SCIENCE NEWS

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THE SUPPORT OF FUNDAMENTAL SCIENCE

EACH one of us has a tremendous stake in the future of fundamental science. To millions of people, the stake is life itself, for advance in medicine, sanitation and public health, which gives life to millions, depends upon fundamental science. We are all familiar with the material conveniences and comforts which science has given us, but we often forget the original patient, fundamental research which made them possible and will be the basis for future advances.

The scientists who carry on fundamental research are like explorers. They are continually seeking to push forward the frontiers of knowledge, by discovering basic principles and how some law of nature works. Their discoveries are the raw material of applied science. If their kind of research should end, then progress in all applied science would presently end also, just as the water fails when the spring runs dry.

We forget the significance of fundamental science sometimes, just as we forget that fundamental science can not support itself, since even the greatest of these basic discoveries can not often bring to the scientist or to his institution any immediate return in money. For this very reason, the greatest part of such research in this country is carried on in our universities and in a few specially endowed research institutions. (Industry and government incline toward *applied* research—the application of some fundamental discovery to immediate problems.)

To-day fundamental science is confronted by a serious problem: universities and research institutions in general have been hard hit in recent years by reduced earnings on their endowments at a time when gifts and bequests have fallen off sharply. These institutions no longer have the funds to finance much essential research. As a result, fundamental science is receiving less support to-day than at the end of the 1920's.

To help supplement existing support for science, the National Academy of Sciences has created the National Science Fund—a national clearing house for advice on philanthropy in science. In every community there are many persons who would like to make large or small gifts for science, but who hesitate because they do not know how it can be done effectively. Sometimes they feel that the amounts which they can afford to give would be of slight assistance to science.

Through the National Science Fund, any donor may obtain the advice of those scientists best qualified to assist him in making a useful gift to science. If he wishes, the fund will administer his gift for him. Through the fund, many smaller gifts may be pooled to accomplish large results. The National Science Fund does not carry on any research of its own, but acts through those institutions and scientists best qualified to undertake the research at any given time.

Scientists to-day have great faith in the infinite possibilities of science in the future. So do countless laymen. Through the National Science Fund, every one—scientist or layman—can share in the adventure of exploring these unknown realms.—WILLIAM J. ROBBINS.

VARIABLE STAR OBSERVERS

SOME 850,000 observations of about 600 stars have been made in the past thirty years by members of the American Association of Variable Star Observers, is reported by Leon Campbell, recorder, in his annual summary of the researches of this band of volunteer astronomers scattered all over the world.

Veteran watcher of the fluctuating light of these stars is the Reverend T. C. H. Bouton, who has observed during the whole thirty years of the existence of the association, first from Hudson, N. H., and now from St. Petersburg, Fla. At the age of eighty-five years he is still adding to his grand total of 25,000 observations.

L. C. Peltier, of Delphos, Ohio, known for his comet discoveries, has been observing steadily since 1918 and has nearly 60,000 observations to his credit.

E. H. Jones, of Goffstown, N. H., has been keeping track of variables since 1923 and has made 40,000 observations. J. M. Baldwin, of Melbourne, Australia, has made nearly 35,000 observations since 1920, and R. G. Chandra, of Bagchar, India, follows with 29,000 estimates made during the past twenty-one years.

The volunteer astronomers of the American Association of Variable Star Observers, sponsored by Harvard Observatory, spend most of their effort in observing the stars that are inconstant in their light. Small telescopes are used for this purpose and there is opportunity for additional observers who will have special stars assigned to them as they prove their competency. They also watch and compute occultations of the moon and search for bright, suddenly appearing novae or "new stars."

In the past year, 38,043 observations of variable stars were made, with Cyrus F. Fernald, of Wilton, Me., first, with 3,133 observations.

THE REMOVAL OF REFLECTIONS FROM THE SURFACE OF LENSES

A NEW chemical process that can wipe troublesome reflections off the glass of show windows, pictures, camera screens and lenses and airplane instruments has come out of current RCA television research and a clue that was dropped in 1900 by Lord Rayleigh, the English physicist.

The new method, developed by Dr. F. H. Nicoll, of the RCA Laboratories, is to expose the glass surface to hydrofluoric acid vapor. This vapor etches away a small amount of surface and leaves a thin, transparent film of calcium fluoride about one quarter of a light wave-length in thickness.

This almost invisible film not only abolishes most of the reflection from the surface, but the light that otherwise would be lost in reflection is saved and transmitted

through the glass. Thus the very thin film is of great usefulness in speeding up lenses used in photography and television. Happily, tests show that the film formed by the hydrofluoric etching is very tough, withstanding washing with such things as water and alcohol. It can be heated safely to high temperatures. It is purple in color, showing that yellow and green, to which the human eye is quite sensitive, are not reflected.

This discovery was made during experiments to improve contrast of television cathode-ray tubes. It promises to allow television to be viewed in rooms that are not quite so dark as heretofore required. Television images are light-painted on the glass face of the cathode-ray tube, passed through a glass protector plate and then reflected from a mirror. In each case reflection cuts efficiency unless the new film is used.

Very thin coatings have been successfully used in the last few years to suppress reflections from glass surfaces as a result of researches by Drs. John Strong, Katherine Blodgett and C. H. Cartwright. In these earlier processes coatings of various sorts have been added to the glass, while Dr. Nicoll's method etches the glass to produce a film. Commercial applications of the new process are being developed.

Lord Rayleigh more than forty years ago jotted down in his records that hydrofluoric acid diluted in 200 parts of water took off a layer of glass each hour amounting to about a quarter wave-length of light. This was the clue used by Dr. Nicoll in developing his new process of making glass more transparent.

INSULIN SHOCK TREATMENT FOR MENTAL DISEASE

VITAMIN B_1 (thiamin) is now being used to make the insulin shock treatment for mental disease safer and more effective, is reported by a California investigator and three physicians at Harlem Valley State Hospital, at Wingdale, N. Y., where this dramatic treatment was pioneered several years ago.

By far the most dangerous complication which may occur in giving the insulin shock treatment is when the patient goes into a state of "protracted shock," failing to come out of it until damage to the brain has occurred or perhaps even death. Yet when patients can be brought out of this dangerous state, it is sometimes found that they have been cured of their mental disease.

That it has been now found possible to predict "protracted shock," prevent it, or even to produce it at will, is reported by Dr. Jacob P. Frostig, of the Medical School of the University of California, and Drs. I. Murray Rossman, William B. Cline, Jr., and Oscar Schwoerer, of Harlem Valley State Hospital.

So far no dependable method has been found for terminating the condition once it has developed, so these physicians have made no use of their knowledge of how to produce it for therapeutic purposes.

Insulin, when given in shock doses, follows a special course in its effects on the central nervous system. First, the cortex of the brain is affected, then the basal ganglia and hypothalamus, then the midbrain and finally the medulla oblongata. Various recognized symptoms accompany the successive involvement of these different parts of the nervous system.

Study of cases of protracted shock revealed that this condition occurs only after the medulla oblongata has been involved for some time. The dangerous protracted shock can be prevented in three ways. The treatment can be terminated as soon as the signs of medullary involvement occur. If the symptoms should develop too rapidly to be prevented, the patient can be given an injection of glucose into the veins. In the case of patients who show a special tendency to the protracted shock, vitamin B_1 will prevent it if given regularly. Even after protracted shock has developed, it was found that injections of the vitamin in doses of from 3,000 to 10,000 units will shorten the period of unconsciousness.

SCIENTIFIC STREET LIGHTING

TRAFFIC fatalities in our cities are more frequent at night than by day. The reason is inadequate and improper lighting, according to Louis J. Schrenk, general superintendent of the Public Lighting Commission, of Detroit.

When this is replaced by a scientifically planned system of lighting, Mr. Schrenk told the Illuminating Engineering Society, meeting at Atlanta, night fatalities diminish and approach the daytime figures. It is quite possible, he indicated, to make city streets as safe by night as they are by day, and it costs but little more than the extravagant and wasteful methods that have been employed. These facts were brought out by an investigation of conditions in Detroit before and after the installation of a scientific lighting plan.

On 100 miles of heavy traffic thoroughfares, night fatalities had amounted to nearly 80 per cent. of the total fatalities. When these streets were equipped with "Traffic Safety Lighting," the night fatalities fell to about 60 per cent. of the total.

In 1930, the city operated 28,000 street lamps at a *per capita* cost of 91 cents per year. In 1940, with safety lighting installed on most of its streets, the city operated 40,121 street lamps at a cost of $1.02 *per capita*.

When the modernization program is completed—it is now only 55 per cent. complete—the commissioner stated that the *per capita* cost would be around $1.35. But further reductions in the proportion of night to day fatalities is expected.

The heart of the improvement is the new "traffic safety lamp," designed after much investigation and many tests on the streets. By a combination of reflector and prisms, this lamp throws its main beam at an angle of 78 degrees, which is 8 degrees higher than the previous "Recommended Practice." This secures better illumination between lamps. The prisms redirect the light so that most of it falls on the street and a less amount along the sidewalks. The reflector cuts off the light at the building line.

Comparison of the new with the old lamps, both of the same brightness, showed that to secure approximately the same results with the old lamps more than twice as many of them would have to be used.

PYRAMIDS AND RUINED CITIES?

EXPLORING Egypt's pyramids is "out" these days, but stay-at-home archeologists who have been excavating American pyramids, at Metropolis, Ill., report finding archeological treasures as rich as those of Egypt.

Pyramids, stone slab coffins and palisade defenses which figured in prehistoric Indian life and death have been unearthed at the Kincaid mound site, according to Dr. Fay-Cooper Cole, University of Chicago anthropologist, who has been directing the summer digging. For eight years the university has worked at a 500-acre area probing its buried history.

The half-dozen larger mounds were pyramids built by Indians carrying the clay in baskets, with a view to raising high places for ceremonies, explains Dr. Cole. On the flat tops they built temples of wood and thatch.

"Many people think that they must go to Egypt for pyramids or to the Near East for ruined cities, but we have both within the borders of this state."

Evidence that the Indians of the region were farmers has been found. They raised corn and beans, but also depended on hunting and fishing. Fearing invaders, they built a palisade with bastions around their community. Still sought is their main burial ground, but single graves which look like stone coffins have come to light. The bodies were laid in the stone boxes formed by the large stone slabs.

More than 100,000 Indian relics, including quantities of pottery, have been recovered from the site, and are being studied at the laboratory of anthropology. There is hope of detecting the exact time when the mounds were in use, by fitting pieces of wood from the site into a tree-ring calendar such as has been used in dating Indian settlements of the Southwest.

THE SOVIET PRE-WAR CENSUS

SINCE Bible days, censuses have been valued in gauging a nation's fighting power, and the Soviet Union reports that its 1939, just-pre-war, census is now important aid in the struggle against Nazi invasion.

Whereas old-time head counts were relied on mainly to show how many men could be mustered, now in total war the number and location of such resources as thousands of miners, seamstresses and truck drivers become facts of vital usefulness.

The Soviet Union gained 16 per cent. in numbers in the twelve years between censuses, according to the figures for 1939. There are 6,000,000 fewer farmers, but machines are doing more of that work. A Soviet trek to the cities in general doubled city population. Industrialization has drawn so many people to cities and centers where natural resources are developed that nearly half the people are reported to be factory workers or to belong to families supported in this manner.

The pre-war census gave the Soviet Union a total population of 170,467,000, a figure which had risen to 193,000,000 at start of the present Nazi invasion, due to Baltic and Finnish additions, and which is now in a continual state of wartime flux.

When the census was taken, Soviet Union officials counted on 305,000 architects, engineers and industrial designers, or almost ten times as many as in 1926. Farm crop experts numbered 90,000. Metal workers counted by enumerators numbered 4,331,000, or more than four times as many as 12 years before. Instrument and die makers had increased from 11,300 to 137,600. New to a Russian census were 15,000 armature winders and 8,800 excavator operators.

ITEMS

NINE out of ten persons who once would have died of pneumonia now are saved, thanks to the sulfa drugs and the development of serum for the thirty-two different types of pneumonia, according to Dr. Edmund F. Foley, of the University of Illinois College of Medicine. Reducing the pneumonia death rate from 50 per cent. to 5 per cent. is "the outstanding medical achievement of the last decade," but he warned that even with serums and the sulfa drugs, early treatment for pneumonia is imperative. Pneumonia, in three fourths of the cases, begins with the patient "half-sick" with what is thought to be a cold. Several days may pass, days which are valuable for treatment, before the disease is recognized and medical aid sought. In only a fourth of the cases does pneumonia start explosively with chill, fever, pain, cough and prostration.

NEW use for sulfapyridine, saving eyes attacked by a highly destructive type of ulcer, was announced by Dr. Cecil W. Lepard, of Detroit, at the Chicago meeting of the American Academy of Ophthalmology and Otolaryngology. Dr. Lepard urged that no time be lost in beginning sulfapyridine treatment. The 48 hours required for a laboratory report on the type of infection is too long, he said, to wait before starting the treatment if the eye is to be saved.

EYE injuries in American industries are occurring at the rate of 1,000 every working day and 98 per cent. of them are wholly unnecessary, according to a study sponsored by the National Society for the Prevention of Blindness (Columbia University Press). It was found that about 1,000 workers lose sight of one eye and 100 or more the sight of both eyes in a year as a result of occupational hazards. Many more have damaged sight. It is pointed out that there is no need for the blinding of workers in American industry. The industrial accident and disease hazards affecting the eyes are now commonly known. Methods of eliminating these hazards or of protecting workers against them have been thoroughly demonstrated. Devices which provide protection against almost every type of eye accident are now available.

SPECIAL high power mercury arc lamps that have been developed by optical engineers to speed up the production of blueprints—needed in vast quantities in defense work—were described by Wm. T. Anderson, Jr., of the Hanovia Chemical and Manufacturing Company, Newark, N. J., at the New York meeting of the Optical Society of America. The lamps give a very high intensity of light in the near ultra-violet region to which the sensitized paper is most responsive. By thus shortening the exposure, the reproduction of working drawings is speeded up.