SCIENCE

VOL. LXVI DECEMBER 9, 1927 No. 1719

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SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal.
Lancaster, Pa. Garrison, N. Y.

Annual Subscription, $6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 8, 1879.

HOSPITAL AND LABORATORY[1]

THE formal opening of this hospital and clinic is significant of something of far greater importance than throwing open the doors of a new building which is imposing and beautiful in its architectural details and perfectly adapted in its plan and equipment to the purposes for which it is intended. This occasion signalizes the inauguration of a great experiment, for which the erection of this magnificent building, the installation of the splendid equipment, and the gathering together of the trained men who are to work within its walls represent but the collection of utensils and apparatus to be used in the performance of the test. That such elaborate plans should have been prepared indicates that those who have been responsible for this great undertaking possess a profound and abiding conviction and belief in the probable correctness of the idea, the truth or falsity of which is to be tested. These intrepid innovators believe that that branch of knowledge which has to do with disease in man has reached a stage in its development which entitles it to occupy a dignified and important place in the group of subjects which the university considers its domain. The fund of information concerning disease has grown to a sufficient bulk, the methods devised for its investigation have become sufficiently accurate, the subject itself is of sufficient interest, and its importance in all that relates to human welfare is sufficiently great to justify the prosecution of its study as an aid in the interpretation of nature, and not, as in the past, only as a part of the discipline required for engaging in a practical profession. This idea is not new, it did not originate in the minds of those responsible for this experiment, it did not spring forth fully formed like Minerva from the head of Jove. There have been many preliminary experiments, *Vorversuche,* but here in this relatively young university, which has been the cradle of so many fruitful innovations in the field of education, this idea is to receive a trial with facilities worthy of the importance of the issue.

It is especially appropriate that this experiment should be made in this great institution whose own commencement involved not one, but many experiments. President Harper early spoke of this univer-

[1] Address delivered at the dedication of the Albert Merritt Billings Hospital and the Max Epstein Clinic of the University of Chicago, November 1, 1927.

sity as "an institution in which a score or more of new educational experiments are being tried." You will recall that, from the instant that his interest was aroused in this institution, the idea of a *university* was uppermost in his mind. He could not entertain the notion of the development of another college and his enthusiasm was really only awakened when resources were made available to found an institution which should be not merely a training school, nor even a place where learning and culture should be preserved and fostered, but which should be a workshop in which the boundaries of knowledge should be extended and the innermost secrets of nature be investigated.

It was the natural outcome of its earlier existence that at the new University of Chicago attention should have been given first to those branches of human knowledge which have to do with man's spiritual needs and social relationships. But before the institution opened its doors it was possible to announce that, through the generosity of a great benefactor, there should be established as a part of the university, a school of science, a department in which the world of nature would be studied and investigated. In this department special attention was to be given to the encouragement of research, more emphasis was to be placed on the skill of professors to investigate than on their ability to teach. It is of interest that in this school of science the departments were to be those of physics, chemistry, biology, geology and mineralogy, and astronomy. While under biology may be included the study of the human species, yet, in the past, in departments of biology, the study has usually included all living things except man. The study of the structure and functions of the human body has been held to be the prerogative of those undertaking a special vocation or profession. An educated man should know something about physics and chemistry; he needs to know *nothing* about human anatomy or physiology. Indeed it has been considered not quite natural or proper for him to want to know, unless he is to use this knowledge practically. Those were not subjects for general culture. They belonged in the technical school which might, or might not, be affiliated with the university, but they were not real, integral members of the group of university branches of study. In the investigation of natural phenomena, the inquiry as to the nature of man has come relatively late. Astronomy long preceded anatomy. Possibly the reason was a realization of the difficulties of this investigation; more likely there has been a fear of uncovering secrets that have seemed almost sacred.

Very early, however, this university recognized that human anatomy and human physiology thrive best when each can have an independent existence, free from the restraints imposed by the exclusive preparation of students for the practice of medicine. Housed in buildings on the university campus, adjacent to the departments of physics, chemistry and the other branches of natural science, these departments were incorporated as true university departments in the Ogden School of Science, and they have grown to occupy important and dignified positions. The facilities of these departments have been open to all who were prepared to profit by the opportunities offered. It is true that most of the students have expected to engage in the practice of medicine, but the fact that these departments have functioned as university departments, in which a foremost place has been given to the extension of knowledge, has been an important factor in determining the high quality of the work which they have accomplished.

The study of the abnormal, the unusual, in the structure and function of man has, however, until now not been undertaken in the same way. For many years all who have been interested in medical education have desired to see this university wholeheartedly enter this field. Years ago Mr. Gates, the great supporter and promoter of all that is good in this university, wrote, "this conception, has been one of the dreams of my own mind, at least, of a medical college . . . , magnificently endowed, devoted primarily to investigation, making practice itself an incident of investigation, and taking as students only the choicest spirits." In this statement Mr. Gates gave expression to the age-old view that it is necessary to combine all that which relates to the study of the structure and function of man, in health and in disease, in one department, a department of medicine, or, as he inadvertently said, a "college," a term which, used in connection with higher education, was anathema to President Harper. The delay in the incorporation of a "college of medicine" within this university, therefore, may have been for good. It has permitted the independent foundation of the departments of physiology and anatomy and it now permits the experiment of establishing within the university a true university department of medicine, or better, a department of pathology in the broadest use of the term, which includes not only the study of disease but also the investigation of methods for its prevention and eradication.

When President Burton took up the duties which had to be relinquished by President Judson, the idea of a university department of medicine found fertile soil. His long experience in teaching and investigation made him enthusiastic regarding this point of view. In a conversation with him concerning this matter, I well remember his saying, in substance, "I know little about medical education but I have had a long experience in theological schools. It was only when we gave up training men to preach and began to assist them in the study of theology that we began to have results commensurate with our efforts, not only in developing scholars, but in producing worthy ministers of the Gospel as well." It was only natural, therefore, that under the guidance of this man the determination to test the effectiveness of this conception should have been made, and under him and President Mason and Professor McLean all the preparations for the experiment have been carried out.

It is unnecessary to speak to this audience of the practical importance of the study of disease or to recall the results which have already been attained in the relief of suffering and the prolongation of human life, through the acquisition of knowledge concerning this great impediment to the enjoyment of happiness and obstacle to human welfare. As a result of increased knowledge, uninhabitable parts of the world have been made pleasant, many infectious diseases, such as yellow fever, have been all but eradicated, the occurrence of diseases like typhoid fever has been markedly diminished, severe diseases, such as diphtheria, have been made almost harmless, and the effects of certain widespread and distressing maladies, such as diabetes, have been extraordinarily reduced. These are but a few of the beneficent results flowing directly from the increase in knowledge concerning disease. The possibilities of blessing to come are enormously greater. That all infectious diseases can be prevented or eradicated is not beyond the bounds of possibility. What would a contemporary of Queen Elizabeth have said if he had been told that in three hundred years in a city many times the size of London not a pock-marked face would be seen on the streets, not a soul would suffer the annoyance of the itch, and that most of the population would never have heard of the plague.

But ignorance concerning disease is still appalling. One who has never stood by the bedside of a loved one dying of disease, conscious that his efforts are rendered useless solely through ignorance, which in the present state of the basic sciences might be removed, has never tasted the bitterness of grief. Preventable disease and misery are still with us. Present knowledge was not able to prevent in 1918 the spread of a disease which swept over the entire world and in the course of a few months was responsible for the deaths of over half a million people in this country or five times the number of our soldiers that lost their lives in the war. It is estimated that in India 6,000,000 people died during the visitation of this epidemic. Let us not only say, let there be no more war, but let us also say, let there be no more epidemics.

Probably even still more important than the practical results in the prevention and cure of disease are the possible effects which the study of disease may have on prevailing biological theories and laws. It has not infrequently happened that the unusual and bizarre in nature have stimulated man's imagination and have led him to undertake investigations which have finally resulted in the formulation of general laws. Observation of the rainbow led to important discoveries in the field of optics, observation of lightning directed man's attention to the study of electricity.

The investigation of all biological phenomena is attended with great difficulty. During the past century great progress has been made, yet it can not be held that the formulation of any laws or generalizations regarding biological phenomena has been comparable in significance with the discovery of the laws regarding gravitation, the conservation of matter or the laws of thermodynamics. The methods to be employed in the investigation of biological phenomena are in principle the same as those which have been so productive in investigation in other branches of science, the results of which have been to give man that marvelous control over the forces of nature, the blessings of which we enjoy but hardly appreciate. Man tried for a thousand years to learn about his environment solely by exercising his reasoning powers, and the result was the dark ages. But in the seventeenth century there was introduced into his armamentarium a new weapon, a new method, the method of experiment. Man began to observe, to think, to try. Before he had only thought. The past three hundred years may be set apart from all that preceded as the Age of Experiment. What is called the scientific method has almost banished darkness from the earth, has almost annihilated distance and has lengthened time.

There have been many attempts to analyze the scientific method, though usually not by scientists themselves, for as one scientist has said, too great self-consciousness might make him lose his power "like the famous centipede, who after profound analysis of his own method of locomotion, found he could not walk." In the scientific method there are undoubtedly three kinds of activity always engaged in, seeing, thinking and doing. But probably rarely, and then only in the simplest cases, are these employed in strict succession. In profitable investigation the observer thinks and the thinker observes. The hypothesis, as we say, frames itself and the trial is made. No question, however, is ever settled by one experiment. The experiment must be repeated, the conditions changed, new observations made, thinking and reasoning going on all the time, until there emerges the answer to the question.

Certain students of the nature of science itself have attempted to classify the various branches of science, and have called certain ones, such as physics and chemistry, in which accurate measurements are important and in which the abstractions of mathematics are largely employed in interpreting results, the exact sciences and have called those branches of science in which, for the present at least, accurate measurements are not so important, the descriptive sciences. All science however is descriptive. Science is an attempt to describe natural phenomena in comprehensible terms. Certain it is that the greater the number of generalizations which are true, or at least seem to be true, for a large class of reactions, the more simple and understandable the subject becomes, and the more these laws can be reduced to mathematical exactness the more useful they are. But we are in possession of a vast store of knowledge which has been of the greatest benefit to mankind, but to which, at present, the methods of quantitative measurement are not applicable. There has even been an attempt to deny the value of all investigation that is not strictly quantitative in its methods. The statement has been made that investigation only becomes scientific when it becomes quantitative. This seems to me to be a narrow point of view which partakes somewhat of intellectual snobbishness. This attitude, however, is not universal; it is even rejected by many whose own methods are the most exact and quantitative. Professor Gilbert Lewis has recently said, "I have no patience with attempts to identify science with measurement, which is but one of its tools, or with any definition of the scientist which would exclude a Darwin, a Pasteur, or a Kekulé." One may add a Harvey, a Mendel, a Virchow and many others. Another writer states, "It savours of what we may call scientific Chauvinism to maintain that the physicochemical interpretations, when they go to the formation of our outlook on nature, require no correction from the biological, mental and social sciences. It requires a long-necked observer to see the whole firmament out of one window." That biology is not as exact as physics or chemistry is related in part to the fact that the phenomena studied do not occur in a simple system; the complexity of the environment in which these phenomena take place, even in the simplest unicellular organism, seems bewildering. Moreover, compared with astronomy and physics, biology is a young science, and only in very recent years has the experimental method been seriously applied to the solution of its problems.

Another point of view which seems to me misleading is the frequent reference to medical science as an applied science. In this designation the assumption is made that it is "oriented in relation to the art of healing." It is true that this has largely been the case in the past and this, I feel, is one of the reasons why even greater progress has not been made in the development of this branch of knowledge. It must be admitted that many of the great discoveries in medicine have been largely empirical. This does not minimize their importance either to science or to humanity. But, in a constantly increasing degree, knowledge in this field is unfolding through the conscious employment of the experimental method, using the discoveries and laws of the basic sciences as stepping stones. It is this that justifies the belief that, in the future, progress in this branch of science will be even more rapid than that which has occurred in recent decades.

Since pathology is a young science, barely in its infancy, accurate observation must of necessity occupy an important part in the activities of its devotees. Indeed, the first step in the study of any science is the observation and description of natural phenomena. Only by this means do we come to have knowledge of what we want to explain. All the sciences, except mathematics, are concrete, in that they deal with what actually happens. There is little point in studying with scientific methods that which "never was on sea or land." It would be my last wish to minimize the importance of the poet, but his ways are not the ways of the scientific observer. Apollo was worshipped not only as the god of medicine, the father of Aesculapius, but also as the god of poetry, music and art, and doctors have always had a propensity to philander with the muses, yet the student of scientific medicine, as the student of every other science, when he is playing the part of an observer, must place a guard over his emotions and, face to face with Nature, must try to see straight. Included in observation is classification, which method has been, and always will be, important in making our observations workable. But accurate observation is not sufficient. "How" and "why" are bound to intrude and must become insistent if knowledge is to grow. In trying to answer these questions the student may now loosen the leash upon his imagination. He may even listen to "the bluebird singing of beautiful and impossible things, of things that are lovely and that never happen, of things that are not and should be." In this stage of the process of discovery the greater the student's power of making unusual and new combinations and the greater his ability to visualize his previous observations in a new light, the more likely is his chance of success. But the scientist and also the physician must keep his reason and his emotions in separate compartments. In selecting which hypothesis he shall try, as he can not try them all, he must again lock up his imagination and call on reason to aid him. In the light of accumulated knowledge, is this or that hypothesis likely to be the right one? Then comes the doing, the performance of the actual experiment, and again there must be accurate observation, for without this the test will be worthless.

For all these procedures of observation and testing, the student of science, be it physics or medicine, must have a workshop, that is a laboratory. And these workshops to-day must be elaborate and costly affairs. When science was younger and when the chief interest lay in those branches of physics where conditions could be easily controlled, as in the science of mechanics, laboratories belonged to the individual. But, as the sciences developed, more elaborate equipment became necessary and the providing of laboratories became a communal obligation, a function of the state or of the university. To-day the university laboratories, even those of physics, have become elaborate affairs, equipped with powerful engines and motors, as well as with the most delicate and finely adjusted instruments. An air-pump and an inclined plane no longer suffice for the needs of the physicist. This development of university laboratories has occurred with astounding rapidity. Until the early part of the last century the only university laboratories worthy of the name were those of anatomy—laboratories for observation and description. It was only about one hundred years ago that the first university physiological and chemical laboratories were established, that of Purkinje, at Breslau, in 1823, and that of Liebig, at Giessen, in 1824. It was even later, in 1845, that the first university laboratory of physics was established by William Thomson, later Lord Kelvin, at the University of Glasgow. Astronomical laboratories are probably the oldest laboratories of all, for man's first wondering gaze apparently fell upon the heavens, certainly long before he became inquisitive about his fellow man. There is evidence that an observatory existed at Alexandria 300 B. C. Because of the importance of astronomy in navigation, for many years observatories were erected and supported chiefly by the state, though the study of the stars has always been a favorite avocation of the rich and noble and they erected observatories for their own use and that of their scientific protégés. At the end of the eighteenth century, however, observatories began to be established in universities, the Radcliffe Observatory at Oxford, presented by the London physician, John Radcliffe, being founded in 1771. The Harvard Observatory was established only in 1847.

From the time that President Harper accepted the presidency of this university and understood its organization, he emphasized the importance of laboratories. It is not surprising, therefore, that a week after the university began to admit students the announcement was made of a gift which enabled the university to erect and equip the most complete astronomical observatory then existing in the world. With the development of the university there were established in rapid succession the wonderful laboratories that have been the envy of most other institutions of learning.

While it required many years for the universities to recognize the importance of, and to establish, observatories where natural phenomena could be observed and in which experimental studies could be made, it has required a still longer time for the universities to recognize the importance of establishing their own hospitals, that is observatories, where human disease, as it occurs under natural conditions, can be carefully and accurately observed, and also their own laboratories of medicine where experimental studies concerning disease may be conducted. It is true that in Germany many so-called university hospitals exist but in most cases these are but municipal or state institutions, more or less under university control. In this country also certain state hospitals have had a close affiliation with the university, but, so far as I know, this is the first hospital erected on the campus by a university with the analogy of the hospital and laboratory clearly in mind.

In the past there has been a trace of the repugnant in the conception of a hospital as a laboratory. Hospitals were originally founded, as the name indicates, to provide hospitality to the poor and decrepit; only later did they become institutions for the care and treatment of the sick. Our most tender and gentle emotions are connected with the idea of ministering unto those suffering from disease. To expose our loved ones to the gaze, and especially the inquisitive gaze, of strangers has seemed cruel and harsh. It is unnecessary here to dwell on the change which has taken place within recent years in the attitude of the public toward the hospital. With the development and growth of modern scientific medicine and with the general recognition of the great blessings which it has bestowed, the dread of entering hospitals and the reluctance to send our friends into them have largely disappeared. The rich, as well as the poor, the powerful and influential, as well as the weak and obscure, are rushing to fill our hospital beds, until society has become unable to supply the demands. Moreover, it has come to be recognized that the best care will be obtained where the observation of patients is the most painstaking and accurate. There is, therefore, no longer any reason why the hospital should not be spoken of as an observatory in which the sick are observed, studied and treated. The hospital is the observatory of the department of medicine. It, of course, must also continue to be the dispenser of hospitality, and it would be a sad day for both scientific and practical medicine if this were ever forgotten. Observation must include not only seeing the sick with our naked eyes, it must be done with the aid, not of powerful telescopes and lenses, but with all the instruments of precision which the other sciences have furnished.

Even this, however, is not sufficient for the university department of medicine if it is to perform its proper function. The student of disease must be constantly seeking for new knowledge that can not be obtained by observation alone. He must employ the other steps in the method of experimentation. This does not mean that patients must be the subjects for experiment—far from it. In my experience the application of new and untried measures to patients in any hospital is in inverse ratio to the scientific atmosphere there existing. It is only in hospitals directed by the ignorant and by charlatans that unusual and untested measures are employed. Indeed, one important purpose of the experimental laboratory is to make certain that any measures to be applied to patients will be helpful and not harmful. The scientific observer of disease does no more harm to his patient than the astronomer does to the stars when he directs his gaze upon them through the telescope. When necessary, experimental studies must be made on animals, under proper conditions to avoid unnecessary pain. But in most of the experimental work in the laboratory of medicine the materials used are not animals, but they are bacteria and excretory fluids, and the instruments used are not knives and trephines, but microscopes and chemical reagents. It is this very inability to modify conditions in his field of observation that makes the work of the student of disease so difficult, just as it does that of the astronomer. The student of disease, as the student in the other branches of biological science, must bring to his aid the methods of the more fundamental sciences, physics and chemistry and physical chemistry, and even employ the methods of mathematics. There can be no doubt concerning the importance of the application of the methods and the contents of these sciences in the study of disease, but in these days of rapid progress we must be on our guard not to be over-fascinated by the prospect which the mere application of the methods of these sciences holds forth. We shall do well to remember the fate of the iatro-chemical and the iatro-physical schools of medicine which flourished in the seventeenth century, in another period of great activity in the physical sciences. The chief result of the foolish pretensions of these schools was the cry "Back to Hippocrates" and a turning of the doctors to Sydenham for guidance. We should remember that, while the contributions of Borelli and van Helmont have had no permanent influence on medical progress, Sydenham is still a living force. Newer concepts like that of emergent evolution give some support to the biologists who hold that there is something more in biological phenomena than the mere manifestations of energy working according to the laws of physics and chemistry that are already known. We sometimes forget that very few of these so-called laws have been discovered and that they are but imperfectly understood. Moreover, our faith in the immutability of some of the most cherished ones has recently been rudely disturbed. An important scientist, Whitehead, has recently said, "Science is taking on a new aspect which is neither purely physical, nor purely biological. It is becoming the study of organisms. Biology is the study of the larger organisms, whereas physics is the study of the smaller organisms." Furthermore, he says, "no one doubts that in some sense living things are different from lifeless things." Let us as biologists and as students of disease be not too modest, ashamed of our problems and our methods. Above all, let us not forget that we have our own problems. Progress is never made by waiting for an explanation of all the details before going ahead. Columbus did not wait for a map of the ocean currents, nor did Lindbergh wait for a chart of those of the air.

In the department of medicine the student should never forget that he is studying disease. In order to make progress he may need to go far afield, since the other sciences may not furnish him the methods or the necessary knowledge to make the next step, but the main problem should always be in the background of his consciousness. Otherwise he would probably better be working in the laboratory of physics or chemistry or physiology. None of those working in the domain of science may stake out preserves. Each worker is bound to be led into his neighbor's field and it is in these wanderings that the best game is usually bagged. But each one, and especially the worker in the department of medicine, should always remember where his home lies. He can never forget this if he has contact with patients in the hospital. He must not forget it if the university department of medicine is to justify its existence.

It is obvious that in the organization and equipment of a department of medicine, the university is confronted with an enormous task, not only in supplying the material resources needed for the hospital and various laboratories but in obtaining men who are properly equipped for the work to be done. In some places the attempt has been made to avoid some of the difficulties by divorcing experiment from observation, by establishing a department of experimental medicine separate from the department of clinical medicine in which study can be made only by means of observation. That progress can be made by observation alone, the history of science abundantly indicates. Hypothesis may follow observation and confirmation or rejection of the hypothesis may come through repeated observations. Indeed, with a sufficient number of observations, possibly even general laws might be deduced without the formulation of any hypothesis whatever. But that has not been the history of scientific advancement. Observation alone makes the road to knowledge long and tedious. The introduction of experimentation provided the needed short cut. On the other hand, many of the advances in recent years have been made by men whose only contact with human disease has been through their own afflictions. The importance of the contributions to our knowledge of disease made by physiologists, by chemists, by physicists, and by those working with disease experimentally induced in animals has been enormous and it is hoped and believed that these contributions will be continued in ever-increasing number. However, the complete separation of the observation of disease, as it occurs naturally, from the more intensive and experimental study seems neither rational nor advisable. It is impossible to reproduce human diseases accurately in animals. Conditions very like those occurring naturally in man may be produced in animals but there is always a difference, very often an important one. Through contact with human disease the imagination is stimulated, placing various observations in juxtaposition gives rise to new ideas, hypotheses develop. These hypotheses, however, will be of value only if they are not mere vain imaginings but if they can be put to the test by the individual making them. The opportunity for testing stimulates the formulation of ideas, in other words it develops the scientific, the experimental attitude of mind. From the educational standpoint this is most important of all. Many of the students in this department will become practitioners of medicine. Whether engaged in the practice of medicine or in investigation the scientific attitude of mind is essential. If this or any other university can cultivate in its students the desire to learn what is unknown, it will probably have solved the educational problem, provided, of course, the student is willing to spend the time and effort necessary to obtain the training required for fulfilling his desires. If one may paraphrase, "we do but go where *curiosity* leads the way."

But not all the students in this department will become practitioners of medicine. Some will become teachers, others will engage in public health activities, in which a knowledge of disease is of first importance. A few, and probably a constantly increasing number, will engage in the study of disease simply because it is a subject of extraordinary interest and because of its importance in the formulation of general biological principles. Some will become investigators of disease because of their desire to prevent suffering and to promote human welfare. With the accumulation of wealth in this country there will undoubtedly be an ever-increasing number of men and women who are relieved of financial burdens. In the past these men and women have become artists, explorers, writers. What is more fitting in this "Age of Experiment" than that some of these persons should become scientists, and what more interesting field in science can there be than the study of disease? In what way can these men and women be more useful to humanity? The university, however, must see to it that these opportunities are not limited to those financially independent. As Professor Huxley has said, "It is given to the few to add to the store of knowledge, to strike new springs of thought, or to shape new forms of beauty. But so sure as it is that men live not by bread, but by ideas, so sure is it that the future of the world lies in the hands of those who are able to carry the interpretation of nature a step further than their predecessors; so certain is it that the highest function of a university is to seek out these men, cherish them, and give their ability to serve their kind full play."

I congratulate this university that it has had benefactors of such generosity and wisdom as to establish and endow this hospital and clinic and department of medicine. I congratulate these donors for the opportunity which has been granted to them to perform so great a service to learning and to humanity. All that is possible has been done in preparation to provide hospitality and comfort for the sick, to relieve their ailments and to provide for their esthetic and spiritual needs; laboratories and equipment have been supplied so that patients suffering from disease may be studied in order that light may be shed on all that is mysterious and obscure; provision has been made for applying all that is known to relieve pain and distress and to save life; but, more important than all, provision has been made for investigation, so that more may be known concerning disease and its cure. This is not merely the dedication of a new hospital for the people of Chicago, or of the State of Illinois. It is a world institution; its influence will be felt wherever sickness and suffering exist. Other hospitals and other institutions have made advances in this direction. The University of Chicago has consciously inaugurated a new idea; it has established a true university department of medicine; it has erected an observatory and laboratory for the study of disease.

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NEW YORK CITY

THE BIOLOGY OF LAKE BAIKAL

MY wife and I have just returned to Irkutsk from a most interesting trip to Lake Baikal and Archan. We went first to the Biological Station of the University of Irkutsk, on the shore of the lake, some distance north of the village of Listvenitschnoe. It was our good fortune to be accompanied by Mr. W. Jasnitsky, of the botanical department of the university, who is working at the station and has charge of its affairs at the present time. Leaving Irkutsk, we went on the train to Baikal, a station at the beginning of the great and swift Angara River, which flows out of the lake. Taking the ferry across the Angara we were met by a boat in which we were rowed to the station, a journey of several hours. It was after dark when we saw a faint light across the waters, and presently came to a log house with several rooms, in which teachers and students live, and the work is carried on. Although the resources of the station are pitifully small, and would be considered quite inadequate in most countries, the group working there is a happy one and is doing work of great value. The surroundings are charming, with meadows full of flowers and hills covered with trees in the background. Across the lake at a distance of 40 or 50 kilom., but seeming much nearer, are the great Transbaikal Mountains. The water of the lake is usually calm in morning and evening, but more or less disturbed during the middle of the day. Occasionally there are storms so severe that it is impossible to land from a boat. The principal work going on at the time of our visit was that of W. Jasnitsky on algae and plankton; M. M. Kojoff on the Baikal fauna and especially the spermatogenesis of the snail *Benedictia baicalensis*; Ivan Rubtzoff on planarians, of which he has discovered several new species, one of which is oviparous; W. W. Jzossimoff (of Kazan University) on general hydrobiology, and especially oligochaetes and water-mites; Nina A. Epoff on the flowering plants of the vicinity; N. M. Wlassenko on the parasitic worms of fishes; Galia A. Muromoffa (University of Tomsk) on the plankton of littoral zone; Lidia A. Wasilewskaia on the plants of a defined area. In addition to these, a house close by is occupied by Professor Dorogostaiski, who has charge of the establishment for breeding useful native animals, deer, foxes, sables, squirrels, etc. Some of the foxes are Siberian, others from Alaska. The deer are from the Maritime Province, and were only recently received. The professor is an all round zoologist and has published a very important work on the amphipod crustacea of the lake. He showed me the exquisite colored drawings for a new paper on the amphipods, with many new species, to be published by the Academy of Sciences at Leningrad next year. In spite of the limited resources, there are enough facilities for good work and the good fellowship and romantic surroundings give the place an indescribable charm, accentuated by the sense of peace and remoteness from the troubles of the world. It is an unfortunate circumstance that the authors of the resulting papers have to pay about half the cost of printing, except in the case of specially interesting work, when assistance may be obtained from Moscow, or of course in the rare case of papers published by the Academy of Sciences at Leningrad.

Leaving the university station, we next visited the establishment of the Russian Academy of Sciences, situated at Maritue, south or rather east of the Angara. We were very fortunate in finding there Professor Nassonov, whom I was especially pleased to meet, as I used to correspond with him about Coccidae in the days before the war. Professor Nassonov explained that the house at Maritue was not to be regarded as a biological station, but only as a base for the Baikal expeditions sent out by the Academy. At the moment there were three parties working in North Baikal—a botanical one under Professor Mayer; one on fish and fish breeding, and chemical analysis of water, under Professor Soldatoff; and the third on general zoology, but principally Cladocera, under Verschagen. They have a motor boat, which enables them to reach distant parts of the lake. Nassonov himself had just returned from an expedition and was about to leave for Leningrad. He gave me some very fine and large amphipods, which I shall send to the U. S. National Museum, as Miss Rathbun tells me they have none of the Baikal crustacea. The Academy has in view the establishment of a larger and permanent station, at Tanhos or Mysovsk, preferably the latter because of the great depth of water nearby. Both are on the transsiberian railway, as is Maritue.

The more we study the Baikal problem, the more evident does it become that it includes matters of the greatest interest for biological theory. In spite of the unexplained presence of the seals (*Phoca foetida sibirica* Gmelin), which are said to be nearest related to the Caspian form, the marine elements which figure so largely in many discussions are evanescent. The nudibranch, the pteropod and the nemertean