SCIENCE NEWS

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THE SPEED OF A NEBULA

THE fastest known motion in the universe has been found at Pasadena, Calif., in a spiral nebula that appears to be moving away from the earth with a speed of 2,348 miles every second. This has been determined by Dr. Milton L. Humason, of the Mount Wilson Observatory, with the aid of photographs of the body's spectrum made with the 100-inch telescope, largest in the world. The nebula can only be observed with the aid of a large telescope, and is known as N. G. C. 7619, its number in the new general catalog of such objects.

Dr. Humason's work has also shown that the nebula is at the vast distance of about 25 million light years, so far away that the light from it which affects the astronomer's photographic plate now has been traveling for the last 25 million years. Every second light travels 186,000 miles and every year about 6 trillion miles.

The method used for measuring the motion of the nebula depends on the wave-like properties of light. When a ringing bell, as on a train or fire-engine, is moving rapidly towards a person, the bell sounds of a higher pitch than when it is standing still or rapidly moving away. It is due to the fact that when the bell is coming closer the sound-waves are pressed together and the result is the same as if the waves were shorter in length. In the case of the receding bell, the waves are spread out and seem longer. The longer the sound-waves the deeper the pitch, and the shorter the waves the higher the pitch.

A similar effect is observed with light. When the light from a star that is rapidly moving from the earth is examined with the spectroscope, which analyzes light, it is also found to be of a lower pitch, or more reddish, than from the same star if it remained at the same distance from the earth. This is shown up by a slight displacement of the dark lines crossing the star's spectrum. A shifting of the lines from their proper places towards the red end indicates that the star is receding, and a shift to the blue that it is approaching.

In the case of the nebula N. G. C. 7619, Dr. Humason found that the lines showed a marked shift to the red. This shift was as much as would be caused by a motion away from the earth at a speed of 3,779 kilometers, or about 2,348 miles, every second.

That it may not be a true motion of the nebula with respect to the earth, however, is shown by the researches of Dr. Edwin P. Hubble, one of Dr. Humason's colleagues. It was Dr. Hubble who first proved that the spiral nebulae are independent systems of stars, like the Milky Way system of which our own sun, as well as all the stars we see in the sky, is part. He has measured the distances of more than twenty of these nebulae, and found their motions. The farther away they are, the more rapidly they seem to be moving. All are moving away from the earth, for the spectral lines of all of them are displaced to the red. Dr. Hubble has not measured the distance of N. G. C. 7619, but judging by the relation between distance and apparent motion, it is about 25 million light years from us. Its apparent motion is the fastest of any known nebula, taking the speed record away from N. G. C. 584, which Dr. V. M. Slipher, of the Lowell Observatory, at Flagstaff, Arizona, found to be receding at the rate of 1,118 miles a second.

At least part of the great apparent speed may be due to the structure of space itself, as suggested by the Dutch physicist De Sitter. Like Einstein, he has suggested that space is curved, something like the surface of a sphere, and according to his views vast distances would cause an apparent slowing down of the light vibrations, or lengthening of the waves. He also supposes that there is a definite tendency of material bodies to scatter in space, which would also partly account for the great motions.

TYPES OF PNEUMONIA

ELEVEN types of pneumonia not hitherto recognized as due to distinct forms of pneumococci, the pneumonia germ, have been discovered by Georgia Cooper, bacteriologist in the research laboratories of the New York City Department of Health, whose results have been announced by Dr. William H. Park, director of laboratories.

Dr. Park also said that specific antibacterial serums have been developed for the most usual five of these new types, although sufficient experience with them has not yet been obtained to affirm positively the apparently good results from their use in a limited number of cases.

The remaining six types constitute about three per cent. of all cases studied. Thus type III is the only important form of the disease which remains apparently resistant to antipneumococcic serum.

Dr. Park explains that "Serums which greatly improve the chances of a patient, especially when given early in cases in which the blood stream is becoming infected with pneumococci, have been developed for type I and type II.

"While we are working continuously to find a serum that will be effective in type III cases, we have not yet succeeded. In the past we have classed cases which did not fall into type I, II or III in a miscellaneous group known as group IV. We have known for some time that this group contained other distinct types which had not been classified, but it remained for Miss Cooper to classify eleven of the most important of this miscellaneous group. Those which we can not classify are now known as group XV.

"Dr. Antoinette Raia, who has conducted research in connection with children at Bellevue Hospital, has made preliminary reports which indicate the value of serum in types IV, V, VI, VII and VIII. Her work also indicates that these types are more usual with children than adults."

Polyvalent serum, or serum effective in both type I and II, has been prepared for the New York City Health Department for distribution for some time, but the attempt is now being made to prepare serum which will be ef-

fective as well for types IV, V, VI, VII and VIII. Dr. Park advises the administration of polyvalent serum at once when the clinical diagnosis indicates pneumonia.

When laboratory facilities are available, the case can be typed quickly and future administration of serum of the type indicated can be specific. Highly concentrated serum which produces only in rare instances the unfavorable effects of large doses of horse serum is now available.

While the development of antipneumococcic serum has not yet reached the stage where the results are so certain that there is any hope of virtually suppressing the disease, as has been done with smallpox, and as health authorities are now attempting to do with diphtheria, it is well past the stage of being of doubtful benefit.

Dr. Park stated that many more cases of pneumonia might now be saved if facilities for preparing the serum were adequate for the fullest usage, and if the medical profession were fully informed of the progress which has been made in the past year or two.

THE PROTOZOAN PARASITES OF MEN AND MONKEYS

FURTHER evidence that man and monkey are of common descent has been brought forward by Professor Robert Hegner, of the department of zoology of the Johns Hopkins University. In a discussion of the parasites that prey on the inner organs of the higher animals, addressed to Hopkins alumni, Professor Hegner stated that protozoa of monkeys and men are the only ones that are capable of living in the bodies of either the human or monkey species. It is a well-established principle, widely observed by scientific men, that each species of animal is afflicted by its own peculiar types of parasite. This principle is known as "host-parasite specificity."

"In very few instances," explained Professor Hegner, "are species of protozoa that live in one species of animal capable of living in another species of animal no matter how closely related the species may be. The situation as regards monkeys and men is strikingly different. . . . There are a few protozoa that occur in man that do not have representatives among monkeys and a few in monkeys that have not been reported from man, but most of the human protozoa have representatives in monkeys indistinguishable from them. This is in such striking contrast to what we know to be true of the protozoan parasites of other animals that we must conclude that a genetic relationship exists between monkeys and men. That is, that the protozoan parasites of monkeys and men have descended from protozoa that lived in the ancestors of monkeys and men and that monkeys and men had the same ancestors. Our studies of these parasites of monkeys and men add a type of evidence to that already acquired that makes even more certain than was heretofore the case that our remote ancestors were arboreal monkeys."

HAY FEVER

LITTLE grains of pollen blown on an April breeze may be the innocent cause of many sneezes from early hay fever sufferers. The season for this trying malady is now at hand and, in the opinion of medical specialists, hay fever victims should arrange to be desensitized without delay.

While pollen from summer and fall grasses and weeds causes most of the hay fever, there is an early variety due to certain trees and shrubs that blossom early. In warm climates this may be mistaken for a common cold of late winter. Rose fever is one name given to this early variety of the malady, though it is caused by many plants besides roses.

As a matter of fact, it is a protein substance in the pollen of plants that causes hay fever. Some persons get it from protein in foods, animal hair or feathers, glue, horn-rimmed glasses, and many other queer and unexpected sources. Physicians have devised a way of testing which pollen or protein is the cause of hay fever in any given person. Treatment to make the person less sensitive to the guilty substance may then be instituted. An amount of the particular protein so small that it will not cause a reaction is injected under the skin of the patient. This is done about once a week, gradually increasing the amount of protein injected, until the test shows that the patient no longer has any reaction to it.

Treatment is generally started about fifteen or sixteen weeks before the time the hay fever customarily begins. It will not help all the sufferers, but 25 per cent. can be completely relieved by desensitization and a varying number can be definitely benefited.

EGGS UNDER ULTRAVIOLET LIGHT

IT is now well known that ultra-violet rays, whether made by the sun or artificially, are good for animals, whether chickens or men. In spite of much exaggeration, some of it harmful, a host of solid facts are being applied wisely by scientists. Dr. Charles Sheard and G. M. Higgins, experimenters of the Mayo Foundation at Rochester, Minnesota, recently announced the results of experiments with irradiated hens' eggs.

They found that by the use of a quartz-mercury arc radiant energy can be transmitted through the shell and lining membrane of eggs. With eggs under normal incubation ultra-violet light caused about 20 per cent. of them to hatch out twenty-four to forty-eight hours sooner than other eggs of the same batch. The effects of sun's rays and cod-liver oil on the production and fertility of eggs have also been compared.

Recent researches by various investigators have shown that ultra-violet radiation has the property of activating substances containing ergosterol and forming vitamin D. In curing or preventing rickets, for instance, sunlight, an artificial source of ultra-violet rays, cod-liver oil, or an artificially activated oil, are effective.

Drs. Sheard and Higgins have discovered that if chickens are kept behind windows made of a quartz-containing glass enough ultra-violet light comes through to keep production and fertility of eggs at a high level. If they are kept behind ordinary glass, fertility and production falls off about half during the winter months. However, the effect of ordinary glass can be offset by adding a little

cod-liver oil to the chicken feed. Chickens which were kept and fed in this last way gave a better record of production and fertility than any of the others.

HEARING AS A HELP IN THE LABORATORY MAZE

SOUND-PROOF material used on the floor of a maze has revealed to investigators, after many years of experiments, a secret by which rats successfully learned the only correct route through the long series of complicated passages of a maze to the single exit. Thus, more light has been thrown on the psychology of animals, particularly where it is suspected that a subtle reasoning power has been exhibited on the part of the subjects.

Dr. John F. Shepard, professor of psychology at the University of Michigan, read a paper before the Michigan Academy of Science, Arts and Letters which recently held its annual convention at Ann Arbor, stating that rats which had previously learned the maze perfectly seemed utterly lost when the sound of their pattering feet on the floor of the maze was stilled by sound-proof layers.

Lengthy experiments indicated that the rats were not finding their way out of the maze by their senses of sight, smell, muscular feeling or touch. Finally, it was discovered that changing the position of the squares of asphaltic linoleum which covered the floor of the maze caused the animals to be less certain of the direction to take in finding their way. Sound-proof floors were installed, and these prevented the rats from learning the route.

Experiments now in progress will determine whether rats depend solely on their sense of hearing for guiding themselves out of a maze. Since rats are widely used by psychologists in studying such processes as learning and memory, a thorough understanding of animal reactions is particularly useful to laboratory workers.

GERMLESS ISLAND IN THE POLAR SEAS

THE northern island of Novaya Zemlya is said to be without germs. Dr. A. F. Kazansky, of the Central Geophysical Observatory at Leningrad, is responsible for the discovery. Polar explorers had may times noted the remarkable purity of polar air. Accurate tests were lacking, however. So, when Dr. Kazansky went to spend a winter at the Soviet Geophysical Station, Matochkin Shar on the lonely polar island, Novaya Zemlya, he was prepared to make the tests. The results he obtained were almost startling. Microbes were not to be found on this enchanted island. No matter what Dr. Kazansky tested—air, earth, water, dust, not a germ could be discovered. Even wild game shot by hunters was germ-free. Such exceptional purity is considered to be a record.

Many different ingenious tests were tried out in the attempt to hunt down some germs. Sterile dishes with an agar-agar jelly especially suitable for bacterial growth were left outdoors for several hours at a stretch. Then the dishes were placed in an incubator and warmed, to stimulate the germ life. In no cases were any microbe colonies found. Just for comparison it may be said that a similar dish with jelly, exposed for 15 minutes to city air, would grow over with germ colonies too numerous to count.

Another highly spectacular test conducted by Dr. Kazansky was as follows. Fresh, juicy meat in an open glass jar was left out-doors, where air, dust and rain could reach it. For eight months it was exposed to the elements. Yet when Dr. Kazansky examined the meat again, no trace of rotting was found. The meat was as fresh as when packed in the jar, almost a year before.

It is supposed that the exceptional purity of air on Novaya Zemlya may prove a great attraction to sanatoria. Many pulmonary patients being very weak and an easy prey to infection require pure fresh air. Polar sanatoria may prove to be ideal.

ITEMS

FOR the fourth time since the beginning of the year, the floor of the Pacific Ocean off the coast of Salvador shook itself on March 20, at 9:37 P. M., Eastern Standard Time, according to government earthquake experts of the U. S. Coast and Geodetic Survey. By means of data gathered from seismograph stations by *Science Service*, the center of the disturbance was located at 13 degrees north latitude and 90 degrees west longitude, about 60 miles off the Salvador coast. As shown by the recent disturbances as well as past records, this is a very active seismic region.

A TOY electric train that obeys the spoken words of its master to go, stop or back is one of the latest achievements of the General Electric Company's Research Laboratory. The locomotive is named Casey Jones. At the words, "Go ahead, Casey," the train starts. "Stop" brings it to an immediate halt, while "Back up!" causes it to do just that. The secret of operation lies in a special selector, connected through a vacuum tube to an ordinary telephone transmitter through which the orders are given. This determines the polarity of the rails in the track, and the polarity in turn determines whether the train goes forward or backwards. Three or more syllables operate the relay and the selector to provide forward movement. A two-syllable order reverses the polarity and the train, while one syllable breaks the circuit. Future applications of the device are seen in elevator controls that will respond to the spoken word, or a furnace door that will open or shut in response to spoken commands over a telephone at the bedside.

LATEST reports from persons visiting the colony of brown pelicans at Brevard Island in Mosquito Lagoon, in Florida, indicate that there are more than 2,000 nests there at the present season. These nests contained eggs and young birds in all stages, some of the young being able to swim but not fly. This indicates a marked increase in numbers over last season, and this particular colony of birds is in a flourishing condition.

CHEMISTRY, CHEMICAL INDUSTRY—Continued

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Bogert, Lotta Jean. *Fundamentals of chemistry;* a text-book for nurses and other students of applied chemistry. Second ed. 345 pp. Ill. (Saunders) $2.75.

Dubrisay, René. *Leçons sur la chimie générale.* 246 pp. (Gauthier-Villars) Paper. $2.25.

Karrer, Paul. *Lehrbuch der organischen Chemie.* pp. xxi + 884. 10 ill. (Thieme) $8.64.

Friend, J. Newton (Ed.). *Text-book of inorganic chemistry.* Vol. XI: Organometallic compounds. Part 1: Derivatives of the elements of groups I to IV by A. E. Goddard and D. Goddard. 446 pp. (Griffin) 25*s.*

Cartledge, G. H. *Introductory theoretical chemistry.* pp. xiv + 553. (Ginn) $3.60.

Rawlins, F. I. G., and **A. M. Taylor.** *Infra-red analysis of molecular structure.* pp. xv + 176. (Macmillan) $3.50.

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Badger, W. L., and **E. M. Baker.** *Inorganic chemical technology.* 227 pp. Ill. (McGraw) $2.50.

Haselhoff, E., and **E. Blanck.** *Lehrbuch der Agrikulturchemie.* (Borntraeger) $12.39.

Eynon, Lewis, and **J. Henry Lane.** *Starch. Its chemistry, technology and uses.* A handbook for the student, the analyst, the consultant and the technologist concerned in the manufacture and application of starch and starch products. 256 pp. (Simpkin) 12*s.* 6*d.*

Haworth, Walter Norman. *The constitution of sugars.* 107 pp. (Longmans) $3.40.

Von den Kohlen und den Mineralölen. Ein Jahrb. f. Chemie u. Technik d. Brennstoffe u. Mineralöle. Vol. I. 1928. pp. vii + 252. 65 ill. (Haessel) $4.08.

Ubbelohde (Ed.) *Chemie und Technologie der Öle, Fette und Wachse.* Allg. Tl. Second ed. (Ubbelohde's Handbuch. Vol. I.) (Hirzel) $18.00.

Bauer, K. H. *Die trocknenden Öle.* pp. vii + 354. 20 ill. (Monographien XI.) (Wiss. Verlagsgesellschaft) $6.48.

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Lange, Otto. *Technik der Emulsionen.* pp. viii + 391. 66 ill. (Springer) $7.06.

Voigt. *Das kolloide Silber.* (Kolloidforschung VIII) (Akademische Verlagsgesellschaft) $2.88.

Eder, Josef Marie, and **Adam Trumm.** *Die Lichtpausverfahren die Platinotypie und verschiedene Kopierverfahren ohne Silbersalze.* (Kopierverfahren mit Eisen-, Uran- u.s.w. Verbindgn.) Third ed. pp. xi + 271. (Eder, Handbuch IV, 4) (Knapp) $4.20.

Chemical engineering catalog, 1928. 13th annual ed. 1107 pp. Ill. (Chemical Cat. Co.) $10.00.

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Gaskell, Augusta. *What is life?* 324 pp. (Thomas) $3.50.

Burns, David. *An introduction to biophysics.* Second ed. 599 pp. Diagrs. (Macmillan) $7.00.

Bělar, Karl. *Die cytologischen Grundlagen der Vererbung.* pp. iv + 412. 280 ill. (Handbuch der Vererbungswissenschaft. Part 5, vol. I) (Borntraeger) Paper, $12.00; subscription price, $9.60.

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Insects of Samoa and other Samoan terrestrial Arthropoda. Part 1. Fasc. 2. Orthoptera. pp. 9 + 58. 51 figs. (British Museum) Paper. 5*s.*

Krogh, August. *Anatomie und Physiologie der Capillaren.* Second ed. Transl. by Wilhelm Feldberg. pp. ix + 353. 97 Ill. (Monographien V.) (Springer) $6.61.

Lectures on plant pathology and physiology in relation to man. 207 pp. Ill. (Saunders) $2.50.

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Adamovic, L. *Die Pflanzenwelt der Adrialänder,* umfassend Ostitalien, Istrien, d. Quarnero-Inseln, d. kroatische Küstenland, Dalmatien, Südhercegovina, Südmontenegro u. Albanien. pp. vi + 202. 31 ill. (Fischer) $2.52.

Turrill, W. B. *The plant-life of the Balkan peninsula.* A phytogeographical study. pp. xxii + 490. 10 plates. 11 maps. (Oxford) $10.00.

Blatter, Ethelbert. *Beautiful flowers of Kashmir.* Illustrated by Mrs. G. A. Wathen and Haldar Joo Wall. Vol. II. 220 pp. (Bale) 21*s.*