correct conditions which are proving detrimental to their development. They could seek out new markets in areas which are part of the trade area which have been neglected. They would be in a

position to provide industry with information concerning the desirability of locating in a community. This would contribute to the economic growth of the community and the welfare of the population.

It is estimated that trade-area surveys would cost on the average of \$2,000 per survey. There is a minimum of 30 communities of Oklahoma which should be surveyed. The estimated cost of this project would be \$60,000.

A study of the tax structure of Oklahoma as compared with selected states is urgent. There is a considerable amount of speculation as to the extent to which the tax structure of Oklahoma is detrimental to industrial development in the state. Furthermore, there are questions of the equitability of some of our taxes and whether we are failing to utilize some possible sources of tax revenue. No one has a factual answer to these questions. The purpose of this study would be to seek the answers to these questions by an intensive analysis of the income and expenditure by types of Oklahoma's revenues, and to compare these incomes and outgoes with those of selected states.

With this information available, we would be able to correct inequities in our tax structure, as well as to point out where it is an improvement over that of other states. We would be able to correct inequities in taxation, and possibly uncover some new sources of revenue. We would be able to improve our tax system, if it is necessary, in order to increase the possibilities of industrial development in the state. To perform a study of this type in a proper manner would cost approximately \$25,000.

We should study the problem of an adequate freight-rate structure for Oklahoma. There is no lack of evidence that the present freight-rate structure in Oklahoma is completely inequitable for the producers within the state. It can be demonstrated that it costs much more to ship goods out of Oklahoma than it does to ship the same goods into the state. This factor has done much to impede the industrial development of Oklahoma. The purpose of this study would be to investigate the various ramifications of the freight-rate structures in Oklahoma and compare them with those in other regions.

The information on freight rates could be used to secure hearings with the Interstate Commerce Commission and secure adjustments for the inequities. The law requires the I. C. C. to consider such evidences and make adjustments when inequities have been proven. The results of this investigation would go far toward improving the present situation.

One of the deterring factors in such a

study is the lack of people trained to make these analyses. Freight-rate analyses require a particular type of cost accounting which differs from the usual procedures. A member of the staff of the University would necessarily give full time to this type of study, and he would need considerable information before he could complete the investigation properly. It is estimated that \$20,000 would be required to prepare a study which would be acceptable to the Interstate Commerce Commission.

We should analyze the Income Stream for Oklahoma. One of the areas wherein we have the least information concerning our economic potential and development is in connection with the incomes of our people. Nevertheless, the income stream represents the acquiring and spending of money by our people, and this process summarizes their economic welfare. We know very little about where people acquire their incomes and how they spend them. We do not know how much income comes into Oklahoma from outside the state and how much is sent out. We do not know whether we are acquiring more wealth or sending more wealth out of our state. We know the answers to none of the problems associated with this situation. The purpose of this study would be to determine the income and outgo of the economic balance sheet of Oklahoma in considerable detail.

With this information, we would be in a position to approach the problem of the wealth of our people from a factual standpoint and take steps to correct situations in which we are dissipating our wealth, and take advantage of instances which might be uncovered as to where we could improve the income acquiring processes of our people. A study of this type would require extensive surveys among the people concerning their sources of wealth and how they spend their incomes. It is estimated that the project would cost a minimum of \$25,000.

We should study Oklahoma's potential as a wholesale center. Geographically, Oklahoma is located in an ideal position to be the wholesale center of the Southwest. Physically she has the transportation facilities to develop as a wholesale center. Actually Oklahoma has lagged in developing her potential in this respect. It would be the purpose of this study to ascertain the causes of this situation.

Information of this type could be used to correct the circumstances which have caused Oklahoma to lag as a wholesale center. This in turn would permit corrections of the situation and the development of a wholesale industry within the state. This in turn would permit additional growth of the retail and service industries as well as improvement in the situation for new in-

dustries considering Oklahoma as a possible location. It is estimated that the cost of this study would be \$5,000.

We need to know the factors contributing to the loss in Oklahoma's population. Confusing reasons are given for the decline in Oklahoma's population which was revealed by the 1950 census. It would be the purpose of this study to investigate the combination of circumstances which have contributed to this population loss.

With factual information available concerning the causes of the population decline in Oklahoma, steps could be undertaken to correct these factors whenever possible. By proceeding on the basis of the true facts of the case, it might be possible to correct the circumstances and eventually reverse the unfavorable population trend. Certainly the situation cannot be corrected as readily if such factual information is not available for use. It is estimated that the cost of this project would be \$15,000.

We should analyze Oklahoma's government as it affects industrial development. Industrial development can prosper only in a favorable governmental environment. There has been considerable criticism that the government of Oklahoma has not provided an atmosphere favorable to industrial development. However, this same criticism has been made in other states which appear to be prospering industrially. This study would secure the facts in comparison with other states.

With this information available, the opportunity would be presented to correct any unsatisfactory conditions in the state government with reference to industrial development. The information would be useful in combating untrue propaganda to the effect that Oklahoma's government is unfavorable to industrial development. The combination of these two situations would result in the development of an industrial climate in Oklahoma and increase the likelihood of further industrial development. It is estimated that the cost of this project would be \$10,000.

We should study current operating practices of successful Oklahoma small business establishments. Among the different business establishments of the state will be found a variety of operating practices. Some are conducive to the best results and some are very costly; some, between these two extremes, range from reasonable success to mediocrity. Business men are always attempting to find out the most successful operating practices, but it is difficult for them to study all of the different business establishments while carrying on their own activities. It would be the purpose of this study to analyze the different operating practices of various industries and summar-

ize those which have proved to be the most successful.

The dissemination of information on the most successful operating practices would enable many business firms in the state to change their methods of doing business. By patterning their activities after the most successful firms, they would provide a better return for themselves while improving their services to consumers by reducing the costs of operation. In this way the business and consuming population of the state would benefit.

These surveys would cost approximately \$2,500 per survey, and would extend through 20 types of retail and service establishments. The total cost of the project would be \$50,000.

We need to analyze the causes of failure of small business establishments in Oklahoma. The turnover of business establishments in Oklahoma is tremendous. The number of firms failing or going out of business during the year frequently equals the number of retail establishments in the state. Each business failure is costly to the business economy of the state. It represents a loss to the particular proprietors. It means that an inefficient establishment has been operating which has been costly to the consumers of the state. The objective of this study would be to ascertain the causes which tended to accommodate failures of small business establishments in Oklahoma.

Information on the causes of business failures would permit establishments to recognize the presence of these causes and correct them before they affected firms currently operating. Furthermore, they might prevent the establishment of firms which were doomed to be failures because of conditions which would be brought out in the study. This would save investments in unfortunate enterprises and costs to consumers. The cost of this project is estimated at \$10,000.

We should have information on the sources of operating capital for small business firms. Many potential businessmen in Oklahoma have the necessary know-how, initiative, and markets, but they are unable to obtain sufficient capital to initiate their enterprises. It would be the purpose of this study to determine where firms currently operating tended to obtain their initial business capital, as well as to uncover new sources of capital.

Potential businessmen would then be in a position to proceed immediately to the best possible sources of capital or to make their arrangements so that they could obtain capital in the manner which their predecessors employed in this respect. This information would assure that men with ideas would be in a better position to make their contributions to the development of the

state's economy. The cost of this project would be \$10,000.

We should make a careful study of the operating costs of Oklahoma retail and service industries. One of the problems which confound the businessman in any line of retail or service industries is the problem of his operating costs. He does not know whether he is spending too much for particular operating activities or whether he is not spending enough. He can answer these questions only by comparing his operating expenses with those of successful competitors. However, he can obtain information on operating costs only for industries on a nation-wide basis. The distribution of these costs nationally are not always applicable to firms operating in a particular region. It would be the purpose of this study to obtain information on the operating costs of firms in each of the retail and service industries in Oklahoma. These costs would be summarized and the patterns for the most successful firms presented as well as those for the less efficient organization.

If small business firms possessed information on the distribution of operating costs of successful firms and others in the different retail and service industries in Oklahoma, their owners would be in a position to analyze their own costs and make corrections in their procedures and policies. This would, again, lead to reduced operating expenses, increased returns in the form of greater profits to the business establishments, and reduce costs to be passed along to the consumers.

It is estimated that the cost of this project would be \$2,500 for each of the 20 retail and service industries of the state. The total cost of the project would be \$50,000.

Anthropology and Sociology

The University is in a most strategic position for the study of the American Indian, since there are more Indians in this state than any other in the United States. We should be in the forefront of research in anthropology. Our Indians are rapidly taking on the ways of the white man, and losing their old customs. Frequently this leads to difficult periods of adjustment. We need co-operative research by anthropologists in aiding the Indians to make the transition between the old and the new cultures.

As the transition is made, the native cultures are rapidly being forgotten, and very few records have been made of them. For many of our Oklahoma tribes, there is no knowledge at all of the old cultures. These valuable anthropological data are being salvaged through our Institute of Human

Studies for the Wichita and Caddo tribes, but the work should be greatly extended before it is too late. Even now only the oldest members of the tribes remember much of the ancient culture. Such work involves the co-operation of anthropologists, linguists, and historians.

Many of the important Indian sites are soon to be covered with water by the Federal River Basin Reservoir projects. It is extremely important to beat the bulldozer to these sites, and to excavate them before they are lost forever. We have been doing this on a small scale, but greatly increased funds are imperative to complete the work in time. It will be many years' work to classify and analyze the recovered material.

Public Health

We have just started a Graduate School of Public Health on a minimal budget. No funds are available for research in this important field. If our School of Public Health is to take its place with the better schools, we must immediately initiate research in this area.

Government

Our Bureau of Government Research is likewise operating on a pitifully small budget. We should be investigating new and better methods of procedure for state, county, and local governments; supervision of tax assessments, public personnel practices, debt limitations, and many similar governmental problems which state and local governments have requested that we study. The fine work which our competent staff has already done under its very small budget indicates what could be done with adequate funds. The constitutional studies made by our Bureau for the State Legislative Council received wide acclaim.

The problems listed above represent just a few of the many important basic researches that we should be doing. Not only should the University be attacking such problems, but it is anxious to do so, and has a staff capable of carrying out the investigations. What is needed is the money for equipment, research assistants to do the routine work involved, travel where necessary, and similar items. The annual expenditure of \$50,000 to \$100,000 would do much to put the University of Oklahoma in the forefront of research. It would help to prevent the rapid loss of the state and national pool of fundamental research findings on which must be based the industrial, business, governmental, economic, social, cultural, and military advances which are so vital to the preservation of the state and the nation in these times of crises.

Management of State Lakes

By WILLIAM T. PENFOUND

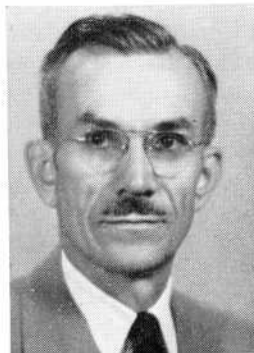
In a recent article in this magazine, Professor Riggs states, "At the present time, Oklahoma has approximately 225 lakes and 100,000 farm ponds with the total surface area of more than 300,000 acres." This list of lakes and ponds is based on an area of ten acres as the dividing line between lakes and ponds. Oklahoma's lakes are man-made, with a few exceptions: the ox-bows along the lower reaches of the Arkansas and Red Rivers in eastern Oklahoma and the playas of the Oklahoma Panhandle. The greatest period of construction of artificial lakes and ponds occurred from 1931 to 1940. At the end of that period Oklahoma ranked eighteenth of the forty-eight states in per cent of total area covered by inland water. It should be pointed out, however, that the position of the state in this respect should have improved somewhat in the last decade with the recent completion of a number of large impoundments.

The lakes of Oklahoma have been studied by investigators from various organizations. Workers from Oklahoma A. and M. College have investigated sedimentation, turbidity, fish populations, and the effect of flooding on plants. The U. S. Corps of Engineers has contributed much data on stream flow, types of rock, sedimentation and other physical facts on flood control reservoirs. The Oklahoma Game and Fish Department has investigated physical, chemical, and biotic factors of lakes with reference to fish production. In addition,

the department has conducted many fishery surveys of specific lakes and have formulated excellent investigative and utilization programs for the future. The University of Oklahoma, especially through the Biological Survey and the Biological Station, has contributed much to our knowledge of Oklahoma lakes. Members of the survey and the faculty and students at the station have conducted studies similar to those of the Oklahoma Game and Fish Department. In addition, they have initiated studies on parasitism in fishes and frogs, on populations of algae, turtles, and birds at Lake Texoma, the effect of lakes on climate, and the plant populations of Oklahoma lakes.

The most important climatic factors in determining the distribution of higher aquatic plants in our lakes are precipitation, evaporation, wind, and temperature. As is well known by most Oklahomans, the amount of the rainfall decreases, but the rate of evaporation and wind velocity increases from eastern Oklahoma westward to the tip of the Panhandle. Furthermore, the rainfall in western Oklahoma is more unevenly distributed and less dependable than in eastern Oklahoma. As a result, the water levels in the westward lakes fluctuate more rapidly than in the eastern lakes.

In general, Oklahoma lakes are full in the spring and decrease gradually throughout the late summer and early autumn. If heavy rains occur during the summer, however, the lakes are refilled to or above the summer pool elevation. If the water is re-



ABOUT THE AUTHOR

Dr. Penfound is a distinguished ecologist and has published in scientific journals many articles resulting from his research in this field. From 1937 to 1941, he worked in the Malaria Control Division of TVA and is at present a Consultant in Malaria Control for the Authority. He joined the faculty in 1947 after having taught for six years at Tulane. The Quarterly is happy to publish this article.