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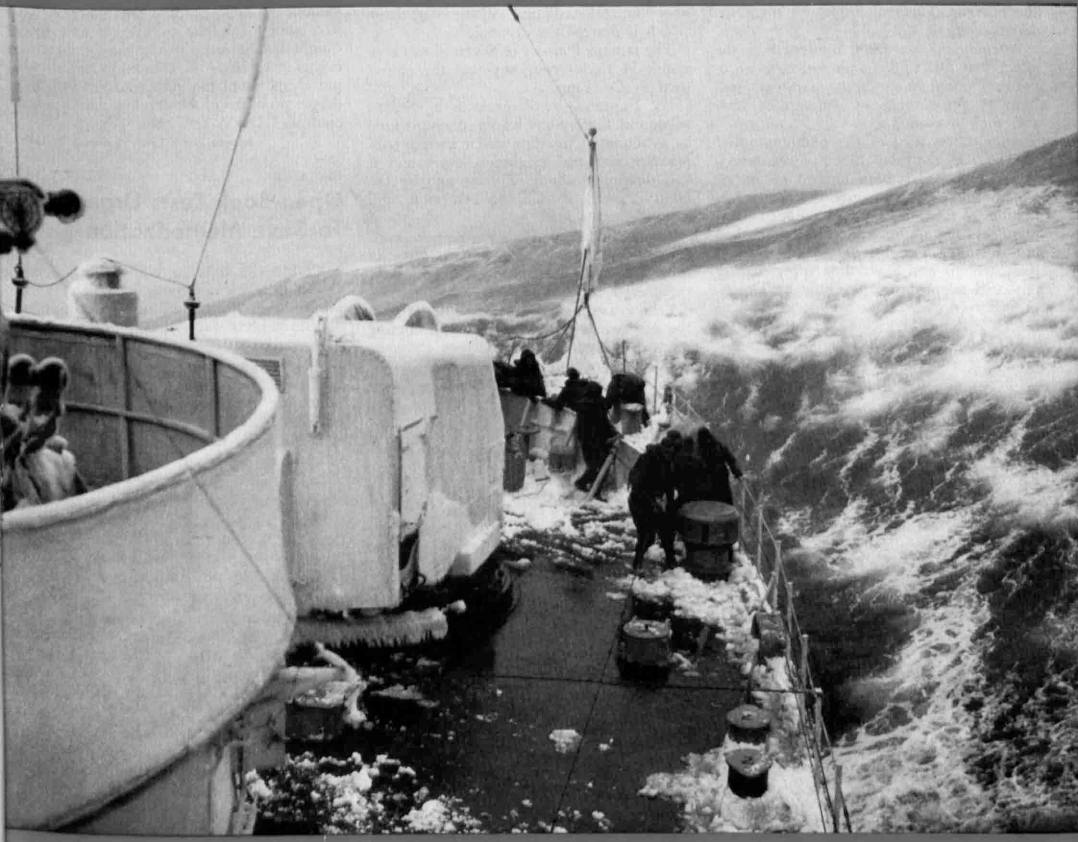
JANUARY 7, 1950

SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Weather Patrol

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A SCIENCE SERVICE PUBLICATION

$5.50 A YEAR

VOL. 57 NO. 1 PAGES 1-16

ASTRONOMY

Star Theories Change

➤ A NEW electronic method of determining the distance of a star from the earth that takes only about 10 minutes was explained to the American Astronomical Society, Tucson, Ariz., by Dr. Olin J. Eggen of Lick Observatory of the University of California.

Heretofore it has taken at least six months to get much less reliable information by older methods. Dr. Eggen's method allows determination of the real brightness of the star from its apparent brightness and its color, since he has worked out a new law of the heavens. The real brightness gives the distance.

Astronomers are more interested in the effect that Dr. Eggen's photoelectric astronomical observations of the past year will have on the theories of structure of stars and their evolution.

An electron tube of the photomultiplier type, one of the tubes that makes a television set work, has been hitched to the astronomical telescope to give the new information of the heavens. Dr. Eggen used photoelectric photometry techniques worked out during the past four decades by Dr. Joel Stebbins and a wartime supersensitive photocell adapted to astronomy by Dr. A. E. Whitford of Washburn Observatory and Dr. G. E. Kron of Lick Observatory.

Photoelectric methods are substituted for the eye and the photographic plate in measuring the amount of light reaching us from a star. The results are much more accurate and faster.

The quality or color of the light is also measured speedily and precisely by using two filters, a yellow one and a blue one.

By first observing a cluster of stars that are known to all by the same distance from the earth, Dr. Eggen was able to match color, which is a measure of the surface temperature, with the apparent brightness. He drew a diagram of "color-luminosity arrays" of the stars which allows him to find from the color and the seeming brightness the real brilliance of the star, from which is derived the distance.

The famous Pleiades or Seven Sisters now visible in the evening sky was the cluster used by Dr. Eggen.

Dr. Eggen's new diagram is a modern version of the famous Russell diagram used by astronomers to relate stellar surface temperature and real brightness ever since it was developed about 37 years ago by Dr. Henry Norris Russell, of Princeton, still a leader in the field.

A consequence of Dr. Eggen's new work is that there are more than two types of stars, the giants and the dwarfs, previously recognized.

Fellow astronomers predicted today that the new work will bring about in coming months changes in ideas of how the stars are formed and how they "grow."

Science News Letter, January 7, 1950

ANTHROPOLOGY

Yap Empire To Fall

➤ SCIENTIFIC study of the decline of a primitive society, the miniature empire of Yap in the South Pacific, is helping the United States to administer the area with tact and understanding.

The delicate political balance which has hitherto unified the far-flung islands of Yap has been thrown out of equilibrium by the impact of Christianity, education, and modern transportation, Dr. William A. Lessa, professor of anthropology at the University of California at Los Angeles, told the American Association for the Advancement of Science meeting in New York.

These forces are slowly whittling down the authority of the Yapese over the subordinate islanders, Dr. Lessa said.

Anthropologists have been studying the Trust Territory of Micronesia, which the United States administers under the United Nations. Yap, formerly a Japanese mandate, lies 458 nautical miles southwest of Guam. The Yap empire consists of a series of sparsely inhabited islands dotting an area some 700 miles in extent.

Dr. Lessa suggested that the United States "would do well to let present trends follow their course without ostensible interference." He urged that nothing be done to hasten the process since that would only arouse resentment.

"The empire is destined to fall apart," he pointed out, and if we let this disintegration take place naturally, at its own slow pace, the conservatives will die out, and the inevitable change will occur with a minimum of unpleasantness.

Science News Letter, January 7, 1950

PSYCHOLOGY

Children Escape Terrors Of Life in Comics

➤ COMIC books, which have been called the "marijuana of the nursery" beamed at "a little monster 'with the brain of a child, the sexual drive of a satyr, and the spiritual delicacy of a gorilla,' " are now partially exonerated as warpers of youth.

Claiming that today's wayward children "are no more comics-made than they are movie-made, or radio-made, or yellow-press-made," Dr. Lawrence A. Averill of State Teachers College, Worcester, Mass., told the American Association for the Advancement of Science that these mass-mediums reflect the same fears and insecurities which beset modern man.

Children immerse themselves in the lurid adventures of comic book heroes to escape from the terrors of modern life which the adults themselves have failed to cope with, Dr. Averill said.

Children who "fly in fancy" on jets and rockets through interstellar space or "blood-curdling nick-of-time adventures," he said, are simply aping their elders in the atomic age. "If we accept the age, we shall have to accept the children of it," he said.

The modern age desperately needs ethical values, he said. Since adults have failed to provide them, "the juvenile comics reader, caught in the same maelstrom of gigantic events is, through the comics, likewise finding escape from too deep concern with the deeper problems of the development of inner controls," Dr. Averill said.

Science News Letter, January 7, 1950

EDUCATION

Open-Book Tests Urged To Save Memorization

➤ COLLEGE tests in which the student can consult his textbooks as much as he pleases were urged as a way to eliminate "cramming" of facts which are promptly forgotten.

Such tests measure a student's ability to find and use facts, rather than merely remember them, said Dr. Jacob Verduin of Ohio State University at the American Association for the Advancement of Science meeting in New York.

Grades on open-book tests compare very closely with results achieved by the same students on practical laboratory examinations. Dr. Verduin's conclusions were based on a two-year experiment with a plant science course for freshmen. A total of 186 students were involved.

In preparing an open-book test, care must be taken to ask "questions which are not directly answered by the text." However, testing fact-finding ability, Dr. Verduin suggested, "is more worthwhile than memory testing."

Under the conventional closed book system, "such a heavy premium is placed on memory that a student's ability to use information is seldom evaluated," he said, adding that "a student who is going to use facts should never trust so faulty a source as memory to provide them." Instead he should consult several references, make sure the facts are accurate, and then apply them.

To teach students the practical skill of putting facts to use, tests should be pointed away from facts and toward application of them, he said.

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MEDICINE

Substitute for ACTH

A chemical compound having a smaller molecule than ACTH may be synthesized to solve the ACTH problem. Results of treatment with the chemical have been good.

➤ A NEW chemical compound with the same anti-arthritis power as cortisone and ACTH was announced at the meeting of the American Association for the Advancement of Science.

The great advantage of the new compound is that it may be possible to make it synthetically. Synthesis of cortisone is proving difficult and costly and the laboratory synthesis of ACTH is considered nearly hopeless.

Good results with the first test of the new compound on a human patient were reported by Dr. L. W. Kinsell of the University of California Medical School.

The patient was a 60-year-old man with rheumatoid arthritis. Swollen joints and severe pain had kept him bedridden. He was given 100 milligrams (about a grain and a half) of the new compound every day for five days. Within 24 hours he began to move around and his joint swelling was practically gone. Te became progressively better, his course following that of patients treated with cortisone and ACTH.

When the injections of the new compound were stopped, his arthritic symptoms came back. When given a course of ACTH treatment, he got better in the same way he had following the treatment with the new compound.

The new compound is a mixture of amino acids obtained by breaking down the ACTH molecule with pepsin, a digestive juice. It was developed by Dr. C. H. Li, also of the University of California, who achieved the first isolation from the pituitary gland of ACTH itself back in 1943.

"We can hope," Dr. Kinsell said, "that in the next few years the chemists may be able to make this substance in large quantities, eliminating our dependence upon slaughtered animals."

The possibility of synthesis of this new compound comes from the fact that it is a much smaller molecule than ACTH. Molecular weight of the new compound is about 1,000, whereas the weight of the whole ACTH molecule is about 20,000.

Chemicals of small molecular size, which can be synthesized, are apparently very powerful stimulators of the adrenal gland cortex in humans, Dr. Kinsell pointed out. The new compound, like the parent ACTH, seems to be more powerful than cortisone.

Glands Produce Cortisone Relative

A close relative of cortisone, rather than cortisone itself, is probably the hormone that is active in the relief of rheumatoid arthritis in patients treated with ACTH.

This possibility was raised in studies reported by Dr. Harold L. Mason of the Mayo Foundation at the meeting of the American Association for the Advancement of Science.

ACTH is a hormone from the pituitary gland. The theory has been that it relieved arthritis patients by stimulating the adrenal glands to produce their hormone, cortisone. This cortisone production under ACTH stimulation probably happens, Dr. Mason's studies showed. But the amounts of cortisone produced are "insignificant." Relatively large amounts of the close relative to cortisone are produced, however. This hormone is known by its chemical name of 17-hydroxycorticosterone.

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MEDICINE

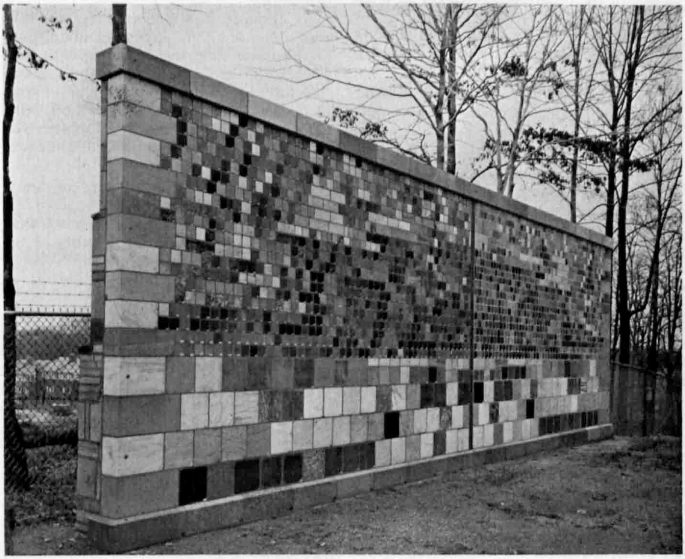
Deaf 'Hear' Via Fingers

➤ A WHOLE new world of sensation—and of hope—may be opening up for the blind, the deaf, and the halt, with the development of techniques for tapping "relatively unused channels into the nervous system" which can partially replace defective senses.

When an experimental vibrator was fitted onto the hand of a deaf mute whose enunciation "was very breathy and bad," within a matter of hours "the improvement in his enunciation was not merely noticeable, but overwhelming," Dr. Norbert Wiener of Massachusetts Institute of Technology told the American Association for the Advancement of Science.

The deaf mute was able to converse with his brother, and he was "for the first time in his life able to compare his brother's speech with his own." It was this ability to compare, hitherto impossible, which enabled him to improve his enunciation.

Although Dr. Wiener has developed no



EXPERIMENT IN STONE—An experimental masonry wall faced with over 2000 specimens of stone from 47 states and 16 foreign countries has recently been erected at the National Bureau of Standards. It will be used to study all phases of the weathering process on numerous varieties of stone as an aid in developing more reliable laboratory methods for predicting durability.

such device for the blind as yet, he foresaw these hopeful prospects for the sightless:

1. "A reading apparatus, which will translate the pages of an ordinary book into a sound or touch pattern recognizable by the blind."

2. "An aid whereby the blind may go around more freely out of doors and in unfamiliar rooms."

Concerning the maimed Dr. Wiener noted that "What the cripple has lost is not only motion, but sensation as well." To remedy this he suggested that "there is a very considerable future in the art of applying strain and pressure gauges to artificial limbs in such a way as to furnish the cripple with better sensory monitoring."

In principle this kind of "sensory replacement" is similar to the sounds we hear over the telephone. Telephone sounds are made up of mechanical clicks and buzzes that are only "a crude imitation of speech". "Less than 1/10 and perhaps even 1/100" of the tone values of air-borne speech are reproduced in the telephone receiver, yet we understand each other.

In the same way, Dr. Wiener's experimental apparatus, a box-like arrangement with leads for the five fingers, transforms sounds into vibrations which with practice can become intelligible. He stressed, however, that "the learning process necessary for achieving proficiency with the new method of receiving speech must be something long and arduous."

The technique is still being tested. Dr. Wiener and his associates have not yet decided whether to use "electrical mechanical vibrators placed on the five fingers" or "electrodes designed for the direct stimulation of the nerve endings in the skin."

They are trying to design a glove model which will be light, portable, and compact.

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MEDICINE

Cancer Pattern Is Traced

➤ SIGNS of a hereditary pattern for cancer of the breast, lower digestive tract and stomach have been discovered in preliminary studies of the occurrence of cancer in Utah "kindred," Dr. Eldon J. Gardner of the University of Utah reported at the meeting of the American Association for the Advancement of Science.

Inheritance of skin cancer and primary lung cancer is doubtful, Dr. Gardner said.

Among kindred descended from one man and six wives, eight cases of cancer developed in the family of the first wife. There was no cancer in the family of the second wife. One case developed in the family of the third wife, and eight in the family of the fourth wife. The families from the fifth and sixth wives escaped cancer.

In two other kindred with more than 1,200 members in each, only one case of cancer in each of the two kindreds was discovered.

As evidence that the hereditary mechanism is one of simple dominant inheritance, Dr. Gardner cited the following examples: Nine of 45 members of one family group had carcinoma of the lower digestive tract at death at ages between 29 and 58. Nine died from all other causes. Twenty-seven are now living, but most of them are under the age of 29.

In another kindred, 13 cases of breast cancer developed, 10 of them between the ages of 37 and 47. The cancer cases were found in only three of six branches of the kindred, the other three branches being entirely free of breast cancer. This is 25 times more in the entire kindred than in the Utah population.

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Question Box

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BIOLOGY

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PHYSICS

What atom smasher has set a world record in its model stage? p. 13.

Photographs: Cover, U. S. Coast Guard; p. 3, National Bureau of Standards; p. 7, General Electric; p. 10, Authenticated News; p. 16, Tennessee Eastman Corporation.

● RADIO

Saturday, January 14, 3:15 p. m. EST

"Adventures in Science" with Watson Davis, director of Science Service over Columbia Broadcasting System.

Dr. Ross T McIntire, Director, American Red Cross National Blood Program, formerly Surgeon general of the Navy and personal physician to President Roosevelt, will talk on "Past and Future of Blood".

SCIENCE NEWS LETTER
VOL. 57 JANUARY 7, 1950 No. 1

49,400 copies of this issue printed

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change, please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C. under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., PEnnsylvania 6-5566 and 360 N. Michigan Ave., Chicago. STAte 4439.

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BIOLOGY

Kinsey Report Criticized

Sex patterns differ greatly in various parts of the world. It is thought that there is no normal sex behavior as implied by Kinsey.

➤ MANY kinds of sexual behavior are not even mentioned in Dr. Kinsey's report on the sexual behavior of the human male.

Dr. Ralph Linton, professor of anthropology at Yale University, reported this to the American Association for the Advancement of Science meeting. If the book had been written about all the males of the world, it would have been a different book.

In some parts of the world, Dr. Linton said, all individuals accept homosexuality as the normal form of sex expression for persons in certain age groups. In other areas, overt homosexuality seems to be genuinely unknown.

Dr. Linton spoke at a symposium intended to criticize the SEXUAL BEHAVIOR OF THE HUMAN MALE as a possible aid to Dr. Kinsey and his associates in writing their forthcoming SEXUAL BEHAVIOR OF THE HUMAN FEMALE. Dr. Kinsey himself suggested this sort of symposium.

It is safe to say, Dr. Linton also declared, that there is no such thing as normal or natural human sex behavior. He criticized the Kinsey report because, he said, "one gathers that he (Kinsey) feels that there is such a thing as normal sex behavior. All our sex practices, he explained, are learned, either by imitation, by trial and error or by instruction. The only thing that is biologically necessary, Dr. Linton declared, is that the sex urge be satisfied.

The methods by which the sex urge is satisfied, Dr. Linton said, vary greatly from society to society in the human species. However, Dr. Linton went on, the ideals of sexual behavior set up in our culture, whether observed or not, would seem to indicate that some forms have greater social value than others, even though any form of sex behavior which does not involve deprivation or attempted suppression of the sex drive can be made satisfying to the individual. The Kinsey report suggests that our legal regulations should be made more realistic, but it seems certain that we will always have definite patterns of approved and disapproved sex behavior.

"What we need," concluded Dr. Linton, "is a franker appraisal of the situation and a clearer picture of what sorts of sex behavior are socially desirable."

The Messrs. Gallup, Roper, et al. might not have been so wrong about Truman's election if they had followed Kinsey's methods of asking questions. This was intimated by Dr. Hugh Jones Parry, formerly associate director of the University of Denver's Opinion Research Center, another speaker at the symposium on the Kinsey report.

Dr. Parry explained that one of the weakest links in the present method of conducting polls is the interviewer. And poll conductors, he said, have tried to solve the problem by rigidly restricting the interviewers to set methods and set wordings of questions so that interviewers would become as close as possible to machines, all asking the same questions in exactly the same way.

In its interviewing techniques, Dr. Parry said, the Kinsey report violates most of the canons of opinion and attitudes research. Each Kinsey interviewer was also a planner of the project. Each interviewer was of a caliber far above the average. Each interviewer was allowed and encouraged to exercise his own judgment in obtaining information. Said Dr. Parry, the Kinsey interviewers were operating in an area somewhere between opinion and attitude research and psychoanalysis.

If opinion researchers reverse the present trend in interviewers in favor of a relatively small corps of highly-trained specialists, each allowed wide option, said Dr. Parry, one of the places they will go for information is the Kinsey report.

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PSYCHOLOGY

Pair Slow Child With Bright One

➤ A NEW way to get simple routine tasks done in school and elsewhere may result from studies of the behavior of dogs at Jackson Memorial Laboratory, Bar Harbor, Me.

Pairing a slow child with a quick one, not in competition but as buddies, each to do the same routine task, might speed up the slower child through mimicry, or copying. This would be how the new method would work if the studies on dogs are confirmed and proved applicable to humans.

The studies started from the often-observed fact that all the sheep in a flock, or all the fish in a school, or all the dogs in a pack, tend to do the same thing at the same time. Scientifically, this is termed allelomimetic behavior.

There is a definite motive behind this kind of behavior, the Jackson Laboratory scientists believe. The animals apparently are copying each other in order to reach the same goal, as for instance, food. This kind of behavior, even without competition, may be one factor behind the increased activity and efficiency that results from the presence of other individuals. The increased activity when others are present is called social facilitation.

The dog studies, which led to this "first scientific evidence for the existence of a new and important type of social motivation," were made by Drs. H. H. Vogel, Jr., J. P. Scott and Mary-Vesta Marston of Jackson Laboratory. They are reported in the scientific journal, BEHAVIOR (Dec.).

In the studies 16 purebred dogs representing five breeds were tested singly and in pairs, running through an alley for a reward of food and petting. When the dogs were run repeatedly with the same animal, the results indicated that social facilitation, that is increased activity and efficiency, amounting to about 18% resulted. The chief measurable effect was on the slower animals. Mimicry of each other was also found.

Dogs run repeatedly with an unfamiliar animal, if it was the same one, showed no important differences in either mutual mimicry or social facilitation as compared with runs with familiar animals.

But when the dogs were run with a different animal each day, they showed less mutual mimicry and social interference amounted to 73%.

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AAAS PRESIDENT — *Kirtley F. Mather, professor of geology, Harvard University, is the new president elect of the American Association for the Advancement of Science. He will serve as president during the year 1951.*

ASTRONOMY

1949 Astronomy Events

➤ THE ten top astronomical events of 1949 were picked by Dr. Harlow Shapley, director of the Harvard College Observatory:

1. Operations in large optical glass for telescopes, including Lick Observatory's 120-inch disk obtained from California Institute of Technology, British acquirement of a 98-inch disk from the McGregor Foundation in this country, ordering of 74-inch disks for telescopes on Australia's Mt. Stromlo, Egypt's Helwan Observatory, and San Michele Observatory.

2. Beginning of operation of the 200-inch and 48-inch Schmidt on Mt. Palomar and the Radcliffe 74-inch at Pretoria, South Africa.

3. Radar observations on the moon at eclipse by Winfield W. Salisbury of Cedar Rapids, Iowa, that show it covered by non-conducting layer of dust.

4. Discovery of an asteroid of 400-day period that goes nearer sun than the planet Mercury.

5. New theory that comet heads are composed of ices of gases and meteoric particles that melt to form the head when near the sun.

6. Various new theories of cosmic ray origin that involve magnetic fields.

7. Discovery of the second satellite of Neptune by Dr. C. P. Kuiper of Yerkes and Davis Observatories.

8. Discovery by Dr. W. J. Luyten of University of Minnesota of a nearby pair of extreme dwarf red stars, one of which has mysterious flares and flashes.

9. Work on the colors of stars by Dr. Olin J. Eggen of Lick Observatory.

10. Discovery by Dr. G. Haro of Mexico that objects formerly thought globular clusters are Pleiades-like groups of stars and nebulosity.

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GENERAL SCIENCE

Basic Science for All

➤ TWELVE 'teen age scientists, speaking before scientists and science teachers at the Fourth Annual Junior Scientists Assembly urged their elders to broaden science teaching so that all students can learn basic science and how to apply the tools of science to everyday living.

"Science is no longer the exclusive property of the favored few," said Irving Yoskowitz, Harvard freshman, who served as chairman of the panel discussion. "It must be common knowledge for all members of our society if we are to survive in an atomic age."

Experienced scientists and science teachers listened to a vigorous discussion of "Is There a Conflict Between Science and the Humanities?" by the specially selected young scientists, who spoke at a joint meeting of the American Association for the Advancement of Science and the Science Teaching Societies.

Andrew Sessler, graduate student of physics at Columbia University, urged that science be taught in the secondary schools so that all students can understand it. If a high school cannot teach two courses: one for science majors and the other for non-science majors, then, Mr. Sessler said:

"Courses in science should be designed to attract and inform those who will not go on to college. The great mass of our citizens are in this group and science should not be foreign to them if they are to perform their duties as alert citizens in an age increasingly scientific."

Miss Ursula Victor, petite freshman at Swarthmore, wanted teachers to give special attention to talented science students in out-of-class activities like science clubs.

"My experience in high school," she said, "showed me that the most effective teaching, for students who intend to be professional scientists, goes on in a direct teacher-pupil relation in the science club where we learned the intricacies of science without boring non-science majors with the kind of science they will never need."

Miss Kathryn G. Spackman, Jr., attractive chemistry major at Vassar saw no need for a slowing down of science till society could catch up with the advances of science. "The day of the scientist in his ivory tower is past," she said. "Scientists today are recognizing more and more that they too are responsible for helping to adjust society to the advancements of science."

Two high school students reported on their research work before this audience. They were Robert Beck of the Bronx High School of Science and Miss Lisa Steiner of the Forest Hills (N. Y.) High School.

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ASTRONOMY

1500 New Universes Discovered In Sky

➤ FIFTEEN hundred new universes or galaxies of stars, each similar to our Milky Way, have been discovered in a Harvard astronomical survey of the big dipper region of the northern sky, Dr. Harlow Shapley, director of the Harvard Observatory, reported at the American Association for the Advancement of Science meeting.

These great stellar systems are only a fraction of those that exist undiscovered in space. Dr. Shapley estimated that in the bowl of the great dipper alone there could be discovered a million galaxies, many so distant that light takes a thousand million years to reach the earth from them. Each contains more than a million stars like our sun. These new universes could be discovered by the 200-inch telescope on Palomar, using longest possible exposures with fastest photographic plates.

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GENERAL SCIENCE

Register of Scientists Urged by Steelman

➤ A NATIONAL policy on scientific manpower will soon be formulated by the government, John R. Steelman, the Assistant to the President, has indicated.

Failure of Congress to establish the National Science Foundation, the logical agency to deal with this problem, may force independent and earlier action, Mr. Steelman said in an address before the American Council of Commercial Laboratories.

In many important fields the national supply of fully-trained scientists is insufficient to meet our needs, he reported, particularly as they apply to national security under emergency conditions. This is a problem before the National Security Resources Board of which Mr. Steelman is acting chairman.

Nearly every research organization in the country today has unfilled positions, he declared, and this situation prevails in universities and in industry as well as in government.

If Congress creates this year the National Science Foundation now "long overdue", Mr. Steelman said, it will be "the most far-reaching and important step we have taken in the field of science in the postwar world."

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MEDICINE

Pregnant Mice Are Better For Pregnancy Test

➤ PREGNANT mice are better for tests to detect pregnancy in humans than the immature female mice of the conventional pregnancy tests, A. J. Ladman of Jackson Memorial Laboratory, Bar Harbor, Me., reported at the meeting of the American Association for the Advancement of Science.

The less frequently used test on pregnant mice requires less work by technicians, less time to obtain results and is about eight times as sensitive as the more conventional test, he reported.

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MEDICINE

Vaccination for Cancer?

Discovery of fungi in human and mice cancer may lead to vaccination procedure for cancer prevention. The parasite cancer theory once earlier fell into disrepute.

➤ DISCOVERY of fungi in human and mouse cancers, with the implication of a possible vaccination procedure for cancer prevention, was announced by Dr. Irene Corey Diller of the Institute for Cancer Research, Philadelphia, at the meeting of the American Association for the Advancement of Science.

The fungi were found in every type of human and mouse cancer so far examined in her laboratory during the last 18 months. They were not found in any tissues of normal animals and humans except in breast tissue of a strain of mice which develops breast cancer in almost 100% of the animals.

While more than 100 malignancies were tested in mice, including sarcoma, carcinoma and leukemia, only 20 cases of cancer in humans have been tested so far. These were cases of Hodgkins' disease, breast cancer, lymphosarcoma of various sites and granulomas.

Alert to the possibility that the fungi got into the cancers accidentally through contamination after removal from the animal or human patient, Dr. Diller and her colleagues took measures which reduced contamination to almost zero.

"After 18 months of study," she stated, "we find it more and more difficult to countenance this possibility."

She cautioned against accepting the results so far as proof that fungi are the cause of cancer. But with Dr. D. R. A. Wharton of Philadelphia she is now making immunological tests to determine whether animal systems build up antibodies against the fungi. If this were the case, it might open up possibilities for some kind of preventive vaccination. But, Dr. Diller said, "It is much too early to report on this phase of our work."

A specific form of fungus was found in every tumor examined, she reported. In mouse breast and transplanted tumors this was usually one called Syncephalastrum racemosum. Injections of fresh members of this fungus group into muscle or belly brings death to cancer-susceptible mice in four to six days, Dr. Diller reported.

In one strain of leukemic mice, in advanced stages of the disease, all the organs of the animals' bodies except the heart were invaded by yeast-like fungi.

Using techniques and stains recently devised by herself and her assistants, Dr. Diller was able to see under the microscope that the cell invaders were fungal spores. With older stains, they had been mistaken for degenerating blood cells.

"Isolation of fungi from tumor tissue is by no means a new phenomenon," Dr. Diller pointed out.

In the period 1895-1900 many investigators claimed to have done this, she stated, and most of the earlier workers thought these fungi were causes of cancers. But the accounts were usually so garbled and the life histories so confused with those of other parasites that the idea of parasites causing cancer fell into disrepute.

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PSYCHOLOGY

Mouths Water At "Ona Khochet Kupit"

➤ "ONA khochet kupit" will make some mouths water among students at Queens College, Flushing, L. I.

The words are Russian, meaning: "She wants to buy." Reason for the mouth watering over these words is that the students learned them while eating lunch as part of a psychological experiment.

It was patterned after the Pavlov dog conditioning experiments in which the famous Russian physiologist had dogs eat immediately after the sound of a bell. Later, the dog's mouths watered when they heard the bell, without eating.

The experiments at Queens College were conducted by Prof. Gregory Razran and reported by him at the meeting of the American Association for the Advancement of Science.

Object of the experiments was to learn whether words or groups of words can act as a stimulus to set up a conditioned reflex in humans, and how such conditioning affects learning and personality.

In previous experiments with nonsense syllables and English words and sentences, given while the students ate pretzels and lollypops, Dr. Razran found that nonsense syllables were more effective at conditioning than words. The meanings of words, however, were more significant than their sounds and spellings, and the predicate of a sentence was more important than the subject. That is, in a sentence, such as: "Streetcars run on tracks," "run on tracks" would be more important than "streetcars."

In the experiments reported today eight students learned 15 unfamiliar Russian words. Some learned the words singly and others learned them as three sentences. Instead of lollypops and pretzels, they got a sandwich, dessert and beverage which they ate continuously for 15 to 20 minutes while learning. The students were misinformed about the purpose of the experiments, being told that they were to study the effects of learning ability, memory and concentration on digestion.

In the beginning of the training, Dr. Razran found, what was attended to and conditioned to were the exact letters and their positions in the Russian words. Later, short-circuiting and cue-reduction took place. Longer words produced somewhat more conditioning, as measured by mouth watering, than shorter ones, and longer sentences than shorter ones. Nouns were the best stimuli to the conditioned reflex, pronouns the poorest, with adjectives and verbs in between. Nouns are better conditioners when alone and verbs when in sentences.

What is associated in word conditioning, and probably in learning in general, Dr. Razran said, is neither a helter-skelter of stimuli aspects nor one dominant stimulus aspect. Instead, word conditioning goes on by a series of systematic groups of associations.

This hierarchy of associations, associated in order of strengths, is very dynamic and varying, Dr. Razran reported. It changes and even reverses itself in the very course of learning and practicing.

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FINE QUARTZ FIBERS—A fiber of molten quartz is drawn from a slender rod being heated to 1800 degrees Centigrade in the General Electric Company's Laboratory at Schenectady, N. Y. The fiber has been attached to the wheel at right by Jean Winn, laboratory assistant. These delicate fibers, only 1/50th the thickness of a human hair, are used in sensitive balances and various electric measuring instruments.

ASTRONOMY

New Theory Explains Magnetic Storms

➤ A NEW theory of magnetism on the sun which explains how sun gas reaches the earth and causes magnetic storms here has been developed by Dr. Donald H. Menzel of Harvard Observatory.

Magnetic lines of force surround the sun as a sort of rubber-like roof. When the matter that the sun's activity flings into space becomes too concentrated, a pocket is made in the magnetic roof. Sometimes such holes extend a million miles and more over the sun's disk. The natural springiness of the magnetic roof sends the material upward to form the great prominences so striking in motion pictures of the artificially eclipsed sun.

Astronomers have been puzzled by the downward rain of material into the sun, even in these prominences. Dr. Menzel concludes that most of the upward moving gases must rise invisibly, because "what comes down must have gone up." Most of the gases arise in the polar spicule jets discovered recently by Dr. Walter O. Roberts at Harvard's Climax, Colo., Observatory.

A sudden outburst of such bubbling, spurting jets from the poles of the sun flings enough matter into space to reach the earth and interfere with radio communication 24 hours after the outburst. It supplies the stuff for the prominence and brilliant flares on the sun which have hitherto been blamed for the earth's magnetic storms. Dr. Menzel announced his new theory at the meeting of the American Association for the Advancement of Science.

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PHYSIOLOGY

Nervous System Has Electric Generators

➤ THE body's nervous system has generating stations along its maze of interconnecting lines. These stations use chemicals in the body, particularly oxygen, for generating electrical energy. Studies of the rate at which they use oxygen were reported by Prof. Frank Brink, Jr., of the department of biophysics of Johns Hopkins University, at the American Association for the Advancement of Science convention.

The axon is the communication line of the nervous system. It conducts impulses from one end of a nerve cell to the other by means of a small electric current, said Prof. Brink. When a pin is stuck in the body, the frequency of electrical impulses is stepped up and the nerve sends its message of pain to the brain. After the pin is removed, the impulses disappear and the axon in the nerve takes in more chemicals in order to be able to send more messages to the brain.

If the nerve cells are deprived of the proper chemicals, especially calcium, said Prof. Brink, the axons send unauthorized impulses along the nervous system which interfere with its normal functions.

These observations are not new, Prof. Brink emphasized, but were discussed in connection with the problem of seeing how the chemicals interact in a single nerve cell in order to produce a stable, functioning axon.

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DENTISTRY

Jelly Chemical May Be Destroyed in Tooth Decay

➤ DISAPPEARANCE of a newly-discovered jelly-like chemical in teeth may be the first step toward tooth decay.

This finding and the discovery of the chemical were announced by Drs. Reidar F. Sognnaes and George B. Wislocki, of Harvard School of Dental Medicine and Harvard Medical School, at the meeting of the American Association for the Advancement of Science.

The jelly-like chemical was found to be a constituent of both the dentine and the enamel of normal teeth. It is a sugar-containing protein, called acid mucopolysaccharide by chemists, and belongs to the general class of mucin.

Under the influence of certain bacteria and enzymes, it can change from its jelly-like state to a liquid.

Destruction of this chemical, and its disappearance from the little tubes in the dentine, is apparently the beginning step in decay. This precedes the invasion of bacteria which have generally been believed to be the primary agents in tooth decay.

"Before one can intelligently and effectively combat tooth decay," the scientists stated, "it will be necessary to learn how to prevent these initial biochemical changes which spearhead the formation of cavities."

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MEDICINE

60 Lead Shots Are Found In Woman's Appendix

➤ AN APPENDIX "packed with more than 60 small lead shots" has just been removed from a 52-year-old woman in London. The "unusual" case is reported by Dr. C. Eppel of London in the BRITISH MEDICAL JOURNAL (Dec. 24).

After the operation, Dr. Eppel states, it was "discovered that the patient often ate game, her brother being a first-class shot."

For three months before the operation she had been having vague abdominal symptoms which kept getting worse. Along with the pain in the abdomen, nausea and occasional vomiting she had headaches and pains in the neck and shoulders. All symptoms, including the head and neck pains, disappeared after removal of the shot-packed appendix.

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IN SCIEN

MEDICINE

Insanity Ascribed To Out-Of-Date Glands

➤ INSANITY results because the human body's glandular defenses against stress and strain are out of date. This antiquated glandular system mobilizes to meet emotional and intellectual emergencies on the plane of using muscles and bones to fight or flee. But most stress situations today demand instead a defense through mental activity.

This theory and a companion theory on treatment of mental disease were presented to fellow psychiatrists by Dr. Johan H. W. van Ophuijsen and three brothers, Drs. Arthur, Mortimer and Raymond Sackler of Creedmoor State Hospital, Queens Village, N. Y., and the van Ophuijsen Center.

Mental disease, according to these psychiatrists, can be helped by treatment with gland chemicals to restore a suitable balance between these chemicals.

Histamine, insulin, male and female hormones and adrenal gland hormones are the chemicals which they believe will help if used according to the individual patient's needs. The importance of early treatment is stressed. Brain cell changes, these psychiatrists believe, result in some forms of mental disorder. If diagnosed early and proper treatment started early, these changes can be stopped and even reversed.

The most serious mental diseases, they believe, are due to overactivity of the adrenal glands in relation to output of sex hormones and insulin and the thyroid gland's hormone.

Depressions, anxieties, and psychosomatic disorders such as peptic ulcers are, these psychiatrists state, due to an opposite condition of too little output by the adrenal glands.

Their new theories are reported in detail in the JOURNAL OF CLINICAL PSYCHOPATHOLOGY (Jan.).

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CHEMISTRY

New Compounds Are Made From Familiar Chemicals

➤ VERY intense light turned instantaneously upon familiar chemicals produces new compounds, experiments at Cambridge University have shown. Drs. R. G. W. Norrish and G. Porter used a gas-discharge flash-lamp developed for photographic purposes. When light 10,000 times as intense as before available was turned on a mixture of chlorine and carbon tetrachloride, for example, unusual solids were formed.

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E FIELDS

GENERAL SCIENCE

U. S. Death Rate Was Lowest Ever in 1948

➤ THE lowest U. S. death rate in history was chalked up during the year 1948. Deaths that year, on which the U. S. Office of Vital Statistics has just completed its figures, occurred at the rate of 9.9 per 1,000 population. In 1947 the rate was 10.1 per 1,000.

Heart and cancer death rates increased slightly over the previous year, while the diabetes death rate was about the same for the two years, and the rates for nephritis (kidney disease) and brain hemorrhage deaths dropped slightly. The major chronic diseases of the older years, such as heart disease and cancer, accounted for 63 of every 100 deaths in 1948.

The death rates for pneumonia and influenza combined and for tuberculosis both reached new lows.

Deaths from measles and infantile paralysis increased sharply. Motor vehicle accident deaths decreased for the second year in succession.

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PSYCHIATRY

"Unconscious Intent" Accident Theory Disputed

➤ PSYCHOANALYSTS are wrong when they claim that "most accidents are unconsciously intended," Dr. E. Richard Weinerman of the University of California School of Public Health declares.

He fears that some employers, reading psychoanalytic writings on "accidentitis," may try to introduce this idea of the accident-prone personality as a "new reason for the old practice of denying compensation."

"It would be a giant step backward," he states, "if an injured worker's compensation were to be denied on the grounds that the accident was due to his 'impetous' and 'resentful' personality, rather than to the complex of contributory causes."

Although he admits that accident-prone individuals do exist, he contends that the accident-prone person is not always a repressed or frustrated person who "subconsciously intends" the injury. And he points out that accidents reflect, "in wholesale manner, defects and inadequacies of industrial equipment, of housing, of traffic systems, of play areas, and of many other remediable conditions of daily life."

Accident statistics from many sources are quoted by Dr. Weinerman to show that many factors besides psychologic ones are involved. In his report to the AMERICAN JOURNAL OF PUBLIC HEALTH (Dec.) he states:

"'Accidentitis' would seem to be a poor resolution for the diverse problems of mine cave-ins, inadequate fireproofing, impaired and uncorrected vision, etc. Neither submerged guilt complexes nor overly compulsive behavior reactions are sufficient explanation for the high incidence of accidents among workers exhausted by production speed-ups or among children forced to the streets for play space."

Successful accident prevention, he concludes, must recognize that disturbed personality, impaired body functioning and unsafe conditions of the environment are all part of the picture of "proneness" to accident.

Science News Letter, January 7, 1950

ASTRONOMY

Astronomical Meeting to Be Held in Russia

➤ THE next meeting of the International Astronomical Union will be held in Leningrad, Russia, in 1951, probably in August, Dr. J. J. Nassau of the Warner and Swasey Observatory, Cleveland, announced at the meeting of the American Astronomical Society.

Decision to hold the meeting in Leningrad was reached after Prof. A. A. Mikhailov of the U.S.S.R. Academy of Sciences gave assurance that all participating organizations would be invited.

An invitation from the United States to have the meeting in this country was withdrawn because of the difficulty of finding dollar exchanges for European delegates and the experience of some scientific institutions in America which had been unable to secure admission to the U. S. of distinguished foreign scientists who were suspected of communistic leanings.

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PHYSICS-CHEMISTRY

X-Rays Are Hard on Build-Up Chemicals

➤ X-RAYS are harder on chemicals the living cells use to build up complex substances than on the chemicals cells use for breaking down complex compounds.

Studies showing these effects on grasshopper eggs in a resting stage of embryonic development were reported by Dr. Theodore N. Tahmisian, Argonne National Laboratory, Chicago, at the meeting of the American Association for the Advancement of Science.

Discovery of an optimum X-ray dose that will stop growth processes of cancer cells without harming healthy neighboring cells is the object of the studies.

Chilling the cells below temperatures needed for normal function lessened X-ray damage.

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WILDLIFE

Scots Find Extra Buck, Blue, Not Green

➤ IN Scotland, of all places, they've just found a buck they didn't know they had, but it won't narrow the dollar gap any since its only value is scientific.

It's a blue buck, a type of South African antelope, which became extinct about 1799 when white hunters looking for a fast buck blasted it off the face of the earth.

An unlabelled skull in the University of Glasgow's Hunterian Museum has just been identified as a blue buck skull. Writing in NATURE (Dec. 24), published in London, Dr. R. Broom, of South Africa's Transvaal Museum, made the identification after comparing the skull with those of allied species.

It is the only blue buck skull known to science. No other specimen "is known to exist, except perhaps in some of the mounted specimens," Dr. Broom writes.

The blue buck and the quagga, a zebra-like animal which disappeared in the last century, are the only two large South African mammals to become extinct since men have begun to keep records, he asserts.

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PSYCHOLOGY

Mice Give Hope for Stopping Human Fights

➤ HOPE that fighting between humans can be stopped is seen in results of studies with trained mice reported by Dr. Emil Frederickson of Jackson Memorial Laboratory, Bar Harbor, Me., at the meeting of the American Association for the Advancement of Science.

Fighting between females of the mouse species was produced for the first time in Dr. Frederickson's studies. To many, this will undoubtedly lend strength to the comment, by Dr. J. P. Scott of Jackson Laboratory, that "the causes of destructive impulses in mice are undoubtedly different from those in human beings (at least in some degree)."

For the first time, also, frustration was shown to be a cause of aggression among mice.

But fighting can take place even when the animals are not frustrated in any obvious or discernible manner, Dr. Frederickson reported.

The importance of training in controlling and producing fighting was emphasized. Habit was found particularly important in spontaneous fighting. There is a gradual but marked decrease in the time at which pairs of inbred mice will begin to fight when given an opportunity to do so. The speed with which a fierce fight occurs, from trial to trial, is in part at least, Dr. Frederickson concluded, a function of the amount of practice.

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GENERAL SCIENCE

At the Halfway Mark

The most eventful half century of science has come to a close. The various scientific developments have opened paths for more and greater achievements.

By WATSON DAVIS

➤ THE most eventful half-century of human history is over. It has brought us atomic energy, radio, the airplane, disease conquests, new materials, longer years of life and a realization that there are other universes than ours.

Which of these and other 20th century great advances of science will the year 2000 celebrate and remember?

Einstein Formula

Atomic energy and the atom bomb have touched few of us except for the fear in our minds. Yet the simple formula, energy equals mass times the square of the velocity of light, the Einstein mass-energy equivalence, is probably the half-century's top scientific achievement. Together with the theory of relativity (although we can not eat or wear or drive it) it is the most revolutionary of the many new scientific concepts and achievements. These will probably be history's pick for scientific immortality.

This exploration of the atom, matter and energy goes deep into beginnings of the future in the past 50 years. First radium, then X-rays and now artificially radioactive substances created with nuclear energy have fought cancer to a standstill. Elements (isotopes) tagged with exploding atoms are tracing the mysteries of living matter, disease and industrial processes.

Much of this is future but what is to come is the promise of the past.

Early Telephone

Electrical communication has blossomed from the early telephone and Marconi wireless. We have the radio, television, sound movies, radar—the whole electronic art. The great family of vacuum tubes is doing everything from solving complex problems to opening doors. Factories can be built that need neither routine human thought nor brawn of men.

New Materials

To the iron, gold, tin, lead, zinc, copper of the past have been added alloy steels, stainless metals, aluminum, magnesium, and even titanium, chromium and a host of other rarities now made work-a-day. This is an age of new metals that withstand the melting heat of flaming jets and the corrosion of time itself.

This is the plastic age, too. Celluloid of the nineteenth century has been supplanted by bakelite, cellulose acetate, rayon, nylon, and a score of other plastics, each to its special use. The rubber tree is superfluous, and who would have guessed that slowness of cold would produce tougher synthetic rubber? Silicon and carbon were joined to raise a versatile plastics family.

Chemical Advances

Dyes, drugs, organic synthetics by the thousands have come from the brilliant and dogged persistence of chemical theory and practice. A great chemical industry in Germany made possible the first World War. Nitrogen first snatched from the air to feed the guns now fertilizes crops that keep the world from starvation.

We profligate wasters of the soil multiply to confound Malthus. Only rising living standards and industrialization seem to apply the biologic brakes upon human fertility, yet there are 20,000 more of us than yesterday and we worry how populous the earth can be. U. S. A. census 1950 exceeds census 1900 two to one.

Who would have claimed even at the mid-point of the first 50 years that one wonder stuff would cure two-score diseases? Yet the sulfas and the antibiotics, among them, have made the pneumonias less troublesome than the common cold and the venereal diseases no longer the universal plagues. Penicillin, streptomycin, aureomycin—they have met germ and virus alike, and the end is not yet. Infections lose their deadliness and chemotherapeutics add years to human lives.

Typhoid, thanks to sanitation and immunization, is inexcusable. The chemical DDT has nipped typhus epidemics and even cleared away the mosquitoes that carry yellow fever and malaria. Man need not now be so afraid of the insects.

Vitamins Discovered

The hidden hunger of the partly ill has been exposed by mere traces of chemicals undreamed of at the century's turn—vitamins running the gamut of the alphabet. In the glands of the body have been discovered powerful secretions, hormones that control our physiology and our emotions. Millions live thanks to insulin, which replaces what is lacking in the diabetic.

Mental Sciences Advance

Our minds have found themselves more and more, for the mentally ill are not possessed by devils now but treated for the diseases they have. Psychotherapies have grown and ripened in the passing decades. Many ill of mind obtain the insight to return to sanity. Civilization, too, shows signs of its psychoses, but the physicians bold enough to minister are few.

Both psychological testing of human abilities and the modern attitude and practice of education have risen in this century. From the mental tests of the first World War have come measuring tools to fit people to their capabilities.

Genetics Began

That we inherit from the past was broadly known, but genetics began with the rediscovery of Mendel at the century's beginning. Fruit-fly, mice, corn, cattle, weeds, all prove the power of genes and the mechanics of heredity. Of practical use are hybrids, as in corn. Our animals are better bred than our people. We know better the potentialities of living creatures.

Swift Transportation

Millions of automobiles have tied our daily life to oil, roads and swift transport from here to there. The city has spread to the country, thanks to everybody's car. Ours

LEADER OF LAST 50 YEARS—Albert Einstein, by his 1905 formula relating mass to energy, has led science's half century advance. Now, along a shaded street in Princeton, he walks symbolically into the 20th century's second fifty years. Youth walks beside him and learns from him.

is an era of profligate power, from the "black gold" of the petroleum bonanza of this century.

Man is now airborne, thanks to the Wright Brothers and their followers. Everywhere else on earth is merely a tomorrow away. A sky without planes can hardly be imagined. There are now rockets, jets, and even guided missiles that find their own target. Flight outdistances sound, and always it is faster, faster.

To the depths of the universe, great telescopes have been pointed to capture evidence of millions of other great galaxies of stars, like our own Milky Way. We find ourselves on one planet of a star which is one of millions in one of millions of stellar pinwheels. Good medicine for man's egotism.

But our reachings for the heavens, like our other 20th century science and technology, gives assurance that the inevitable changes of the future will bring us new conquests of space, matter, mind, disease and life itself.

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MEDICINE

New Drug for Migraine

➤ RELIEF of migraine headache in 42 out of 50 patients has been achieved by a new drug that combines caffeine with another chemical, ergotamine tartrate, Drs. Sheldon G. Cohen and Leo H. Criep report from the University of Pittsburgh School of Medicine.

Ergotamine comes from a fungus, ergot, which grows on rye and other grain and has been used in childbirth. The tartrate form of ergotamine has brought some relief to many a migraine sufferer. Some of the patients, the Pittsburgh physicians point out, have found for themselves that black coffee enhanced the effect of the ergotamine, and that a certain amount of relief can be had from black coffee alone.

Adding coffee's caffeine (which is found also in tea) to the ergotamine tartrate apparently has the same effect of enhancing the ergotamine effect. Like ergotamine, the new drug, which is called Cafergone, is most effective when given at the first warning of a migraine headache.

The new drug can be taken by mouth or by rectal suppositories and thus eliminates the need for hypodermic injections in patients whose migraine was not relieved by ergotamine execept by such injections. Patients who got relief from ergotamine taken by mouth found the new drug gave as much or more relief.

The Pittsburgh doctors warn, in their report to the NEW ENGLAND JOURNAL OF MEDICINE (Dec. 8) that the drug should not be taken by pregnant women nor by patients with heart and blood vessel disease, high blood pressure and perhaps some other conditions. Also, a total of six pills or three suppositories should not be taken oftener than every 10 days because of the danger of ergot poisoning.

Chief value of the new drug, the doctors state, seems to be in stopping a migraine attack in its early stages.

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ASTRONOMY

Moon's Edge Is Measured For Better Timing

➤ THE moon's profile is being measured. Drs. C. B. Watts and A. N. Adams of the U. S. Naval Observatory, Washington, told the American Astronomical Society meeting how they are measuring photographs of the limb or edge of the moon to get a large-scale measure of the irregularities created by the mountains and valleys of the moon.

The moon's position and motion are used in computing the earth's rotation on its axis. The best time to measure the moon's position in the sky is just when it hides or eclipses a star, in what is known as a lunar occulation. But the exact instant at which the moon hides a star depends on whether it is a mountain sticking out or a valley indenting the point on the moon's edge that first goes in front of the star. Exact timing of star occultations depends on our knowledge of the contour of the moon's edge.

A further complication is that the edge of the moon is always changing. The moon seesaws back and forth as it keeps one face to us and the surface features at its edges are different at different times. Drs. Watts and Adams are mapping the marginal zone from numerous photographs taken at Washington and at the Yale-Columbia Southern Station, Johannesburg, South Africa.

A moon photograph is rotated by a motor in either direction. A micrometer microscope is moved by a motor connected with the micrometer screw. The motion of the screw is represented by linear motion of the recording pen, and a graph profile of the moon is constructed on a large horizontal scale.

The micrometer motor is controlled by two photomultiplier tubes. One of these receives light through a radial slit lying across the limb; the other, for comparison, has a small aperture outside the limb and a similar one a short distance inside. The micrometer motor causes the microscope to follow the limb along a line of constant light intensity by balancing the output of the two multipliers.

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Quick-Reading Temperature-Conversion Tables

For speed, when you're converting degrees F to C, and vice versa, you can now use a simple, compact "Sauveur-type" table all the way from absolute zero to 3350 C and 6062 F, in increments of one degree.

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ASTRONOMY

Double Stars Lose Matter

➤ THE ejection of matter from one part of a double star can change the period of revolution of the two stars around each each other, Dr. F. Bradshaw Wood, of the Steward Observatory, University of Arizona, told the American Astronomical Society meeting.

Some double stars in the sky are so oriented that astronomers see them eclipse each other. This causes variations in the total light received from each such system. The variations are usually strictly periodic, occurring each time the two stars complete a revolution. Astronomers have been puzzled to find some eclipsing systems that fluctuate in an irregular manner, actually seeming to have a change of period. Dr. Wood listed 18 systems that show such fluctuations.

He believes that such stars are in a state of dynamical instability. As they revolve around each other, each distorted into an "eggshape" by tidal effects, a portion of one star projects beyond what is known as the Jacobian limiting surface surrounding the star. Where this occurs, it is possible for mass easily to escape. Of the 18 stars listed, 17 seem to be near this limit, which may account for their changes in period. The only other explanation would be to have the separation between the stars altered, or a combination of loss of mass and a change in the separation.

Observations of eruptive prominences on the sun show large amounts of material being expelled with explosive force to distances which, in extreme cases, are of the order of the sun's own diameter. In the case of the sun, it seems probable that this material eventually returns to the surface, but this does not have to be true of a highly distorted star located close to another star of equal or greater mass. Even if the eruptive forces were no greater than those observed on the sun, the more powerful of the eruptions would easily eject the material beyond the Jacobian limiting surface where it would be lost to the system. Loss of mass of the order of 1/100,000 that of the system would cause a period change appreciably larger than those usually observed in eclipsing stars.

But even this large a loss of mass is not necessary, for Dr. Wood pointed out that the reaction of the escaping matter will give a push to the star itself. The explosion will most easily eject material from the system at those portions at the surface which are nearest instability, that is, the ends of the shorter equatorial axis. The tendency will be either to increase or decrease the period, depending upon whether the ejections occur at the leading or following end of the axis as the two stars rotate. The change of period caused by the change of motion such "explosions" of matter produce will be 20 times those caused simply by the loss of mass, and therefore not as much mass need be lost as implied above.

Expulsion of only one millionth (1/1,000,000) of the mass of a system will produce the largest observed change of period, and in cases encountered in nature a value of 1/10,000,000,000 or even 1/100,000,000 may well prove more normal.

But a system could not go on losing this much material for very long, at least not astronomically speaking. Dr. Wood suggested that the condition of near instability could scarcely last more than 10 or 100 million years and that it must be a temporary affair in the life of the double star.

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AGRICULTURE

Potato Pest Is Still Confined to Long Island

➤ THE golden nematode, a serious soil pest of potatoes, seems still to be confined to a section of Long Island, a special laboratory of the U. S. Department of Agriculture in Hicksville, N. Y., reported.

During the past few years it has examined thousands of samples of soil from all important potato growing areas of the United States. The samples were obtained from potato grading or storage units and were ideal for detecting nematodes. No traces of the tiny, almost invisible worm were found in any of the samples outside those from Long Island.

This laboratory also keeps a close check on soil on plants from foreign potato country. The check resulted in 27 interceptions of the golden nematode; 15 from England, three from Ireland, three from Germany and six from other areas. The same laboratory has made 16 other interceptions of other similar organisms. They were of the same genus but of other species. A wide-spread distribution of golden nematodes would cause the loss of many millions of dollars a year to American farmers.

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METALLURGY

Hidden Variety of Natural Vanadium Discovered

➤ A NEW kind of vanadium, elemental metal used in alloying steel, has been discovered. It is a variety or isotope of the element, weighing one unit less than ordinary vanadium, but occurring only one part in 400 in the material as found in nature.

Discovered at both the University of Chicago's Argonne National Laboratory and the University of Minnesota independently and announced simultaneously by letters to the PHYSICAL REVIEW (Dec. 1), the new vanadium is unusual because it is only the seventh ever discovered out of more than a thousand isotopes that have an odd number of neutrons and an odd number of protons in its makeup.

Neutrons and protons together are in the heart or nucleus of the atom. Ordinary vanadium has atomic weight 51, while the new isotope that is presumably stable is 50. Other isotopes of vanadium are all artificially produced and destroy themselves in a relatively short time through their radioactivity. They are weights 47, 48, 49 and 52.

David C. Hess, Jr., and Mark G. Inghram of the Argonne National Laboratory found the new kind of vanadium because neutron bombardment of the metal gave a kind of radioactivity that the normal sort of metal should not give. Wallace T. Leland of the University of Minnesota made this discovery while investigating the heavier elements with a mass spectrometer.

The new stable vanadium 50 is less abundant, one in 400, in vanadium metal than the famous fissionable uranium 235 isotope (used in the atomic bomb) is in uranium, one in 140.

Science News Letter, January 7, 1950

On This Week's Cover

➤ IN the North Atlantic area ten ocean stations are maintained to "collect", record and transmit weather data to interested meteorological offices ashore in order to provide dependable information vital to air, sea and land travelers, and to the stay-at-home as well. Ships on weather patrol maintain positions far at sea regardless of weather. The Coast Guard Cutter Ponchartrain battles it out in North Atlantic, Ocean Station Baker. Old "weather birds" will tell you about sitting on deck for meals when ship wallows like this in the trough of a following sea.

Science News Letter, January 7, 1950

Words in Science— PERIHELION-APHELION

➤ ALTHOUGH the pathway followed by the planet Venus in its circuit around the sun is almost a circle, that followed by most of the planets is flattened into an elliptical shape.

This means that at some times the planet is much closer to the sun than it is at other times. A planet moves faster when it is near the sun than when it is far away.

Astronomers have names for the position of greatest distance and that of shortest distance from the sun. They are aphelion, which means away from the sun, and perihelion, which means near the sun. You pronounce these words uh-fee-li-on with the stress on the fee and per-i-he-li-on with the stress on he.

Science News Letter, January 7, 1950

PHYSICS

Atom Smasher Sets Record

➤ A WORLD'S record in atom smashing has been set here by a new machine which is still in the prototype stage, or as the layman might put it, while still in "swaddling clothes."

The precocious scientific "baby" is Stanford University's electron linear accelerator. At only 14 feet of its eventual 160-foot length, it has produced 25 million electron volts, Dr. Richard F. Post and Prof. Marvin Chodorow announced at the meeting of the American Physical Society.

While only a fraction of its anticipated billion volt output, this is still the highest energy obtained to date anywhere with an electron linear accelerator.

The Stanford scientists plan to have 80 feet of the linear accelerator operating by next August.

They hope to get an output of 60 million electron volts for each 10 feet of accelerator tube. On this basis the 80-foot section may reach the 320 million electron volt level, well over the threshold of where it may produce mesons.

Both Dr. Post and Prof. Chodorow worked closely with the late Dr. William W. Hansen, Stanford physicist who planned and developed the electron linear accelerator and whose brilliant career was ended by a chronic lung disease last May.

Stanford scientists were not as excited by the record set by the accelerator as they were by the fact that the performance of the device confirmed Dr. Hansen's theoretical predictions.

The 25 million electron volt output is the voltage he expected from the current power input, and the accelerator operates at precisely the frequency he predicted, on 2,855,000 kilocycles.

In its current stage of construction, the linear accelerator could probably develop some 60 million electron volts if it were operated at full power, the scientists indicated, but they have not done so because at present they have not constructed the heavy shielding necessary to protect technicians against the radioactivity which would be present at the higher enery levels.

The linear accelerator is being constructed under a contract with the Office of Naval Research.

In lay language it can be described as an atom-smashing gun which is expected to hurl atomic particles at an energy of a billion electron volts or more.

It will be an unusual atom smasher in that the atomic "projectile" is the light, negatively charged particle of the atom, the electron, rather than the heavier, positive particles, the protons and deuterons, which are the atomic "missiles" in most other types of atom smashers.

In the electron linear accelerator, the electron rides down the accelerator tube on the crest of an electro-magnetic wave. The electrons travel at 186,000 miles a second, or within 99.99999 of the speed of light.

At such a speed the electron weighs some 2,000 times more than when at rest, gaining mass in accordance with Einstein's law of relativity as it shoots along the tube. When the electron "projectile" crashes into its atom target at the end of the tube, the resulting collision is expected to knock 15 or 20 particles off the nucleus and possibly to produce heavier mesons than has been hitherto possible in laboratories.

One of the prime advantages of the linear accelerator type of construction is that it will be possible to bring the high energy electrons out of the accelerator into the laboratory for study.

Science News Letter, January 7, 1950

WILDLIFE

NATURE RAMBLINGS

Opossum

➤ WHEN danger threatens, the opossum falls into a limp, lifeless heap. He hopes, by playing dead, to make himself unappetizing to even the hungriest of his enemies.

This stratagem shows a poor understanding of animal psychology, especially of hungry animal psychology, because opossums are rarely known to attain a ripe old age. "Playing 'possum" is a one-sided game in which 'possum is loser and winner takes all.

Hazards start early in the life of the opossum. Opossums are marsupials, that is they carry their young in a pouch in the manner of kangaroos. They are the only marsupial native to this country. Nature has devised a ruthless aptitude test for newborn opossums, to fail which is fatal. They must find and climb into the pouch where warmth and food are waiting, or die.

The contestants in this life-and-death "entrance exam" are pitiful creatures. At birth opossums are blind, deaf, and incredibly tiny. Fifteen of them weigh about an ounce; it would only take a three-cent stamp to ship all 15 of them via first class mail. Each baby opossum is smaller than a bumblebee.

The entrance to the pouch, hidden amongst the hairs of the mother's abdomen, is small and hard to find. The young opossum must grope blindly until he reaches the opening, and then pull himself up and in.

But gaining the sanctuary alone is not enough; he must get there ahead of his brothers and sisters, because there may not be enough teats to go around. There may be as many as 18 young in a litter and only 12 teats. The first dozen fasten themselves to a teat and do not let go until weeks later when they have grown ten-fold. The six laggards who finish last in the race for the pouch are doomed to death by starvation.

The lucky opossum that grows to full stature is about the size of a house cat. To reach this size he has had to evade foxes, wolves, wildcats, owls, hawks, and all the other creatures, including man, who like to lunch on young opossum.

However, not all opossums are that large. There is one kind of miniature opossum, sketched above, that lives in South America. They sometimes arrive in this country as unwilling stowaways in bunches of bananas. Presumably, when the bananas were harvested, the pilfering opossum "played 'possum," and before he knew what had happened, he found himself en route to foreign parts.

For the 'possum it is just one more perilous journey; awaiting him at the end of it, in all probability, lurks the store cat.

Science News Letter, January 7, 1950

AERONAUTICS

1949 Steps in Aviation

➤ FAST ROADS from city centers to nearby airports to save over-all time for air travelers are future essentials, according to the U. S. Civil Aeronautics Administration. A road expert has just been added to the staff of the CAA to assist in their planning, it is revealed by D. W. Rentzel, head of the organization.

This is one of the forward steps taken during the past year to promote air transportation. The year has been a notable one in aviation. Supersonic flights, a round-the-world non-stop flight, jet-propelled bombers and fighters and jet-propelled airliners in England and Canada, have all been headline news during the year. But there are many little-publicized developments looking forward to air travel with greater safety, comfort and speed.

Safety is the number one requirement in air transportation in the minds of all concerned. Comfort and speed are secondary. America had during 1949 the lowest fatality rate in the history of domestic and international flying by the scheduled carriers. For the first 11 months of the year, for which figures are now available, there was one fatality per 100,000,000 passenger miles. These figures, however, do not include fatalities in military, chartered and private flying.

Very important during the year, a primary factor in safety, is the greatly extended use of very high frequency radio communications for planes. This VHF, as it is called, is static free and permits a pilot to understand more easily radio instructions received from tower control men. It is rapidly coming into use on the radio ranges that provide the radio beams which pilots follow on cross-country routes. This new radio range is known as the omni-range because it sends out beams in all directions instead of in the four directions common in the old radio range.

Some 400 of these omnirange stations are planned to cover the United States; 370 are now in use.

The adoption of the omnirange is one of the steps in the program of the Radio Technical Commission for Aeronautics for which it was awarded the highly-prized Collier Trophy, to be presented by the President early in January.

The program of this government commission, on which were representatives of federal civil and military organizations concerned with flying and others from the industries, is a common system for the control of both military and civilian planes in the air. It would utilize the new electronic navigation aids now being installed and others under development which will be ready for use soon. A common control system is in itself one of the most important steps in aviation.

Among the navigation aids recommended by the RTCA is the joint use of the CAA instrument landing system (ILS) and the radar-radio ground controlled approach (GCA) apparatus favored by the military services. In this latter, a plane approaching in heavy overcast is located and tracked by radar in a ground station and directed by radio voice into a safe landing by the radar observer. Some 90 of the major airports in the United States now provide the radio beams for ILS landings; the foggiest ones are already equipped with GCA.

Important also during the past year is the widening use of the so-called cross-wind landing gear that has followed the development of improved types of this castored-wheel device. With such equipment a plane can land on an available runway without regard to the direction in which the wind is blowing.

The principal advantage is perhaps the decreased cost of airfields. Much less land is required. Airports can be constructed nearer to the cities they serve. A single runway will be sufficient for some ports while at the busier ones a number of parallel runways can be used.

Behind all developments in aerodynamics are the wind tunnels. Even the Wright Brothers in developing the airplane utilized a simple tunnel designed and built by themselves. During 1949, several advanced tunnels were completed and put into use. Included among them is a new supersonic tunnel at Langley Field, Va., constructed by the National Advisory Committee for Aeronautics, in which test models large enough to hold instruments may be used.

Then there is the new NACA tunnel at Lewis Flight Propulsion Laboratory, Cleveland, Ohio. It is large enough to test the operation of a full-sized airplane engine under very high air flow.

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Java is said to be the most densely populated country of the world.

A *house from sawdust* is to built in London; wall board from chemically treated sawdust is already being made for the building by a leading British timber firm under a special process developed in the United States.

• Books of the Week •

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C. Ask for free publications direct from issuing organizations.

ANNUAL REPORT 1949—*Carnegie Endowment for International Peace*, 74 p., paper, free upon request to publisher, 405 West 117th St., New York 27, N. Y.

BIBLIOGRAPHY AND INDEX OF GEOLOGY EXCLUSIVE OF NORTH AMERICA—Marie Siegrist and Eleanor Tatge—*Geological Society of America*, 386 p., $3.25. An alphabetic author and subject index to the literature received by the Society and the Library of Congress through February, 1949.

BUREAU OF THE CENSUS MANUAL OF TABULAR PRESENTATION—Bureau of the Census—*Gov't. Printing Office*, 266 p., illus., $1.50. A reference aid for use by analysts and technicians.

DEATH OF A SCIENCE IN RUSSIA—Conway Zirkle, Ed.—*University of Pennsylvania Press*, 319 p., $3.75. A collection of articles, documents, and statements tracing the development of Russian genetics since 1936.

THE ELEMENTARY SCIENCE LIBRARY—Eva L. Gordon—*New York State College of Agriculture*, 63 p., paper, 20 cents. A listing of about 200 books, published since 1938 and chosen for their value to elementary school science teaching.

EMBRYOLOGY OF THE CHICK AND PIG: A Laboratory Manual—Bruce M. Harrison—*Brown*, 135 p., illus., $3.50. For those students who already have a general knowledge of zoology.

GOVERNMENT PUBLICATIONS FOR THE CITIZEN: A Report of the Public Library Inquiry—James L. McCamy—*Columbia University Press*, 139 p., $2.50. The author surveys the scope and present machinery for publication and distribution of government information to the general reader.

GRAIN PRODUCTION AND MARKETING—G. A. Collier—*Gov't. Printing Office*, USDA Misc. Publ. No. 692, 78 p., illus., paper, 25 cents. A pamphlet giving a brief survey of the grains from seeding to their utilization.

AN ILLUSTRATED KEY TO THE LIZARDS, SNAKES AND TURTLES OF THE WESTERN UNITED STATES AND CANADA—Jay M. Savage—*Naturegraph Company*, 32 p., illus., paper, 50 cents. To be used in determining the species of a western reptile.

INTRODUCTION TO MODERN OFFICE MANAGEMENT—J. George Frederick—*Business Bourse*, 198 p., $3.50. Presents some of the problems of office management and suggests how they may be solved.

INTRODUCTION TO PHYSICAL BIOCHEMISTRY—J. M. Johlin—*Hoeber*, 2nd ed., 246 p., illus., $3.75. A college text revised.

MAJURO: A Village in the Marshall Islands—Alexander Spoehr—*Chicago Natural History Museum*, Publ. 641, 266 p., illus., paper. $3.50. A report of the author's investigations made during the past decade.

MERCHANT SHIPS 1949-50—E. C. Talbot-Booth—*McGraw-Hill*, 260 p., illus., $8.50. A reference book on the World's merchant shipping.

PRINCIPLES AND PRACTICE OF THERAPEUTIC EXERCISES—Hans Kraus—*Thomas*, 309 p., illus,. $6.50. A monograph.

SEA ANEMONES AND CORALS OF BEAUFORT, NORTH CAROLINA—Louise Randall Field—*Duke University Press*, 39 p., illus., paper, $2.00. A brief report of some of the lower forms of fauna of this area.

SCHOLARSHIPS, FELLOWSHIPS AND LOANS—S. Norman Feingold—*Bellman*, 254 p., $6.00. A directory containing information on student aids. A large bibliography.

SEISMICITY OF THE EARTH AND ASSOCIATED PHENOMENA—B. Gutenberg and C. F. Richter, —*Princeton University Press*, 273 p., $10.00. An account of the relative seismicity of various parts of the earth since about 1904.

27 MASTERS OF POLITICS: In a Personal Perspective—Raymond Moley—*Funk and Wagnalls*, 276 p., $3.50. Brief sketches of the lives of some of our leading politicians.

WATER IN THE PHYSIOLOGY OF PLANTS—A. S. Crafts, H. B. Currier and C. R. Stocking—*Chronica Botanica*, 240 p., illus., $6.00. A basic reference book compiling much of the relevant literature.

VINYL RESINS IN INDUSTRIAL COATINGS—Richard W. Quarles—*Official Digest*, 12 p., illus., paper, free upon request to Mellon Institute of Industrial Research, University of Pittsburg, Pittsburg 13, Pa.

Science News Letter, January 7, 1950

ENGINEERING

Message in Bottle Doomed; Plastic Sack Takes Over

➤ ALTHOUGH the shipwrecked mariner has become a rarity now that shipwrecks don't occur as often as they used to, his favorite form of communication—a message in a bottle—has had a place in our modern age. Until today.

Today the word was out that the drift botttle is giving way to a new-fangled plastic envelope. The polyethylene envelopes, six inches wide and 0.004 inch thick, are lightweight, won't break, don't blow in the wind, and 200 of them can be held in one hand. Bottles are heavy, breakable, blowable, and come 12 to the case. Full or empty they take up a lot of space aboard a ship.

Bearer of these unromantic tidings was F. C. W. Olson, of Ohio State University, who told a group of the American Association for the Advancement of Science of use of the plastic envelopes for computing water currents in Lake Erie.

Into the water- and weather-resistant envelope a stamped, self-addressed card is inserted, the envelope is heat sealed, and then set adrift in quantity. The finder is asked to fill in time and place of recovery and to drop the card in the mail.

In tests so far, Mr. Olson said that they have received over 600 cards out of 1,500 turned loose in the new plastic envelopes.

Science News Letter, January 7, 1950

• New Machines and Gadgets •

For addresses where you can get more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C. and ask for Gadget Bulletin 498. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

DE-ICING FLUID for automobile windshields comes in a flexible polyethylene atomizer that delivers a fine spray on the ice-covered glass with a pulsating action of the fingers. The fluid turns sleet or frost into slush which can be easily cleared by the windshield wiper.

Science News Letter, January 7, 1950

ELECTRIC DEODORIZER, suitable for use in the kitchen or anywhere in the house to kill household odors, is a simple unit which is plugged directly into the ordinary electric outlet. A built-in heating unit activates enclosed deodorizing ingredients, releasing them into the room.

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LABORATORY HOT PLATE, electric type, provides stepless heat control and, after attaining a surface temperature of 500 degrees Fahrenheit, consumes current only 50% of the time. Heating elements, of the flat type which prevent "cold" spots, are completely embedded for safety.

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BABY TABLE, with seat, shown in the picture, has telescoping legs which permit it to be raised to dining-table height so that the baby can join the family at meals. Wood-

en extensions fit inside the hollow, square, plastic-coated, metal legs, and they can be slid up or down.

Science News Letter, January 7, 1950

READING LAMP, for in-bed readers, is clamped on the top of the book or magazine being read. It lights automatically when the book is brought into reading position and turns off when the reader dozes and lets the book drop. The light from its seven-watt bulb is directed only on the reading area.

Science News Letter, January 7, 1950

DYNEL is a synthetic fiber of a plastic type which is suitable for uses ranging from blankets to bathing suits to infant wear. It is a strong, warm, quick-drying fiber, dimensionally stable and said to be resistant to moths, flame, mildew, acids and alkalis.

Science News Letter, January 7, 1950

SANDING MACHINE, recently patented, for resurfacing bowling alley floors, is a low-wheeled frame the width of the floor. It carries a sanding drum rotated by electric motor. The same motor operates a suction device to pick up floor dust made by the sander. The whole is pulled forward by means of a cable reel.

Science News Letter, January 7, 1950

PLASTIC LETTERS for outdoor signs, available in sizes from two inches in height to three feet, and in various colors, are light in weight, completely weatherproof and easily attached. They can be made transparent, translucent or opaque, and can be lighted from within or from the outside.

Science News Letter, January 7, 1950

Do You Know?

The *mermaid legend* of America is based on the manatee of Florida waters.

Eggs may explode if heated in the shell to a high enough temperature; the moisture inside is converted into overheated steam.

Improved *breeding* has doubled the milk production of American cows in the past century.

One of the largest undeveloped *sulfide ore* bodies is in Carroll County, Virginia; the ore body also contains considerable iron deposits.

Diesel-driven, under-car *electric generators* developed for use on individual railroad cars to provide electricity for lights and ventilators, permit the entire power of the locomotive to be used for traction.

The sex of a *chick*, which now can be determined very soon after hatching, by trained people, has an effect on the sale price; sexed pullets sell at a premium because of the demand for egg producers.