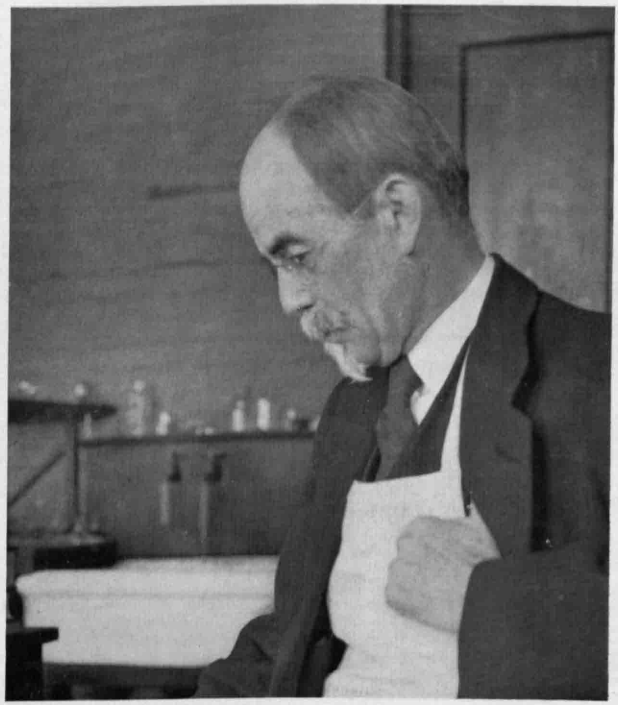
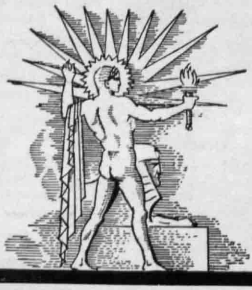
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •





JANUARY 9, 1932

New Scientists' President at Work

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A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXI No. 561

The Weekly Summary of Current Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—$5.00 a year postpaid; two years, $7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

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Publication Office, 1930 Clifton Ave., Baltimore, Md. Editorial and Executive Office, Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

? DO YOU KNOW THAT ?

An apparatus has been devised to measure the reflective qualities of white paint that is used in the traffic stripes on highways.

An elaborate color organ will be installed in the sound motion-picture theatre in the Rockefeller development in New York City.

A city directory for New York is to be compiled, and the work will be planned so as to give about 100,000 full working days of employment to the city's unemployed.

Cabbage, onions, and celery are best served raw or very carefully cooked, as they have a tendency to lose their minerals in cooking more than other vegetables.

Scientists who have long and unsuccessfully tried to obtain eggs of the flying fish were casually given a fine mass of them, when a little girl playing on the beach at the Scripps Institution of Oceanography at La Jolla, California, brought in some fish eggs she had found.

A skid-proof road of iron blocks on an asphalt base has been laid in London for exhibition purposes.

A new development in rubber road construction is a rubber expansion joint for concrete roads.

The dining hall in the newest British ocean liner will be the largest room ever built in a ship.

There are fewer children under five years of age in the United States today than there were in 1920.

The female alligator, after making a nest of leaves, sticks, and rubbish near the water, lays about ten eggs, covers them with mud and rubbish, and goes on depositing in layers until 60 eggs, or even more, are laid.

In a new Field Museum exhibit showing mountain lions at home, no male lion appears with the mother and her kittens in the den, for curators explain that the male lion deserts his home while the babies are young, returning only after the young lions are partly independent.

WITH THE SCIENCES THIS WEEK

Science Service presents over the radio, an address

THE ROLE OF CELLULOSE IN INDUSTRY

By Dr. Henry K. Benson, Chairman, Division of Chemistry, National Research Council, and Professor of Chemistry, University of Washington.

Friday, January 15, at 3:45 P. M., Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

NEUROLOGY

Nerves Grow As if With Aim A.A.A.S. Prize Paper Shows

New Fundamental Life Question Raised at Meeting By Proof that Nerves Travel From Spine to Destination

SCIENCE must now set about answering a fundamental question of life, why nerves grow with seeming intelligence and purpose, as a result of researches by Dr. Carl Caskey Speidel, University of Virginia anatomist, who presented the $1000 prize paper before the American Association for the Advancement of Science annual meeting at New Orleans.

Living, growing nerves of the tadpole were seen by Dr. Speidel to sprout from the spinal cord and, like a telephone wire being strung from a central office to a home, to go directly to the muscle or sense organ they were destined to connect with the central nervous system.

With his microscopic observations which revealed the growth of nerves in the living body for the first time, Dr. Speidel settled conclusively a controversy in neurology that has raged since 1860, when the German biologist, Wilhelm His, suggested that nerves grow outward just as Dr. Speidel finds they actually do. The opposing theory was that nerves grew by the connecting up of cells already existing in the region between the central nervous system and the part of the body to be controlled by the nerve.

But out of his success there will arise, as is often the case in science, a still more difficult question: How does the nerve know how to travel unerringly to its destination.

Thus the door is held open to some uncomprehended commanding purpose, which some will call a manifestation of some sort of god, to rule the course of the growth of living things.

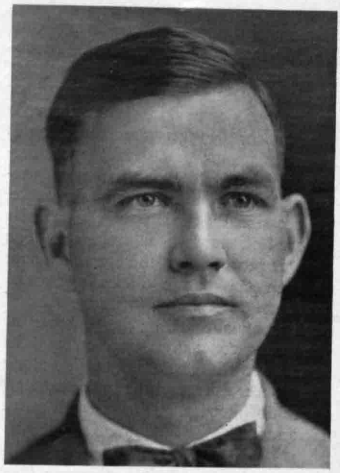
Use of a special, dark field illumination microscope enabled Dr. Speidel actually to follow the growth of the nerves from minute to minute over a period of several weeks. Some of the tadpole nerves grew at rather astonishing rates for short periods. One traveled for ten minutes at the rate of one micron per minute, a distance that is about one five-hundredth of the width of the mark of a soft lead pencil.

The nerve traveled outward on its important journey much as though it were a whole animal in itself, a sort of very intelligent worm bent on getting where it should go.

While nerve action may be electrical in its nature, Dr. Speidel's work also successfully destroyed the idea that nerve growth is controlled by an electrical field in the body. He saw two nerves prolonging themselves along the same route in opposite directions, which would be impossible if they were controlled by an electric field.

Unlike a telephone line, nerves cannot be patched when cut, but the break must be remedied by an entirely new outgrowth from the place of the cut to the muscle or sense organ controlled. It is just as though a telephone lineman were unable to use any of the old wire between the place of a break in the line and the subscriber's telephone and had to string entirely new wire.

This explains why, when a finger or leg suffers a serious cut, it may take weeks and months for normal feeling to be restored in it, and why muscles have to be entirely reeducated.



DR. CARL CASKEY SPEIDEL
—the University of Virginia anatomist who presented the $1000 prize paper before the American Association for the Advancement of Science.

Dr. Speidel, who is honored with the prized thousand-dollar award for a notable paper out of the more than a thousand read at the meeting, is only 38 years old. He has worked on his problem for a number of years. He was born in Washington, D. C., did his undergraduate work at Lafayette College, Pennsylvania, and took his Ph.D. at Princeton in 1918. His researches in detailed form will be published in a forthcoming issue of the *Journal of Experimental Zoology*.

Science News Letter, January 9, 1932

NEUROLOGY

Prize Winner Describes Study Of Living Nerves of Tadpole

By PROF. CARL CASKEY SPEIDEL,
University of Virginia Medical School.

This statement was prepared by Prof. Speidel as a non-technical abstract of his A. A. A. S. New Orleans paper which won the thousand-dollar prize of the meeting.

MANY years ago nerve cells were studied in tissue culture outside the animal body, and nerve fibers were observed growing out from them. At the end of each fiber an actively growing tip, or "growth cone," was seen. Up to the present time, however, it has not been possible to follow these in the tissues of the living animal. By means of a special technic I have been able to make direct observations under high magnification of active nerve sprouts and their growth cones in the transparent tail fin of living frog tadpoles. Individual fibers have been followed from day to day for periods of more than a month.

The growth cones travel through the tisues by slow ameboid movement, spinning the nerve fibers behind them. They are quite sensitive to their environment.

Correction by Dr. Speidel

Exploratory processes are being continually sent out and retracted. At obstructions which hinder their progress for a short time, a slight thickening, or varicosity, is often left. If the sprout is blocked for a longer time, branching is sometimes stimulated. If the obstruction is insuperable, giant cones may result. Retraction may then take place, or occasionally the tip of the fiber is pinched off and left to degenerate. The first, or pioneer, growth cone to advance through the tissues shows a marked tendency to follow "directive lines," such as are afforded by the processes of the young connective tissue cells. The second growth cone usually glides along the pioneer fiber, and the third and later cones do likewise. Thus, a small nerve is formed.

Occasionally, growth cones may be seen progressing along a directing fiber in diametrically opposite directions, a fact which is significant for certain theories of nerve development.

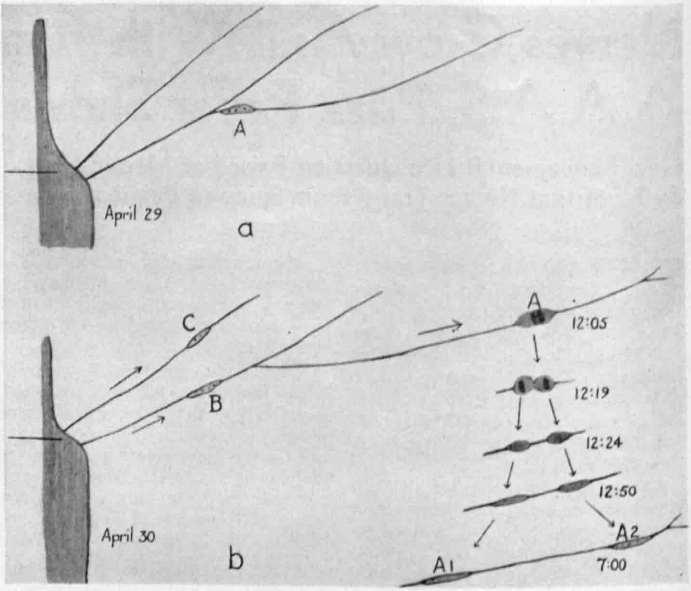
When the whole tadpole is subjected to electrical stimulation the growing nerve sprout tips seem not to be affected, either in rate or direction of growth. Cell division on the part of closely adjacent sheath cells or fibroblasts, however, may cause resting sprouts to become active. New sprout formation may also be stimulated.

In later stages of development some of the nerve fibers become encased in a fat-like sheath (myelin sheath), the function of which is to insulate, nourish and protect the fibers. The entire process of formation of this sheath has also been seen for the first time, either in a living animal or in tissue culture. The myelin sheath is formed through the cooperation of a young sheath cell and a nerve fiber. It is developed in segments, each segment representing the sphere of influence of a single sheath cell. The sheath is quite delicate and sensitive, so that the slightest irritation or injury is enough to cause its degeneration.

Many varieties of myelin-sheath formation, injury, adjustment and repair have been seen, by keeping the same individual fibers under observation for several months. The sheath cells are exquisitely sensitive to adjacent injuries or other changes, and actively slide along the nerve fibers to bring about the proper adjustments necessary. Under the proper stimulus they may multiply, bridge gaps between fibers, and transfer from one nerve to another. They move by the "fixed constriction ring" method, similar to the movement exhibited by certain white blood cells and by amebas. Experimentally, sheath cells may be kept isolated from the nervous system for a month, and still retain the capacity to migrate back again and resume their normal functions.

Detailed histories of nerve sprouts, growth cones and myelin segments after nerve section have been obtained. Often small nerves, after being cut, appear to heal by "first intention," the two stumps becoming quickly reconnected. A complete analysis, however, reveals that, fundamentally, true healing by first intention does not take place, as far as each individual nerve fiber is concerned.

Science News Letter, January 9, 1932



HOW NERVES GROW

Sketch by Dr. Speidel showing manner of travel of nerve cells in tadpole tail amputated at level shown by horizontal line. One pioneering sheath cell labeled A moved rapidly in a day and then divided into two daughter cells, A1 and A2. B and C are other cells starting on their journeys. (From forthcoming issue of Journal of Experimental Biology.)

PARASITOLOGY

Animal Immunized Against Parasite for First Time

SUCCESSFUL immunization of an animal against a many-celled parasite has been accomplished for the first time in history, and this feat may be the first step toward the development of a preventive of tapeworm and other unpleasant parasitic infections in human beings, it was revealed in a report to the American Association for the Advancement of Science.

Prof. Harry M. Miller, Jr., of Washington University, St. Louis, reported that by injecting portions of a tapeworm into rats it is possible to prevent the development of tapeworms from eggs fed later to the rats eo protected. The worm lives in the intestine of the cat and has thus baffled by this immunizing injection its larval stage in the liver of the rat.

Although it has been possible to immunize and protect animals from disease caused by typhoid and many other one-celled bacteria, more complex invaders have not hitherto been stemmed by any attempts at immunization. Prof. Miller's research is therefore hailed as encouraging.

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MEDICINE

Infantile Paralysis Caused By Disappearing Microbe

Important Discovery Leading to Preparation of Serum And Vaccine Which May Result in Stamping Out Disease

THE CAUSE of infantile paralysis is an exceedingly minute microbe, roughly one five-hundred-thousandths of an inch in size, which becomes invisible to the most powerful microscopes when it infects the brain and spinal cord and produces the dreaded paralytic symptoms which have killed or shattered the lives of many American children in the past few years. This important discovery, which may lead to the prevention and curing of the disease, has been disclosed to the American Association for the Advancement of Science by Dr. Frederick Eberson of Mount Zion Hospital and University of California Medical School, San Francisco.

The preparation of vaccines from the germ in the hope of developing a practical method of protection against the disease is now in progress, Dr. Eberson announced.

He is also attempting the production of a serum for use in prevention and treatment, but neither of these efforts is yet ready for definite report. Testing upon human patients is still in the future.

By using a specially prepared sterilized food, Dr. Eberson succeeded in making visible microbes appear and grow where only a carefully filtered fluid from the brain and spinal cord of infantile paralysis victims had been planted. Before Dr. Eberson's research, the cause of poliomyelitis, as infantile paralysis is called medically, was attributed to a microbe too small to be seen with any microscope and capable of passing through the pores of the finest screen or filter, minutely grained clay or porcelain. This invisible infectious agent was called a virus. Now Dr. Eberson has shown the Dr. Jekyll and Mr. Hyde character of the germ by making it come out from under its cloak of invisibility.

The special germ food used by Dr. Eberson consisted chiefly of minced sheep brain tissue contained in a veal broth. Into a test tube of this material he placed a very small amount of filtered substance from the brain and spinal cord of monkeys ill with the disease. This test tube culture developed the very small but visible germ after it had been kept at the temperature of the human body for several weeks. By transferring a tiny drop of the growth in one tube to another, he kept the disease strain alive and saw it multiply greatly.

The crucial test was when Dr. Eberson infected monkeys with the visible germs, saw them develop poliomyelitis in typical severity and then grew the visible germs from the invisible organisms in the fluids of their diseased nervous system.

The discovery of the cycle of infantile paralysis and the demonstration of both invisible and visible stages of the germ's life is considered important to the future conquests of other diseases like colds, influenza, encephalitis, etc., now attributed to invisible germs.

The poliomyelitis germ discovered by Dr. Eberson ranged in size from the lowest limit of visibility to about a tenth of a micron. The germ has a sheath-like surrounding envelope that causes it to group with others to form clumps.

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CHEMISTRY

New Synthetic Rubber Process Is Explained

THE STAGES by which the new artificial rubber of the E. I. du Pont de Nemours & Company was discovered and perfected, were revealed by Dr. W. H. Carothers to the fourth organic chemistry symposium of the American Chemical Society at New Haven, Conn.

Synthetic rubbers are derived mostly from a group of simpler substances, liquid hydrocarbon oils known as "dienes," Dr. Carothers explained. On being allowed to stand, these compounds react slowly with themselves to form substances resembling rubber.

In the case of isoprene, commonest of the dienes, which is obtained by decomposing natural rubber itself, this conversion to a rubber-like product is very slow and difficult to control, Dr. Carothers said. Hence the limited success reached in trying to commercialize this process.

Other dienes were prepared and studied by a group of du Pont chemists, including Dr. Arnold M. Collins, Ira Williams, Dr. Gerard J. Bercher, Dr. James E. Kirby and Dr. Carothers. Special attention was paid to the reactions of the dienes prepared from vinylacetylene, a compound formed by the joining of two molecules of the common gas acetylene.

Success crowned these efforts in the discovery of two dienes, chloroprene and bromoprene, having the desired behavior, continued Dr. Carothers. These compounds are very similar to isoprene; in them chlorine or bromine replaces the methyl group of the isoprene molecule. These react with themselves very rapidly to form rubber-like products and thus permit the systematic study and control of the effect of different conditions on the transformation.

The work of Prof. J. A. Nieuwland of the University of Notre Dame and of W. S. Calcott, F. B. Downing and Dr. A. S. Carter of the du Pont Company on the polymers of acetylene, all contributed to make this achievement possible.

This fact of rapid reaction, Dr. Carothers stated, led to the new synthetic chloroprene rubber, DuPrene, which for certain special purposes is superior to the natural product.

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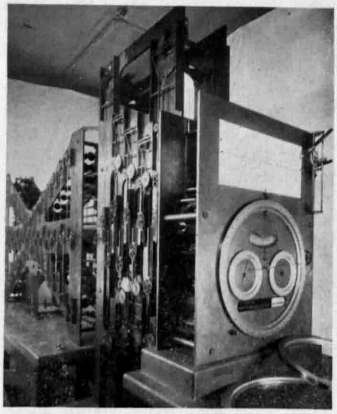


TIDE-PREDICTOR

—the super calculating machine of the U. S. Coast and Geodetic Survey which does the work of sixty mathematicians and with more speed and accuracy, too. The machine not only indicates on its face dials the predicted high and low tides for any place at any day in the year, but also traces a continuous graph of the variation of the tide or current. It may be used for calculating tides or currents for any future time or any time in the past.

ASTRONOMY

What Leapyear Skies Have to Offer

Total Eclipse of Sun, Meteor Shower, and Return of Nine Periodic Comets Main Features on Program for 1932

A YEAR from now, when astronomers look back over the record of 1932, three main things are likely to stand out. A total eclipse of the sun in an easily accessible part of the earth, a shower of meteors finer than any seen in many a year, and rivaling those of 1799, 1833 and 1866; and nine periodic comets that are due to return: these are the events that promise to make the coming year outstanding.

Unfortunately, none are absolutely certain. The eclipse, to be sure, will occur shortly after three o'clock, eastern standard time, on the afternoon of August 31, and nothing that astronomers can do will affect it. But cloudy weather may intervene to make useless all the elaborate efforts to observe it. The meteor shower, in November, seems likely. but the watchers of the stars have not forgotten their ill-fated prediction of a return of the meteors in 1899, at which time they failed to materialize. And though nine periodic comets are due, it is hardly likely that all of them will be actually observed.

Among the minor, but interesting, astronomical events of the year will be one of the very rare appearances of Jupiter without any satellites. Ordinarily, through a small telescope, four of these moons are seen. Frequently one may be hidden, as it passes behind the planet, into its shadow, or across its face. Occasionally two are thus hidden simultaneously, and still more rarely only one may remain visible. Exceedingly rare is the simultaneous disappearance of all four moons, an event which will take place on May 3, from 10:25 P. M. to 11:20 P. M., eastern standard time. Not since May 10, 1914, has this effect been seen in the United States, nor will it be seen again until 1939.

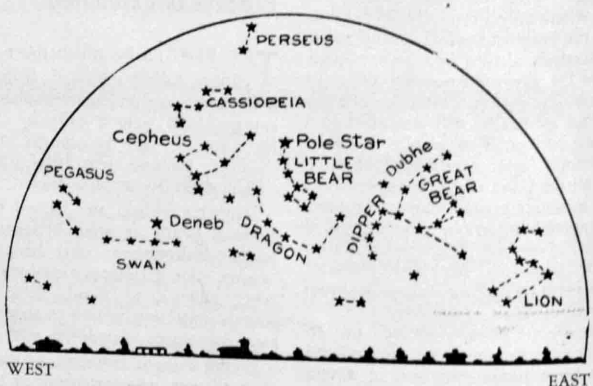
The planet Venus will shine brightly in the western evening sky during the late winter and spring. About the 22nd of March, when spring is commencing, it will be joined for a few days by the seldom-seen planet Mercury. At the end of the summer Mars will begin to come into view, appearing first in the morning sky, before sunrise. As it approaches closer to the earth it will continue to brighten, until at the end of December it will exceed in brilliance any star except Sirius. By this time the telescopes of observatories that make a specialty of planetary study will be focused on it, and it will continue to be observed during the first half of 1933, when it will come even closer. Jupiter will shine in the evening sky during the late winter and spring. Then it will be almost in line with the sun and will vanish from sight until autumn, when it will reappear in the morning sky. Saturn will be visible at night throughout the year, in the morning until summer, after that in the evening.

First in United States Since 1925

The total eclipse of the sun is the first to be seen anywhere in the United States since 1925. It will be the last until 1945. When, on August 31, the moon's shadow sweeps across the earth, the sun will be completely hidden for about a minute and 40 seconds, along a path crossing Quebec and New England. The shadow will reach the St. Lawrence River about 3:23 P. M., eastern standard time, passing over Montreal, Sorel and Three Rivers. About 3:27 it will cross the border into the United States, where it will pass over northeastern Vermont, all of New Hampshire but the southwestern portion, southern Maine, northeastern Massachusetts and Cape Cod. Provincetown will see it about 3:33.

This is a popular vacation region any summer, and with the eclipse coming right at the height of the season, it should prove an added attraction. Probably it will be seen by more people than have witnessed any previous eclipse, if it is clear. However, a study of the record for past years indicates that the chances for clear weather are about even. There may be light scattered clouds, so that one group may fail to see the eclipse during the minute and a half when the sun is completely covered, while another party a few miles away might see it all. Hundreds of astronomers, from all parts of the world, will be located along the path, ready to make observations possible only at eclipse time. With these expeditions scattered, at least one is likely to get good results, for it is improbable that thick clouds will prevail over the entire path, as they did over southern California in September, 1923, when an eclipse was to be visible there.

After the eclipse, the astronomers will converge on Cambridge, Mass., where the meeting of the International As-



NORTHERN SKIES DURING JANUARY

The ninth first magnitude star of the January evening skies shines low in the northwest—Deneb, all that remains visible of the constellation of Cygnus, the swan. In the west, standing upon one corner, is the "great square of Pegasus," and directly above it is the chained woman, Andromeda. As a whole, the northern skies are somewhat bare, most of the conspicuous stars appearing in the south.

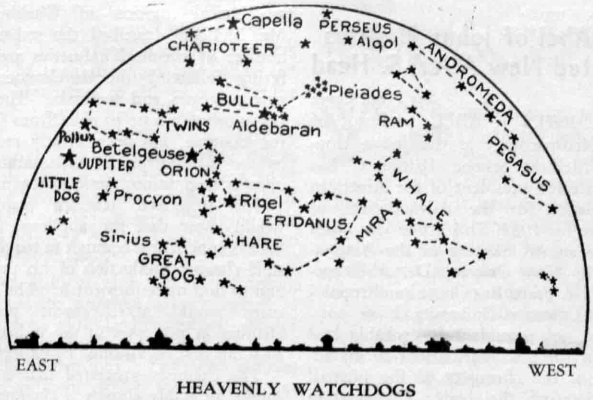
tronomical Union will be held from September 2 to 7. This will be the first time that the Union has met in the United States. But this is not the only eclipse of the year, even though it is the most important. The smallest possible number of eclipses in any year is two, when both must be of the sun. There can be as many as seven, when either five are of the sun and two of the moon, or four are solar and three lunar. Four is the most usual number, and that is what we have during 1932.

Eclipse at South Pole

The first is the annular eclipse of the sun, on March 7. The path of the annulus, in which the dark disc of the moon is seen surrounded by a bright ring of sunlight, is short and close to the South Pole, but a partial eclipse, with the moon partly hiding the sun, will be seen near sunset in Australia, New Guinea and Sumatra. Two weeks later, on March 22, when the moon will have passed to the other side of the earth, it will partly enter the shadow of the earth, and the result will be a partial lunar eclipse, visible in the western United States, and in general around the Pacific Ocean. The year's last eclipse occurs just two weeks after the one in August, on September 14. Then the moon again is partly engulfed by the earth's shadow, but this partial eclipse of the moon will be visible only in the eastern hemisphere.

In 1930 and 1931 the middle of November brought returns of the Leonid meteors, or "shooting stars," finer than for many years previously. As the 1931 shower was the finest since 1866, there is good ground for hoping that 1932 will bring a display approaching, or even exceeding in magnificence, those of 1833 and 1866, when the entire sky was covered with the flashing bodies. Studies by British astronomers, members of the computing section of the British Astronomical Association, and by Dr. A. C. D. Crommelin, president of the Royal Astronomical Society, indicate that Tempel's comet, with which the meteors are associated, will approach close to the earth in November, and thus support the belief that the meteors will make an appearance.

In addition to Tempel's comet, eight others are expected, but some may not be observed. None has ever on previous visits been seen with the naked eye, however. Those that are most likely to be detected with the observatory telescopes are: the Grigg-Skjellerup comet, which has a period of 5 years and was last seen in 1927; Neujmin's second comet, with a period of 5.4 years, last seen in 1927; Kopff's comet, with a period of 6.6 years, last seen in 1926; Borelly's comet, with a period of 6.9 years, last seen in 1925; Brooks' second comet, also with a period of 6.9 years and last seen in 1925; and Faye's comet, with a period of 7.3 years and last seen in 1925. The latter is a very dependable body, as it has been seen 8 times since it was first discovered in 1843. Brooks' second is also an old favorite. It was discovered in 1889 and has been observed four times since then. When it returns this year, it will be in the midnight sky at the same time that it is closest to the sun. This is the most favorable possible position for a comet, so it is almost certain that it will be seen.



HEAVENLY WATCHDOGS

Occupying a position in the southern skies this month to the left of the familiar constellation of Orion are his two faithful dogs, Canis Major and Canis Minor. The greater of the two, Canis Major, is identified by the brilliant "dog-star," Sirius, brightest star in the heavens. Higher and to the east the lesser dog stands its post, marked by the shining Procyon.

New Comets Likely

In addition to these, it is almost certain that several new comets will be found, and it is possible that one of them may prove to be a brilliant, naked eye object, unlike those mentioned above.

During the present month of January, the most conspicuous stars are seen in the southern sky. The familiar constellation of Orion is directly south. Above the three stars that form the warrior's belt is the red star Betelgeuse, and below them is Rigel. Above Orion and to the right can be seen the heavenly bull, Taurus, the ruddy Aldebaran marking his eye. On the other side of Orion, we see his two faithful dogs. Canis Major, the greater of the two, is lower, and identified by the brilliant "dog-star," Sirius, brightest star in the sky. Higher, and to the east, is the lesser dog, Canis Minor, with Procyon, only slightly inferior, to mark it.

A little higher than Procyon, and to the left, is Pollux, the brighter of the twins, Gemini, and below the twins is the "sickle," in Leo, the lion, with the bright Regulus at the end of its handle. Directly overhead is Capella, in Auriga, the charioteer.

The ninth first magnitude star of the January evening skies is low in the northwest — Deneb, all that remains visible of the constellation of Cygnus, the swan. In the west, standing upon one corner, is the "great square in Pegasus," and directly above it is the chained woman, Andromeda. Cetus, the whale, appears in the southwest. Next to him, in the south, and reaching close to Rigel, is the river, Eridanus, a large constellation that contains no very bright stars.

Between the two dogs, marked by Sirius and Procyon, is Monoceros, the unicorn, also of fainter stars. The planet Jupiter is seen in the eastern sky, between Regulus and Pollux. Its great brilliance, and steady light, leaves no doubt as to its identity. In the early evening, just after sunset, Venus appears low in the west, brighter than any other star or planet. No other planet will appear in the evening sky this month.

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Knives and forks that look like gold but are much more durable have been produced by a British manufacturer, using an alloy of aluminum and copper.

GENERAL SCIENCE

Dr. Abel of Johns Hopkins Elected New A.A.A.S. Head

See Front Cover

DR. JOHN J. ABEL, professor of pharmacology at the Johns Hopkins Medical School, Baltimore, has been elected president of the American Association for the Advancement of Science for 1932. This action was taken at the annual meeting of the Association in New Orleans. Dr. Abel succeeds Dr. Franz Boas, noted anthropologist at Columbia University.

The new president is probably best known for his contributions to knowledge of the chemistry of the internal secretions of the body. He deserves credit for being the first to obtain in chemically pure form the secretion of the adrenal glands, to which he gave the name epinephrine, also known as adrenalin. Dr. Abel did the fundamental work which led to its isolation, although the Japanese investigator, Jokichi Takamine, was the first to obtain the substance in crystalline form. Dr. Abel was also successful in isolating the hormone of the pituitary gland and was the first to obtain insulin, secretion of the pancreas, in crystalline form. His research has extended to many other subjects. In addition he has been an educator whose students have won distinction in many parts of the world. Dr. Abel recently announced that he would retire from teaching next fall, to devote himself exclusively to research.

He was born in Cleveland in 1857, graduating from the University of Michigan in 1883. He has been honored with degrees, medals and membership in scientific societies both in this country and abroad. He has also founded and edited scientific journals.

Science News Letter, January 9, 1932

ECONOMICS

Research Statement for Would-Be Borrower Urged

A "RESEARCH STATEMENT," as well as balance sheets, profit and loss statements and other evidences of financial solidity may be required of the industrial concern of the future seeking to borrow money from a bank.

This suggestion, designed to protect banks from economic revolutions which originate in new chemical and industrial processes, was made at the recent meeting of the Washington Chemical Society following a discussion of trends in chemical industry by R. S. McBride, a chemical engineer of Washington. Mr. McBride described the setbacks a number of chemical industries are suffering following the development of new processes and methods. The importation of nitrate of soda from Chile, for example, has been greatly reduced by the manufacture in this country of nitrates from atmospheric nitrogen.

The suggested research statement would show that the applicant for a loan is conducting research to make possible cheaper production of his product and to find more uses for it. The statement would also present possible changes in processes in the industry as they can best be visioned by experts.

The chemists suggested that a bank might profitably employ a chemical engineer to advise its officers concerning the prospective results of making certain industrial loans.

Science News Letter, January 9, 1932

ANTHROPOLOGY

Sweet Potato Reveals Old Contacts with America

AMERICA in ancient times was not completely undiscovered—shut off from the rest of the world as it is sometimes pictured. At least, the Indians of the South American coast had contacts with islanders of far off Polynesia, Dr. R. B. Dixon of Harvard University has reported to the American Anthropological Association.

An American plant, the sweet potato, found its way to Polynesia in pre-Columbian times, Dr. Dixon stated.

Theories that Polynesian natives made voyages of extreme length in their big boats must be discounted after careful study of documentary evidence, said Dr. Dixon. He added, however, that the islanders did make voyages of 1,500 miles, which would have carried them to the American coast.

A report of excavations in Nebraska, where remains of Pawnee Indian villages of different ages were found, was presented by W. Duncan Strong of the Bureau of American Ethnology. In one place, Mr. Strong found settlements of these Indians stratified. Remains of prehistoric structures were in the lowest layer, over them were proto-historic remains, and above these an historic Pawnee village. This evidence of evolution in Plains Indian culture was received by the association as an important archaeological contribution.

The association elected John B. Swanton to be president for 1932.

Science News Letter, January 9, 1932

IN SCIEN

PHYSIOLOGY

Animals Die When Deprived Of Rare Gases in the Air

OXYGEN and nitrogen, chief constituents of the air, are not alone sufficient to keep life aglow, Prof. J. Willard Hershey of McPherson College, Kansas, has reported to the American Association for the Advancement of Science. His experiments showed that animals die after living ten days to three weeks in air from which carbon dioxide and rare gases, helium, argon, krypton, etc. are removed.

Prof. Hershey predicted that helium atmosphere would be used in fighting diseases just as oxygen atmospheres are now utilized in treating pneumonia. Large factories and office buildings supplied with synthetic atmospheres in which oxygen is mixed with helium instead of nitrogen are also foreseen by Prof. Hershey as a result of his tests.

Science News Letter, January 9, 1932

PSYCHOLOGY

Grade School Children Write Better Than Adults

ADULTS write 350 per cent. worse than do the children in elementary school, Dr. T. Ernest Newland, of Bucknell University, said in a report to the American Association for the Advancement of Science. High school students can write more legibly than their elders, but their writing is 136 per cent. more illegible than that of the elementary pupils.

These rather surprising conclusions come as a result of the analysis of illegibilities occurring in 341,315 words contained in compositions and letters written by 2,381 different persons.

Only four types of difficulties accounted for more than one half of all the 42,284 illegibilities recorded. These were failure to close letters, closing strokes that should be looped, looping strokes that should be straight and closed, and using straight up-strokes in place of rounded letters. Four letters, a, e, r, and t, contributed more than 45 per cent. of the illegibilities.

Science News Letter, January 9, 1932

CE FIELDS

ARCHAEOLOGY

Illinois Stone Axes May Be 4000 Years Old

THE ANCIENT HISTORY of Illinois may be pushed back to 2000 B. C., if a chance archaeological discovery by highway workmen proves the good clue that it appears to be, Prof. A. R. Kelly of the University of Illinois has stated.

Workmen excavating a culvert near Henry, Ill., dug up two flint axes and an arrowhead, the leg bone of a deer, and some ashes and charcoal, all buried nine feet deep, Dr. Kelly said. The discoverers casually carried off the relics, and so disturbed the site that scientists can not be sure of its significance. But Dr. Kelly and Dr. George Eckbau, of the State Geological Survey, examined the road cut and reported that the soil under which the relics lay buried appears to be a deposit some four thousand years old.

Scientific excavations in the Illinois valley near the site will be rushed in the hope of further discoveries, particularly in the gravel and sand pits of the bluff which are known to belong to the Pleistocene Age of geological history, Dr. Kelly stated.

Science News Letter, January 9, 1932

PHYSIOLOGY

Shape of Infant's Body Determined by Diet

BABIES who are poorly fed not only grow more slowly than well-fed infants, but take on different bodily proportions. This new importance ascribed to infant diet was stressed in a report by Dr. Harry Bakwin, of New York City, to the American Association for the Advancement of Science.

Dr. Bakwin told how he watched two groups of New York babies through their first year of life. One group of babies lived in homes of moderate income, where the best infant diet was provided. The other group of babies were born into poverty stricken homes, which could not provide so well for the children.

At the end of the year, Dr. Bakwin found that the ill-fed babies in poor homes were acquiring a narrower bodily frame. Their faces had not widened, nor had their shoulders and chests and hips broadened to the extent that the well-fed babies had "filled out."

Dr. Bakwin stated, "An intensive campaign is now being carried on to supply proper dietary treatment to a group of infants in a poverty district of the city in an attempt to bring the growth up to the level set by the more prosperous group."

Dr. Bakwin also told of recording the growth progress of sick babies as compared with healthy babies, and of his finding that diseases affect the baby's bodily dimensions. Different diseases have different effects, the physician reported.

Infants with acute intestinal intoxication were smaller in their dimensions than healthy babies, he stated. On the other hand, infants with eczema and tetany show wider faces, broader shoulders, larger chests, and wider hips than do healthy infants.

Science News Letter, January 9, 1932

ANTHROPOLOGY

Women Have Long Faces, But Men's Are Deeper

THE FEMININE face is longer and shallower than that of the male, a communication from Dr. Milo Hellman, research associate of the American Museum of Natural History, New York, has informed the anthropologists at the American Association for the Advancement of Science. But Dr. Hellman's paper, read by Dr. W. K. Gregory of the same museum, hastened to explain that the argument that ladies are more fashionable and are wearing long faces in keeping with the present depression is not true because his measurements were made over a period of seven years before the depression.

Nor do the relatively deeper faces of men have any connection with the idea that "beauty is only skin deep" because, Dr. Hellman explained, beauty now is entirely on the surface, cosmetically. Males have relatively broader jaws, more prominent chins and longer noses than females, Dr. Hellman's measurements on all ages from birth to 22 years showed. But jaws of girls grow to protrude more from the age of eight on, than those of boys.

The largest dimension of the human face from birth to maturity is its width, but as the face grows larger it becomes longer and deeper.

Science News Letter, January 9, 1932

PSYCHOLOGY

Hypnotized Person Responds To Pin Prick Not Felt

WHEN the anesthetized left arm of a person under the influence of hypnotism is pricked with a needle, a response will be shown in a psychogalvanometer if it is attached to the right arm. This shows that, although the hypnotized person feels no pain in the anesthetized arm, his nerve pathways are still intact, Dr. Roy M. Dorcus of the Psychological Laboratory of the Johns Hopkins University has reported to the American Association for the Advancement of Science.

Dr. Dorcus found a similar response when the hypnotized person was told that he could not hear and then a pistol was fired in the room. The hypnotized subject was not conscious of any sound, but the psychogalvanometer showed it up just the same.

These findings were made in the course of a series of experiments designed to show whether in dissociation, hypnotically induced, there is a blocking in the nerves, and if so at what level of the system this blocking occurs. This was to test an accepted theory that in such dissociation a neural pathway or several of them somehow become separated from the other neural pathways of the total system, and that this cutting off is central.

Science News Letter, January 9, 1932

ZOOLOGY

Hibernating Lizards Do Practically No Breathinig

HARD WINTERS never bother Texas horned lizards. Like a lot of other animals, they sleep right through them, thus saving a lot of hustling for food; and it has now been discovered that they even economize on breath to the extent of 95 per cent.

In a report to the American Society of Zoologists, Dr. George E. Potter and H. Bentley Glass, of Baylor University, reported the outcome of observations on the respiration of hibernating horned lizards kept in closed glass vessels where their breath could be measured. They found that their oxygen intake dropped to about five per cent. of the normal summer figure, and that the carbon dioxide given off was only about six per cent. of what it was while the animals were active.

Science News Letter, January 9, 1932

PHYSICS

Heat of the Spectrum

"A Classic of Science"

While Studying Light for Telescopic Observation, Herschel Found that Radiant Heat is Invisible Light

Investigation of the Powers of the prismatic Colours to heat and illuminate Objects; with Remarks, that prove the different Refrangibility of radiant Heat. To which is added, an Inquiry into the Method of viewing the Sun advantageously, with Telescopes of large Apertures and high magnifying Powers. By William Herschel. In Philosophical Transactions of the Royal Society, Vol. 90. *London,* 1800.

Read March 27, 1800

IT IS sometimes of great use in natural philosophy, to doubt of things that are commonly taken for granted; especially as the means of resolving any doubt, when once it is entertained, are often within our reach. We may therefore say, that any experiment which leads us to investigate the truth of what was before admitted upon trust, may become of great utility to natural knowledge. Thus, for instance, when we see the effect of the condensation of the sun's rays in the focus of a burning lens, it seems to be natural to suppose, that every one of the united rays contributes its proportional share to the intensity of the heat which is produced; and we should probably think it highly absurd, if it were asserted that many of them had but little concern in the combustion, or vitrification, which follows, when an object is put into that focus. It will therefore not be amiss to mention what gave rise to a surmise, that the power of heating and illuminating objects, might not be equally distributed among the variously coloured rays.

In a variety of experiments I have occasionally made, relating to the method of viewing the sun, with large telescopes, to the best advantage, I used various combinations of differently-coloured darkening glasses. What appeared remarkable was, that when I used some of them, I felt a sensation of heat, though I had but little light; while others gave me much light, with scarce any sensation of heat. Now, as in these different combinations the sun's image was also differently coloured, it occurred to me, that the prismatic rays might have the power of heating bodies very unequally distributed among them; and, as I judged it right in this respect to entertain a doubt, it appeared equally proper to admit the same with regard to light. If certain colours should be more apt to occasion heat, others might, on the contrary, be more fit for vision, by possessing a superior illuminating power. At all events, it would be proper to recur to experiments for a decision.

Experiments on the heating Power of Coloured Rays

I fixed a piece of pasteboard, AB, in a frame, mounted upon a stand, CD, and moveable upon two centres. In the pasteboard, I cut an opening, *mn,* a little larger than the ball of a thermometer, and of a sufficient length to let the whole extent of one of the prismatic colours pass through. I then placed three thermometers upon small inclined planes, EF: their balls were blacked with japan ink. That of No. 1 was rather too large for great sensibility. No. 2 and 3 were two excellent thermometers, which my highly esteemed friend Dr. Wilson, late professor of astronomy at Glagow, had lent me for the purpose: their balls being very small, made them of exquisite sensibility. The scales of all were properly disengaged from the balls.

I now placed the stand, with the framed pasteboard and the thermometers, upon a small plain board, GH; that I might be at liberty to move the whole apparatus together, without deranging the relative situation of the different parts.

This being done, I set a prism, moveable on its axis, into the upper part of an open window, at right angles to the solar ray, and turned it about till its refracted coloured spectrum became stationary, upon a table placed at a proper distance from the window.

The board containing the apparatus was now put on the table, and set in such a manner as to let the rays of one colour pass through the opening in the pasteboard. The moveable frame was then adjusted to be perpendicular to the rays coming from the prism; and the inclined planes carrying the three thermometers, with their balls arranged in a line, were set so near the opening, that any one of them might easily be advanced far enough to receive the irradiation of the colour which passed through the opening, while the rest remained close by, under the shade of the pasteboard.

By repeated trials, I found that Dr. Wilson's No. 2 and mine, always agreed in shewing the temperature of the place where I examined them, when the change was not very sudden; but that mine would require ten minutes to take a change, which the other would shew in five. No. 3 never differed much from No. 2.

1*st Experiment.* Having arranged the three thermometers in the place prepared for the experiment, I waited till they were stationary. Then, advancing No. 1 to the red rays, and leaving the other two close by, in the shade, I marked down what they shewed, at different times.

No. 1.	No. 2.	No. 3.
43½	43½	43¼
48	43½	43½
49½	43¼	43¼
49¾	43¼	43¼
50	43¼	43¼

This, in about 8 or 10 minutes, gave 6¾ degrees, for the rising produced in my thermometer, by the red rays, compared to the two standard thermometers.

2*nd Experiment.* As soon as my thermometer was restored to the temperature of the room, which I hastened,

Dr. Franz Boas

studied the civilization of the Central Eskimo. His description of their domestic life is the next

CLASSIC OF SCIENCE

by applying it to a large piece of metal that had been kept in the same place, I exposed it again to the red rays, and registered its march, along with No. 2 as a standard, which was as follows.

No. 1.	No. 2
45	45
48	45
51	45
51	44½
51	44

Hence, in 10 minutes, the red rays made the thermometer rise 7 degrees.

3*d Experiment.* Proceeding in the same manner as before, in the green rays I had,

No. 1.	No. 2
43	43
45½	43
46	43
46	42¾
46	42¾

Therefore, in ten minutes, the green rays occasioned a rise of 3¼ degrees.

4*th Experiment.* I now exposed my thermometer to the violet rays, and compared it with No. 2.

No. 1.	No. 2.
44	44
44	44
44¾	43½
45	43

Here we have a rising of 2 degrees, in ten minutes, for the violet rays.

5*th Experiment.* I now exposed Dr. Wilson's thermometer No. 2 to the red rays, and compared its progress with No. 3.

No. 2.	No. 3.
44	44
46	44
46½	43¾
46½	43¾

Here the thermometer, exposed to red, rose in five minutes 2¾ degrees.

6*th Experiment.* In red rays again.

No. 2.	No. 3.
44	44
46	44
46½	43½
47	43½
47	43

And here the thermometer, exposed to red, rose in five minutes 4 degrees.

7*th Experiment.* In green rays.

No. 2.	No. 3.
43½	43½
44½	43½
44½	43

This made the thermometer rise, in the green rays, 1½ degree.

8*th Experiment.* Again in green rays.

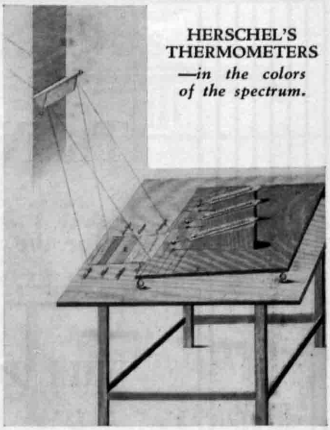
No. 2.	No. 3.
43	43
44½	42¾
44¾	42¾

Here the rising, by the green rays, was 2 degrees. . . .

I might now proceed to my next subject; but it may be pardonable if I digress for a moment, and remark, that the foregoing researches ought to lead us on to others. May not the chemical properties of the prismatic colours be as different as those which relate to light and heat? Adequate methods for an investigation of them may easily be found; and we cannot too minutely enter into an analysis of light, which is the most subtle of all the active principles that are concerned in the mechanism of the operations of nature. A better acquaintance with it may enable us to account for various facts that fall under our daily observation, but which have hitherto remained unexplained. If the power of heating, as we now see, be chiefly lodged in the red-making rays, it accounts for the comfortable warmth that is thrown out from a fire, when it is in the state of a red glow; and for the heat which is given by charcoal, coke, and balls of small-coal mixed up with clay, used in hot-houses; all which, it is well known, throw out red light. It also explains the reason why the yellow, green, blue, and purple flames of burning spirits mixed with salt, occasion so little heat that a hand is not materially injured, when passed through their coruscations. If the chemical properties of colours also, when ascertained, should be such that an acid principle, for instance, which has been ascribed to light in general, on account of its changing the complexion of various substances exposed to it, may reside only in one of the colours, while others may prove to be differently invested, it will follow, that bodies may be variously affected by light, according as they imbibe and retain, or transmit and reflect, the different colours of which it is composed.

Radiant Heat is of different Refrangibility

I must now remark, that my foregoing experiments ascertain beyond a doubt, that radiant heat, as well as light, whether they be the same or different agents, is not only refrangible, but is also subject to the laws of the dispersion arising from its different refrangibility; and, as this subject is new, I may be permitted to dwell a few moments upon it. The prism refracts radiant heat, so as to separate that which is less efficacious, from that which is more so. The whole quantity of radiant heat contained in a sun-beam, if this different refrangibility did not exist, must inevitably fall uniformly on a space equal



HERSCHEL'S THERMOMETERS *—in the colors of the spectrum.*

to the area of the prism; and, if radiant heat were not refrangible at all, it would fall upon an equal space, in the place where the shadow of the prism, when covered, may be seen. But, neither of these events taking place, it is evident that radiant heat is subject to the laws of refraction, and also to those of the different refrangibility of light. May not this lead us to surmise, that radiant heat consists of particles of light of a certain range of momenta, and which range may extend a little farther, on each side of refrangibility, than that of light? We have shewn, that in a gradual exposure of the thermometer to the rays of the prismatic spectrum, beginning from the violet, we come to the maximum of light, long before we come to that of heat, which lies at the other extreme. By several experiments, which time will not allow me now to report, it appears that the maximum of illumination has little more than half the heat of the full red rays; and, from other experiments, I likewise conclude, that the full red falls still short of the maximum of heat; which perhaps lies even a little beyond visible refraction. In this case, radiant heat will at least partly, if not chiefly, consist, if I may be permitted the expression, of invisible light; that is to say, of rays coming from the sun, that have such a momentum as to be unfit for vision. And, admitting, as is highly probable, that the organs of sight are only adapted to receive impressions from particles of a certain momentum, it explains why the maximum of illumination should be in the middle of the refrangible rays; as those which have greater or less momenta, are likely to become equally unfit for impressions of sight. Whereas,

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in radiant heat, there may be no such limitation to the momentum of its particles. From the powerful effects of a burning lens, however, we gather the information, that the momentum of terrestrial radiant heat is not likely to exceed that of the sun; and that, consequently, the refrangibility of *calorific* rays cannot extend much beyond that of *colourific* light. Hence we may also infer, that the invisible heat of red-hot iron, gradually cooled till it ceases to shine, has the momentum of the invisible rays which, in the solar spectrum viewed by day-light, go to the confines of red; and this will afford an easy solution of the reflection of invisible heat by concave mirrors.

Science News Letter, January 9, 1932

ANTHROPOLOGY

Scientific Theory Upset By Hairs of 300 Arabs

SCIENTIFIC conclusions as to the differences between hair of the white, Negro, and Mongoloid races, may have to be revised, it appears from a report on a study of the hair of 300 Arabs which was made to the American Association for the Advancement of Science.

The new discoveries were reported by Mildred Trotter of the department of anatomy at Washington University, St. Louis. Samples of Arab hair which she has examined were collected by Henry Field, anthropologist of the Field Museum.

Placing the shafts of Arab hair under a microscope, Miss Trotter found that their shape was inclined to flatness. Yet these Arab hairs were not wavy or kinky as flat-shaped hair ordinarily is. Previous studies of the hair of different races had shown Negro hair to be flattest, hair of the white race intermediate in shape, and the straight hair of the Mongoloid race to be round. Finding that Arab hair does not fit into this scheme indicates that the racial rule has exceptions.

Miss Trotter also found some Arab hair samples flatter than others, and the flatter the hair shaft the heavier it was in weight. This is contrary to the rule established for the races. In previous studies, flatter hair was lighter in weight.

The traits shown in Arab hair indicate a need for further investigation of the subject, the speaker stated.

Science News Letter, January 9, 1932

ARCHAEOLOGY

Sunken Pleasure Boats Reveal Mechanical Skill of Romans

Draining of Lake Nemi Produces Evidence that Devices Such as Ball Bearings and Stop Cocks Are not New

BY PUMPING water out of Lake Nemi and uncovering the two sunken pleasure boats of the Emperor Caligula, archaeologists have not gained the hoped-for Roman art treasures, but they have found something perhaps even more important. These two big ships, 1900 years old, are a revelation that the Romans had an astonishing knowledge of mechanics and physics, such as the modern world has but lately acquired.

Evidence that the Romans knew the principle of ball bearings, that they had stop cocks to control the flow of water, that they used alloys of steel presumably invented by modern metallurgy, was given before the Archaeological Institute of America by Prof. Kenneth Scott of Western Reserve University.

The principle of ball bearings was first patented in the year 1906, Prof. Scott stated. Yet on one of Caligula's galleys are wooden surfaces revolving on bronze discs. These reduce friction to a minimum and give a great facility of displacement. The principle is that of ball bearings.

"Perhaps one of the most striking finds," he continued, "is a large stop cock for controlling the flow of water. It is a conical key plug of bronze with the surface of the seat and of the valve perfectly adjusted to hold the water.

"It was not fashioned by use of a file, but was made with a turning lathe, executed by very skillful mechanics, and with large, speedy, and stout machines. The bronze box was turned conically on the inside with a point which operated beyond the visible control of the mechanic and was therefore guided by him only by calculation and with metrical tables in the same way in which motor cylinders are bored out. The work was done with a very hard sharpened metal tool and with non-oxydizing bronze for the piece—with alloys of metals which we had considered as invented by our own metallurgy."

The Romans even invented a modern form of anchor, Prof. Scott showed. In the galley was an iron anchor about thirteen feet long. It was hammered from a big block of iron and furnished with a mobile shaft, which would more easily bring it alongside the hull.

"This is precisely what is called today the 'Admiralty Anchor,'" said the speaker. "It is so named because in 1852 the English Admiralty had an anchor of this type."

How much knowledge of ship construction was lost in the Middle Ages is shown by the fact that the so-called gigantic ships of the sixteenth and seventeenth centuries were not so large as the Roman galleys at Lake Nemi.

The mechanical and physical knowledge of the Romans, now revealed by Caligula's yachts, has not been made clear in excavations of Roman towns, such as Pompeii, because the contrivances on the ships were not the sort of thing needed in houses or temples.

TASTES LIKE CHICKEN

Visitors in the tropics get a good scare when their first iguana drops out of a tree at their feet. They get a second dose of astonishment immediately thereafter, when they see a scramble of natives fall pell-mell on the scuttling reptile; grabbing for it as though it were a great prize. Which it is. In spite of its unprepossessing appearance, iguana is good eating. The dark peoples who live in Caribbean countries prize its flesh quite as highly as the Negroes of our own South prize 'possum. And Nordic travellers who have overcome their repugnance to "eating lizard" are inclined to agree with them.

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EVOLUTION

Discovery Shows Darwinian Evolution Governed by Law

"Kinetic Theory of Species" Proves Fight for Existence Results in an Orderly Progress with Predictable Outcome

THE LAW of evolution which governs the rise of different kinds of plants and animals has been announced by Dr. W. H. Longley of Goucher College, Baltimore, in a report to the American Association for the Advancement of Science. His discovery that law governs the stupendous phenomenon of Darwinian evolution came as the result of several years of statistical research and years of observations of marine life.

Fitting naturally into a series of laws well known to science, Dr. Longley's new mathematical statement of evolution rules the growth of living organisms just as statistical relations in physics govern the action of gases.

By this new formulation Darwin's "struggle for existence" is proved to result in an orderly progress whose outcome is as predictable as what will happen when steam is let into an engine cylinder.

"We know the law of evolution as well as we do the laws of falling bodies," said Dr. Longley, explaining that the law of evolution can be expressed by a mathematical equation or plotted as a curve which looks like the sweep of a railroad track changing direction at right angles.

Laborious counts of thousands of species or kinds of bats, reptiles, cacti and other great classes of living things allowed the derivation and testing of Dr. Longley's "kinetic theory of species." In formulating the law, the scientist, who serves during the summer as executive officer of the Tortugas, Fla., Marine Biological Laboratory of the Carnegie Institution of Washington, analyzed great masses of statistics on the number of species in various genera, the geographical distribution of species in the genera of both many and few species, the dates of discovery and naming of species. Dr. Longley bases his work on the idea that the factors involved in evolution and the way they have worked together may be inferred from the number and distribution of the species which are made in the process.

The evolution law, Dr. Longley explained, belongs to a family of laws in which the simplest group are the gas laws of physics. In ordinary gases the molecules are active bodies, acting upon one another by chance, but they are incapable of reproducing or changing.

If the gases are glowing or "excited" then another law is needed. The units in excited gases have variability added to the properties of simple gases.

The curve of evolution is also related to the laws of population growth, in which the units are living things, acting upon one another, capable of self-perpetuation but assumed to be non-variable. One law of population growth was developed by Dr. Raymond Pearl and associates of Johns Hopkins University during the past decade. This shows that great masses of organisms, whether people of the United States, yeast in a dish or fruit flies in a bottle, increase their numbers rapidly when their numbers are small but multiply more slowly as the population grows larger, finally reaching stagnation.

The most complex of this family of laws is Dr. Longley's newly discovered law of evolution. It deals with population of populations. It is the law of growth of genera. It is the necessary outcome of interplay of the units of a particular sort of kinetic system. It is a "glorified gas law."

Darwin's hypothesis of evolution by natural selection is confirmed by the mathematical statement of evolution developed by Dr. Longley. It supports Darwin's origin of species and puts into statistical form the fundamental law that has so influenced human thought since its enunciation by Darwin in 1859.

Science News Letter, January 9, 1932

PHYSIOLOGY

Gland Extract May Be Essential to All Tissues

THE EXTRACT of the adrenal cortex glands may be a hormone necessary for the proper functioning of all the tissues of the body, Prof. Frank A. Hartman of the University of Buffalo has announced to the American Association for the Advancement of Science.

This extract, called cortin by Prof. Hartman, has been used in the past to rescue from the brink of the grave sufferers from Addison's disease. Now Prof. Hartman has evidence that cortin is resistant to disease toxins and necessary to normal growth, kidney functions and other bodily mechanisms.

Science News Letter, January 9, 1932

CHEMISTRY

Vitamin Prepared Chemically For First Time in History

A VITAMIN has been manufactured in the laboratory by strictly chemical methods for the first time in history, Drs. Charles E. Bills and Francis G. McDonald of the Mead, Johnson & Co. Research Laboratories, Evansville, Ind., have reported to the American Association for the Advancement of Science.

They synthesized vitamin D, the so-called sunshine vitamin, by treating ergosterol with nitrogen monoxide gas and obtained the potent vitamin without the use of ultraviolet radiation. At present vitamin D is made by shining ultraviolet light on ergosterol, whereas before the relationship between vitamin D and sunshine was discovered five years ago, children had to take cod liver oil to obtain vitamin D that prevents rickets.

The synthesis of the vitamin is carried out in solution with methyl alcohol, ether and ethyl acetate at low temperature and with rigid exclusion of oxygen.

An extremely pure non-crystalline preparation of vitamin D was described by Drs. Bills and McDonald. In company with four European laboratories, the American scientists have also produced crystalline vitamin D. The purest of these substances is claimed to be the most potent drug known.

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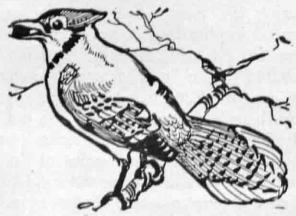
ORNITHOLOGY

Nature Ramblings

By FRANK THONE



A Roughneck in Fine Feathers

WITH the summer birds pretty completely gone, we are turning to the permanent, year-round boarders for such consolation as they can give us. It takes a hardy bird to stand a northern winter; no wonder then if some of these hardy fellows turn out to be a bit tough.

Of such is the tribe of the bluejay. He is a roughneck in fine feathers, a roystering, blustering, obstreperous gangster in clothes that are well-tailored but "swell" rather than elegant. You can't help liking the fellow after a fashion, just as you can't help admitting that some of our modern city bandits have a picturesque and even a rather engaging side to their lamentably shady characters.

But it can never be forgotten that for all his fine feathers the bluejay is a roughneck still, a robber and a thug with innocent blood on his beak. The same bird that flashes brilliantly around your charitable lump of suet during the coming winter, last summer got his animal food partly by raiding the nests of smaller birds and spearing their eggs and swallowing their unfledged offspring. Not so attractive a picture, that. It is for this reason that in many places the protection of the law is withheld from the jay, and it is accounted something of an act of virtue to waylay and kill him.

Yet even in performing such an act of justice we must be assailed with doubts. When we think of him in connection with other birds we must condemn him as a murderer, but when we think of him in connection with grasshoppers he almost appears as a policeman. But no sooner does he begin to acquire a little virtue in this way than we catch him in an orchard as a thief.

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CHEMISTRY

Powerful Explosive Made Out of Wet Natural Gas

A POWERFUL new explosive made from wet natural gas has been developed by Robert G. Wulff, industrial chemist of Los Angeles. The new product consists of a mixture of sodium chlorate with liquid butane, two ingredients of very low cost. It is claimed that the explosive is intermediate in shattering proclivities between dynamite and the slower-acting black powder.

Butane is a simple compound of carbon and hydrogen. It is an extremely volatile liquid, cheaply extracted from wet natural gas by compression over oil. Boiling at the low figure of 33 degrees Fahrenheit, it can normally be preserved only in tanks under a slight pressure.

Uses Standard Apparatus

Mr. Wulff prepares a simple cartridge of crystalline sodium chlorate which he soaks thoroughly in butane. He then has a few minutes' time before the butane would escape during which he can detonate the charge with standard electrical apparatus. The sodium chlorate, containing a very high percentage of active oxygen, burns the butane with explosive violence. If there be an hour or more delay before the cap be fired, the chlorate charge becomes harmless, since the butane has all boiled away spontaneously.

Mixtures of chlorate with combustible matter have often been tried as industrial explosives, and have served to amuse incautious high school chemistry pupils. Unfortunately they have proved treacherous, due to the instability of the chlorates and consequent danger of premature explosion. When butane is used as the combustible, a partial evaporation of the added liquid instantly chills the chlorate cartridge to a temperature below freezing. At such low temperature the material is stable, and hangs together safely until the attendant chooses to press the button.

The new explosive appeals strongly to the blasting operative who occasionally notes that one of his blasting charges did not go off according to program. If dynamite is used in such a case the workman confronts the danger of bumping into the unexploded charge as he returns to work. With butane-chlorate he need only stay away for an hour, or better over night, and the danger literally evaporates. The residual chlorate is entirely harmless.

Since the butane and chlorate are stored in separate containers, transportation hazard is eliminated. Neither chemical alone will explode on any pretext.

The product is suggestive of the mixture of liquid oxygen and charcoal offered some years ago as a safety explosive. The charcoal formula involves an expensive liquid ingredient, however.

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• First Glances at New Books

Transport

THE ROMANCE OF TRANSPORT—Ellison Hawks—*Crowell,* 333 p., $3. The story of how people and things are shifted about on the face of this globe from the days of the savage to the present era of airships and airplanes is told in this volume of British origin. Its eighteen chapters are well illustrated.

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Chemistry

COLLOID CHEMISTRY, VOL. 3, By selected international contributors,—Edited by Jerome Alexander—*Chemical Catalogue,* 655 p., $10.50. The third volume of this admirable text, now appearing, is a series of 42 papers by as many different authors on technological applications of colloid chemistry. The book is of just as much interest as the earlier ones, for as the editor remarks: "Scientists must consider the existence of a long standing practice as presumptive evidence that there is something valuable in or about it, and that exploration in that neighborhood, with impartial separation of gangue, should yield some nuggets of truth."

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Entomology

INSECTS AND THEIR CONTROL—Andrew Wilson—*Interstate Printing Corporation, Plainfield, N. J.,* 383 p., $2.50. A practical discussion of the control of some insect pests, the treatment being organized according to host plants. The list of the latter is somewhat patchy and unsystematic. The author moreover utilizes the text to recommend for use patented spray materials of his own manufacture.

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Chemistry

PHYSICAL CHEMISTRY, L. J. Gillespie—*McGraw-Hill,* 287 p., $2.75. This book gives a good introduction to those parts of physical chemistry of most interest to biologists, particularly to those who intend to go into research. Few topics require a knowledge of the calculus, though it is desirable. Modern atomic theory, crystal structure and photochemistry are omitted.

Science News Letter, January 9, 1932

Entomology

MORPHOLOGY OF THE INSECT ABDOMEN—R. E. Snodgrass—*Smithsonian Institution,* 128 p. A thorough treatise on an important phase of insect anatomy, by an author who has been contributing much to this branch of entomology.

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Ethnozoology

THE ELEPHANT LORE OF THE HINDUS—Franklin Edgerton—*Yale University Press,* 129 p., $2. The peoples of India have known the elephant for ages, have lived and worked with him, talked and written about him. In this little book, which consists wholly of translations from the Sanskrit, some of their ancient lore is for the first time made available in English.

Science News Letter, January 9, 1932

Botany

TREES IN WINTER—A. F. Blakeslee and C. D. Jarvis—*Macmillan,* 292 p., $2. An abridged edition of this very well-known book which contains good illustrations.

Science News Letter, January 9, 1932

Botany

A TEXTBOOK OF BOTANY. VOLUME III: ECOLOGY—Henry C. Cowles. Revised and enlarged by George D. Fuller—*American Book Company,* 499 p., $2.80. A short time ago, botanists everywhere welcomed the appearance of the two first volumes of the revised "Chicago Text." Now they rejoice again at the coming of the completing volume. Prof. Cowles has reason to be proud of the job his one-time pupil and present colleague has made of the revision of his part of the famous botanical trilogy.

Science News Letter, January 9, 1932

Entomology

A CATALOGUE OF THE TROMBICULINAE, OR CHIGGER MITES, OF THE NEW WORLD WITH NEW GENERA AND SPECIES AND A KEY TO THE GENERA—H. E. Ewing—*Smithsonian Institution,* 19 p., 3 pl. free. Though of interest primarily to systematic entomologists, this pamphlet will interest the average citizen at least to the extent of letting him know how many different kinds of these little misery-causing pests there are in America.

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Botany

THE RUBIACEAE OF VENEZUELA—Paul C. Standley—*Field Museum,* 142 p., 75c. Of interest to taxonomic botanists.

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Physics

THE NEW CONCEPTION OF MATTER—C. G. Darwin—*Macmillan,* 222 p., $3. The layman has been mystified during the past year or two by paradoxical implications of the latest revolution in physical thought, largely attributed to the "new quantum mechanics" or "wave mechanics." Popularizers have been so busy informing the public of the very latest developments and stimulating readers to a series of "ohs" and "ahs" that they have not explained what the new quantum theory is really all about. Prof. Darwin has realized that there are still some people who want to know the "whys and wherefores" of the new physics and are able to digest plain statements of fact. The present book, originally delivered as a series of Lowell lectures and as popular science in the best tradition of Faraday and Tyndall, is the result. Among other things, the new theories explain how apparently solid particles like the electron of the atom nucleus may behave like a train of waves.

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General Science

OUR SURROUNDINGS—A. G. Clement, M. C. Collister and E. L. Thurston—*Iroquois Publishing Co., Syracuse, N. Y.,* 628 p., $1.68. An elementary general science textbook in its second edition.

Science News Letter, January 9, 1932

Archaeology

THE ORIENTAL INSTITUTE OF THE UNIVERSITY OF CHICAGO, 68 p., 25c. In commemoration of the dedication of the new building of the Institute, a third edition of this handbook, completely revised, has been issued.

Science News Letter, January 9, 1932

Entomology

MANUAL FOR THE STUDY OF INSECTS—J. H. Comstock, A. B. Comstock and Glenn W. Herrick—*Comstock Publishing Co.,* 401 p., $4. Comstock's Manual needs no introduction: a whole generation of entomologists have been brought up on it. Since it first appeared, however, many new facts about insects have been discovered and many old names of insects have been discarded. This revision, carried out by one of the Comstocks' early pupils, makes this veteran text available again as a modern book.

Science News Letter, January 9, 1932