Adventure in the Laboratory

As told to Roscoe Cate

WHEN scientists mention the preparation and properties of a certain form of Dihydroxytetrahydronaphthalene, or cytological and morphological factors in the development of amphibia, or perhaps diamagnetic susceptibilities — the layman feels a headache coming on and suddenly remembers a previous engagement.

Beneath the technical language, however, there is a vast amount of creative work and intellectual adventure that is understandable to any college graduate. At the University of Oklahoma, faculty members are engaged in hundreds of important research projects. Although many of them will produce results that are only of theoretical value, in expanding the borders of knowledge, it is virtually certain that some of the experiments will lead to highly valuable discoveries that will be of considerable practical value as well.

Only last month, newspaper and magazine readers all over the nation were told about a discovery made by Dr. Alma J. Neill working in a small research laboratory in the O.U. Pharmacy building. After four years of investigation, she had located the cause of the mysterious disease, sleeping sickness.

Faculty members, working in what little free time they can snatch from their heavy teaching duties, are carrying on research in almost every branch of learning. Let's look into some of the laboratories and see what's going on.

Such an everyday item as the red reflector button that warns motorists of danger points on streets and highways is the subject of research in the physics department by Dr. G. A. Van Lear, Jr.

These reflector buttons are, in effect, just so many artificial dog's eyes. A reflector button is not, as many people suppose, merely a chunk of glass that glitters in the light, but combines an accurately-formed lens and a curved mirror, so that when light from a headlamp strikes it, the light is collected and sent back close to the headlamp where it started, with only enough spread to reach the driver's eyes.

In this way, a maximum economy of light is achieved, for instead of scattering it in all directions, the button sends it back just where it is needed, and without any special aiming of the button. One can easily see that this is the case by stopping his car when about one hundred feet from a reflecting STOP sign in town, leaving his lights on, and moving a few feet sidewise from the car. The buttons will seem to stop shining. A similar experiment can be performed with a dog, with someone directing a flashlight at its eyes.

To work at all well, a reflector button must be properly designed and accurately manufactured. There is a serious need for investigations that will make it possible for purchasers (largely state highway departments) to specify just what optical properties their buttons must have, and to test those delivered for conformity to specifications. For instance, the streets of at least one city in Oklahoma displays reflectorized STOP signs which are even less visible than painted signs.

An investigation directed by Mr. Van Lear is designed to gather sufficient knowledge to outline adequate specifications and tests.

RESEARCH work on the forces that hold atoms together in molecules and crystals has been carried on for a number of years by Dr. J. Rud Nielsen, professor of theoretical physics. Molecules are exceedingly small—an ordinary glass of water contains ten million billion billion water molecules —and their behavior differs much from that of large-scale objects. Nevertheless, all the properties of matter in bulk depend ultimately upon the properties of the molecules of which it is composed. The study of molecular structure is, therefore, of great practical importance.

The method used in most of the experiments is to illuminate the substance to be investigated by the intense light from a mercury arc lamp, and the colors of the feeble light scattered by the molecules are analyzed in a so-called spectrograph. The mercury lamps and the spectrographs used have been built at the University. One of the spectrographs designed by Professor Nielsen has many unique features and is believed to be the largest of its kind in existence. It required four years to build this instrument. Some of its parts were made in the shop of the physics department; other parts were made in Munich, Germany, in Copenhagen, Denmark, and at the Massachusetts Institute of Technology.

In the course of the work, it became necessary to use a microphotometer for measuring the spectroscopic plates. Since the University was unable to pay the $2,400 which such an instrument costs, a microphotometer was designed and built by Dr. F. W. Crawford, formerly an instructor in physics in the University and now a research physicist with the Phillips Petroleum Corporation.

Dr. Nielsen's work has received recognition in the form of a number of research grants. During 1937 he received grants of $500 from the American Philosophical

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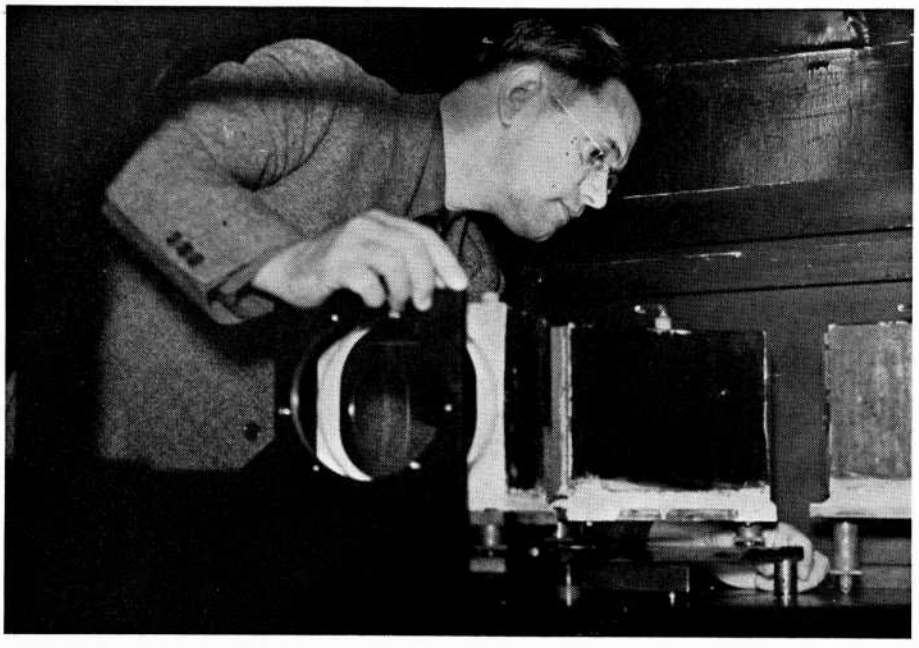

Dr. J. Rud Nielsen inspects the huge prisms on the interior of the University's spectrograph—largest of its kind anywhere although "homemade" by the physics department. Buried in an inconvenient cubbyhole in the Ad Building basement because of lack of space, it is seen by few people, but is of vital importance for research work

BARROWMAN-WILSON: Miss Marion Katherine Barrowman, '36ex, and Charles Edwin Wilson were married April 16 in Norman. They will live in Tulsa.

Head of the instrumental division at Mangum Junior College is Eric Parham, '36fr, of Guthrie.

When the new Oklahoma City chapter of Kappa Alpha Alumni was formed this spring, Hal Stewart, '36bus, was elected secretary of the group.

MAIDT-COLVERT: Miss Dorothy Roberta Maidt and James Robert Colvert, '36, were married March 26. Mrs. Colvert is a graduate nurse from St. Anthony's Hospital in Oklahoma City. Mr. Colvert is a member of Pi Kappa Phi fraternity. He is now a student at the University of Oklahoma School of Medicine in Oklahoma City. The couple will reside at 200 Northeast Fourteenth Street in Oklahoma City.

YOUKER-CRITES: Miss Mildred Dodge Youker and Reed Crites, '36law, were married May 21. Mrs. Crites attended several California colleges. Mr. Crites was a member of Beta Theta Pi fraternity at the University. They will live in Bartlesville, where he is secretary for the Reda Pump Company.

BARROWMAN-WILSON: Miss Marion Barrowman, '36ex, and Charles Edwin Wilson were married in Norman in April. They will live in Tulsa, where he is employed in the credit department of Frick-Reid Supply Corporation.

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Society and $200 from the Society of Sigma Xi. From 1931-33 he held Guggenheim and Rask-Oersted fellowships.

Magnetic forces so small as to be almost inconceivable to the layman are being investigated by Dr. William Schriever, professor of physics, and the experiments are likely to provide valuable data for geophysical prospecting done with the magnetometer.

Imagine a gold wire so fine that one-tenth of an ounce of it would reach San Francisco to New York City, a distance of over 3,000 miles. One-sixteenth of an inch of this wire would weigh one-millionth of a dyne, or one twenty-eight *billionth* of an ounce. It was necessary to design a torsion balance so sensitive that it could measure forces as small as one-millionth of a dyne, in order to determine the degree of magnetization which most ordinary substances possess when placed in magnetic fields only two to twenty times as strong as the magnetic field of the earth. It is the weak magnetic field of the earth which causes the compass needle to point toward the north.

Some valuable mineral deposits disturb the earth's magnetic field slightly; petroleum itself does not do this to the degree required for its detection, but the geologic structures with which it is usually associated do disturb the earth's magnetic field to a measurable extent. Such disturbances are usually measured with an instrument called a magnetometer.

In order to be able to predict the sort of structure which may cause a measured magnetic disturbance, it is necessary to know the degree of magnetization that will be produced in ordinary rocks by a magnetic field as weak as that of the earth. Ordinary rocks are so very weakly magnetic that they are commonly classed as *non*-magnetic.

Heretofore, measurements of the magnetizations of such substances as ordinary rocks have been carried on in magnetic fields from a hundred to several thousand times as strong as that of our earth, in order to obtain forces sufficiently large to measure. The construction of the supersensitive torsion balance made it possible to measure the forces on small spheres in fields only a few times as strong as that of the earth.

It was necessary to have the entire balance in a vacuum, and to mount the whole apparatus on concrete piers resting entirely free of the enclosing building. Ordinary winds acting on the small nearby trees would cause sufficient vibrations to make the use of the balance impossible.

Already the experiments with weak magnetic fields have shown that the degree of magnetization of para- and diamagnetic substances (those only slightly repelled or attracted by a magnet) is *not* directly proportional to the field strength as had previously been supposed.

Numerous specimens of rock found in central United States will be investigated both as to their magnetizabilities and their remanent or permanent magnetizations. This data will be valuable in interpreting magnetometer explorations for possible oil bearing formations.

In the Botany Department of the University, interesting research work is being done in four different directions.

Dr. Milton Hopkins is making a survey of the State preparatory to making a list of the plants that occur in Oklahoma. He plans to publish a pamphlet listing the various species that should be of value in landscape gardening, with emphasis on drought-resistant forms.

Glenn Couch is studying microscopic forms of plant life known as diatoms. These little organisms have hard shells and are used for scouring powders and for insulating purposes.

Dr. Harrison L. Chance specializes in the study of the bacterial cell. He is particularly interested in the internal structure of the bacterial cell as compared with the internal structure of the cells of higher organisms. His recent work has attracted the attention of bacteriologists all over the country.

The structure of leaves, particularly with respect to the time of year that the leaves are formed within the buds, and the environmental factors affecting their formation, is being studied by Dr. G. L. Cross. It is hoped that the results may be of some significance with respect to frost injuries, early spring droughts, and other adverse environmental conditions that may exist at the time of bud formation.

EDITOR'S NOTE—This is the first of a series of articles about research projects at the University of Oklahoma.