THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

ISSUED BY
SCIENCE SERVICE
B and 21st Streets
WASHINGTON, D. C.

EDWIN E. SLOSSON, Director
WATSON DAVIS, Managing Editor

SUBSCRIPTION: $5 A YEAR, POSTPAID

Vol. V. No. 171

Saturday, July 19, 1924

SCIENTIST TRANSPLANTS BEATING HEART INTO NEW BODY

A living, beating heart has at last been transplanted from one living body intoanother.

Into a body already supplied with a heart, Dr. P. Stohr of Wurzburg, Germany, placed a beating heart taken from another body. And he succeeded in keeping both hearts alive, functioning in the same body. Dr. Stohr has also succeeded in isolating the heart system from the organism and developing it outside the body for a considerable length of time.

The experiments were on embryo salamanders. Although there is a wide gap between salamanders and man, it is the ultimate hope of all such experiments that the same thing may eventually be accomplished in the case of man. However far the the present discovery may be from such an eventuality because of the numerous intricate problems that must first be solved, it is of great interest and import.

Dr. Stohr first attempted to confirm the findings of another scientist named Ekman who had demonstrated successfully that the undeveloped embryonic heart of salamanders is capable not only of remaining alive outside the organism but also of developing into its several parts. Stohr succeeded in the case of salamanders and tritons in seventy cases and kept hearts alive for as long as three weeks.

In other cases Stohr transplanted the heart from one embryo to another, thus producing larvae or tadpoles with two hearts each. These tadpoles successfully kept alive for a period of time long enough to show the result of an extra heart on the development of the animal. During these experiments Stohr learned several noteworthy and interesting facts. He found that the power to perform regular contractions is the inherent property of each heart cell and not a function of the nervous system or of the immediate surroundings of the heart.

He also learned that there was an extraordinary regularity of pulse beat in the excised hearts. In only five cases out of the seventy were there irregularities, and these exceptions were capable of explanation. He also noted that each heart cell or entire heart has a rhythm all its own and cannot be influenced by the rhythm of another heart in the same body. Neither heart cares what the other heart is doing. A rise of temperature causes the pulse rate of both hearts to increase but in the same proportion in each case.

In successfully implanting hearts there are three possible arrangements: 1. the new heart may send the blood stream in the same direction as the regular heart: 2, the new heart may work in the opposit direction, causing a conflict in the

circulation; 3, the heart is only joined on at one end after the manner of an appendix. It is also possible that the new heart may find no connection at all in the common blood stream and build for itself a new circulatory system.

Stohr also learned that the heart is extremely jealous of its functions. When a new heart was implanted in a body where there was already one, without being properly oriented, they got along about as well as two roosters in one barn-yard. The two hearts battled for the blood stream. If both were fortunate enough to obtain enough blood there was no danger to their existence and both developed. In most cases, however, the original heart being first on the spot gained supremacy over the new heart and the development of the latter ceased.

In some cases the new heart proved stronger and little by little destroyed the weakening heart originally there. When a new heart was first implanted in an embryo salamander it was noted that development was at first distinctly arrested on the side where the implantation was made. But after several weeks symmetrywas again established and normal development apparently occurred.

CONTAGIOUS HEALTH

By Dr. Edwin E. Slosson.

When Bob Ingersoll was lecturing on "The Mistakes of Moses" he was asked sarcastically if he thought he could do any better if he were running the universe. He replied "Yes" and when challenged to specify in what particular he could improve on the present administration, he answered that if he were the Almighty he would make health contagious instead of disease.

This, like other of his witty retorts, will not stand close scrutiny. In fact, recent researches indicate that the proposed improvement is already in existence and has been for ages. As we now know the microbes are not all enemies of man. Some are his active allies and they carry on warfare in his defense in much the same way as the disease-producing kinds do against him.

A French biologist, d'Herelle, discovered in 1917 that bacteria are preyed upon by something yet smaller than themselves; something too small to be seen with any microscope or to be filtered out from a fluid, for they will pass even through the pores of porcelain. "Bacteriophages", he calls them - "bacteria-eaters". They are so minute that it would seem that they must belong to the field of chemistry rather than biology, yet they grow and propagate and maintain a definite individuality like living creatures. They are normally present in our digestive tube and protect us by breaking down and dissolving inimical bacteria. The greater the number of the invading hosts the faster the bacteriophages multiply and the fiercer they become in fight, until finally they have overcome the infection. They may then in the flush of their victory carry their campaign into the enemy's country and cure others of the community. The sick persons who have been cured thus become carriers of the cure and centers of healing infection, so starting an epidemic of health. As d'Herelle says in his new book "Defenses of the Organism":

> "A sick animal propagates the disease. An animal in a state of active resistance propagates immunity. These few words sum up the whole history of epidemics."

Dr. d'Herelle may be over-sanguine in thinking that he has seized the whole secret of epidemics, but his discoveries are in line with the modern methods of medical practice, which is to enlist the aid of bacteria in our defense aginst bacteria and to promote civil war in the Kingdom of the Protozoa. We have already in our midst an army of defenders in the form of white corpuscles of the blood and these may be multiplied and encouraged to greater exertions by medical means. We may counteract a toxin with an antitoxin. We may, as Metchinkoff advised, colonize the colon with the benign bacteria that produce lactic acid, in place of those that produce poisons. We may infest parasites with minor parasites. We may set the ultramicrobe to catch the microbe.

In this way we may hope to stave off the day when we shall fall victim to the innumerable hosts of invisible foes that continually beset us, though so far they have in the end come out conquerors in every case. "A bacillus less than one five-thousandths of an inch in length, multiplies, under normal conditions, at a rate that would cause the offspring of a single individual to fill the ocean to the depth of a mile in five days." The cholera bacillus doubles in nubers every twenty minutes. How can a clumsy creature like man, who requires twenty years to grow up, ever hope to compete with such a rapid multiplier? Yet somehow he does manage to overcome the cholera and keep it under control. He even begins to believe that he may in the course of time completely exterminate those disease germs which must live on and in man, for once every patient were cured or secluded these would vanish from the earth, never to reappear. So man by the aid of science may in time vanquish the earth-born myriadons of his arch enemy, Beelzebub, God of Flies and Vermin.

READING REFERENCE - Kendall, Arthur I. Civilization and the Microbe. Boston and New York, Houghton Mifflin Company, 1923.

OCEAN CONFERENCE PLANS SURVEY OF UNKNOWN SEAS

Plans for the most complete survey of the ocean from top to bottom ever attempted, have been inaugurated by a conference at Washington, representing scientific branches of the government and allied institutions under the auspices of the Hydrographic Office of the U. S. Navy.

Definite routes and areas have not yet been chosen, but the preliminary discussion indicates that instead of a globe-girdling expedition, a comparatively small section of the seas will be selected for intensive study. The Aleutian Islands region of Bering Sea and the Caribbean Sea are under consideration as offering unusual opportunities for scientific investigation, with the latter most favored.

One or more ships will probably be fitted out with a complete laboratory and equipped with the latest scientific apparatus for the first cruise. The sea bottom will not only be mapped, but the composition of the water, its density, tempertaure and currents which affect the distribution of marine plant and animal life will be studied at all depths.

Beside the investigation of the water and the life in it, specialists in various sciences will probably be landed on oceanic islands within the area covered by the ship.

In emphasizing the importance of this investigation, it was pointed out that five-sevenths of the surface of our globe is covered by the waters of the seas. The water area can produce far more food than all the land can ever be made to yield, and one of the purposes of the expedition will probably be to take an inventory of such food possibilities which will be needed if our population continues to increase. Fish, mollusks, and marine animals are dependent upon the microscopic plants that grow in the sea as far down as the sunlight penetrates. The floating mass of minute forms of vegetable and animal life, collectively called "plankton", varies greatly with slight changes in the temperature and composition of the sea water, according to laws not yet discovered but which the proposed expedition may aid in understanding.

The exploring ship will map the ocean bottom by means of the new sonic finder which determines depths by measuring the lapsed time between sending down a sound and getting back the echo from the bottom. By this instrument, soundings can be made by a ship in motion and much more easily and quickly than by the old way of heaving the lead.

The geologists of the conference expressed the hope that a study of the sediment being deposited on the ocean bed would lead to greater knowledge as to the age of the earth, the origin of oil and shale deposits, and the balance of oceanic and continental areas which is responsible for earthquakes.

READING REFERENCE - Murray, John. The Ocean, New York, Henry Holt and Company, 1913.

Crowder, William. Dwellers of the Sea and Shore. New York, The Macmillan Company, 1923.

GREEKS USED SLOPING ROOF 3000 YEARS AGO

Crown Prince Gustaf Adolf, heading the Swedish archaeological expedition which is excavating the ancient city of Asine, Greece, has unearthed evidence that the so-called saddle-roof was known in Greece more than 3,000 years ago. The architecture of that Mycenaean, or pre-Hellenic, period, is partly illustrated by fragments and ruins found at Mycenae. It has long been a question whether these houses had flat or sloping roofs, but word has just come from Greece that the Swedes at Asine have discovered and explored a tomb, which no one has entered or disturbed for 3,000 years, and have found that this tomb is in the shape of a house about 24 feet square cut into the rock, with the top cut into the exact form of a saddle-roof, with two sloping sides, and gables at the ends.

The Crown Price's expedition, which has now been at work a number of years, has just compledted the spring term of excavation, and is returning to Sweden in order to make a scientific study of the treasures found. Up to date, more than 500,000 important treasures and fragments have been found, which are being classified and studied at Lund University by special permission of the Greek government, to which the bulk of the finds must eventually be returned. The finds include decorated vases, funeral urns, gold ornaments, silver and copper coins, etc., which illustrate the civilization and art during thousands of years of history in Asine. This city, situated on the Greek Peloponnessus, flourished and fell a

number of times during the pre-Christian era. And a discovery just made by the Swedish expedition points to a surprising gap in its history. The excavators, after having cleared the strata which contained relics dating to about 300 B.C., found that the level directly beneath this contained a layer of relics undoubtly belonging to a period about 1600 B.C. The scientists are now hoping that other excavations may throw some light on what had happened during the intervening 1,300 years.

One of the most important discoveries made at Asine this year is that of a house which expert archaeologists from other countires pronounce the first house of the geometric period thus far excavated. A description of this house is, however, not now available.

The Swedish expedition will resume its field work in the autumn of this year.

READING REFERENCE - Hammerton, J. A. Wonders of the Past. New York, G. P. Putnam's Sons, 1924.

THE NEW SUNSPOT CYCLE SETS IN

By Isabel M. Lewis,
U.S. Naval Observatory.

Old Sol is rousing himself once more like some huge giant awaking from his slumbers. After passing through a remarkably quiescent state during the sunspot minimum period of a year or more ago, he shows numerous signs of renewed activity.

Sunspot groups belonging to the new cycle are now appearing in increasing number and size in high solar latitudes as the spots of the old cycle dwindle away in low solar latitudes. Eruptive solar prominences, flames of incandescent hydrogen, helium and calcium, are more in evidence now than they were at the sunspot minimum and, in general, they rise to greater heights. The bright masses of calcium gas elevated somewhat above the normal solar surface, which give the sun its rice-grained or mottled appearance and which appear in greatest intensity in the vicinity of sunspots, are now more brilliant than formerly and more prevalent.

Then, too, the solar corona observed last fall in Mexico at time of total solar eclipse was brighter and more intricate in its structure than the corona of 1922 observed in Australia at a time when the sun was in an unusually peaceful state. Everything points to the gradual increase in the activity of the sun which will culminate a few years hence - probably during the year 1928 - in the outbursts of the sunspot maximum period when for weeks at a time the surface of the sun will never be free from spots, when great eruptive prominences will frequently attain to heights of many thousand miles and streams of electrons shot forth from the sun with unusual force and intensity will penetrate deep into our own atmosphere and set up magnetic and meteorological disturbances of various kinds.

Much has been learned of the nature of sunspots in the past two decades largely through the daily systematic observations of solar phenomena at observatories where much time is devoted to solar research, as at the Mt. Wilson and

Yerkes Observatories.

Probably no astronomer of the present day has added more to our knowledge of the nature of sunspots than Dr. George E. Hale, past director of the Mt. Wilson Observatory. As far back as 1908, Dr. Hale observed at Mt. Wilson the vertical motion in sunspots and showed them to be solar storms of a cyclonic nature. Shortly afterwards, he confirmed the suspected existence of magnetic fields in sunspots. Now it is known that all sunspots act as magnets and occur generally in bipolar groups, the leading group whirling in one direction with polarity of one kind, the following group whirling in the opposite direction and carrying the opposite charge. The intensity of the magnetic field depends in general upon the size of the spot or spot group.

One of the strangest discoveries bearing on the nature of sunpots has been the discovery of the reversal of the polarity of sunspots with the sunspot minimum. Prior to 1912, a sunspot minimum year, it was observed at Mt. Wilson that the preceding spots of a bipolar group in the northern hemisphere of the sun carried negative charges and the following spots positive charges, while the reverse was true of spots in the southern solar hemisphere. After the sunspot minimum was passed a reversal of polarity took place in all groups and this was maintained until the year 1922 when the sunspot minimum next occurred.

Waiting with interest to see what would take place at this time observers found that again a reversal of polarity took place. It is suspected that this change of polarity indicates a change in the direction of whirl of individual spots while the dominant charge of the entire group remains the same. Yet there still remains much of mystery to clear up regarding sunspots and the sunspot cycle of solar activity.

READING REFERENCE - Abbot, Charles G. The Sun. New York, D. Appleton and Company, 1911.

Huntington, Ellsworth. The Earth and the Sun. New Haven, Yale University Press, 1923.

SECOND BABIES YOUNGER IF THEY ARE GIRLS

Parents have to wait longer for their second child if it is a girl than if it is a boy.

This is the conclusion drawn from data reported to the Eugenics Research Association by Prof. H. D. Fish of the University of Pittsburgh as a result of an investigation into the control of sex of children before birth.

A study of 2,043 Hebrew families, tabulated from nurses' reports at the Irene Kaufmann Settlement, Pittsburgh, Pa., indicated that the time interval between first and second children is measurably longer preceding the birth of a female second child than it is preceding the birth of a male second child.

"It seems to make no difference what the sex of the first child was," Prof. Fish declared, "More than 95 per cent of the families studied were Russian Jews,

the remainder Austrian and Rumanian Jews.

"The average time interval between first children and second femalechildren was 35.10 months, but for second male children it was 31.85 months. The difference between thses averages is 3.25 months. There is only one chance in more than five hundred million that this difference is due to random sampling. Comparison of all the birth intervals of the two groups rather than the averages shows there is only one chance in about eighty billion that the two differ in a purely chance manner.

"A similar study of 507 related families of an old New England stock tended to substantiate the above result , indicating the phenomenon is not peculiar to Jews."

From the study of the mechanism of heredity that has been undertaken by scientists during the past twenty years, equality in numbers between sexes is expected, Prof. Fish explained. Inequality, however, is observed. More male than female children are born. Mixtures of different nationalities produce a greater percentage of male children than the pure parent stocks. There is an excess of male births among first children that is greater than the excess of male births which occur later in the family. Thses things point to influences outside and inside the reproductive cells which tend to modify the sex ratio.

ASTRONOMICAL MIST CLEARED BY MATHEMATICS

The mystery of nebulium, the strange gas supposed to exist in comets, nebulae, and certain stars, is being dissipated. Prof. Harvey B. Lemon of the University of Chicago has made discoveries which indicate that there is probably no such element in the universe and what has been taken for it is merely helium in disguise.

Spectroscopists, who detect the make-up of stars and other things by analyzing the light which comes from them, have long been worried by lines in the nebular spectra, which did not agree with those of any substance known on earth. A bright green line was especially characteristic. These strange lineshave been attributed to an unknown element of light atomic weight which was called "nebulium" after the nebulae in which they were found. Ideas about nebulium have, however, become even more nebulous; for modern work in physics and chemistry seem to indicate that there could be no light weight element not already known.

In addition to the so-called nebulium lines, most of the nebulae show the well known lines characteristic of hydrogen and helium. Thinking that one or both of these elements might possibly cause the lines of nebulium, Prof. Lemon applied to them the algebraic formulae which had been found to fit the lines of many other spectra. According to his mathematics, the unknown nebular lines attributed to nebulium lie on the same parabolic curves as the spectral lines of a helium atom which has had one electron knocked out of it. The reproduction of the nebulium lines has never yet been accomplished in the laboratory, but Prof. Lemon thinks his figures give a clue for experiments which may prove fruitful.

READING REFERENCE - Gregory, Sir Richard. The Vault of Heaven. New York, E. P. Dutton & Co., 1924.

RADIO FANS WILL ENGAGE IN LONG CONVERSATION

Radio amateurs will addempt twoway conversation with Australia and New Zealand from August 10 to 20 and from September 7 to 16. Australian and New Zealand amateurs will listen from 3:00 to 3:30 a.m. and will transmit from 3:30 to 4:00 a.m., Eastern Standard Time. At 4:00 o'clock in the morning two-way conversation will be attempted. The same program will be followed each day. While eastern American radio fans will be getting up early in the morning for these trials, Australians will begin working about 6:00 p.m., accoring to their watches, on the day before.

Transmission will be on a wave length of about 100 meters, which will restrict somewhat the number of United States amateurs who can participate. The test is being arranged by the American Radio Relay League and the Australian Radio Relay League.

BAD WEATHER HELPS AMERICAN HEALTH

Many Americans were saved from being killed by automobiles by unseasonable weather in May, according to Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company. Moreover, the unseasonable May evidently had no adverse effect upon general health conditions in American and Canadian cities.

This is indicated by the very low deathrate prevailing during that month among the 15 million industrial policyholdres of the Metropolitan Life Insurance Company. This rate was only 9.3 per 1,000 which may be compared with 9.9 for May of 1923. With a single exception, May 1921, this year's mortality is the most favorable for this month in the history of the Company's record. Automobile fatalities were fewer in number than during May of last year or of 1922.

"In this particular the effect of unseasonable weather conditions is shown," Dr. Dublin says, "for they probably resulted in curtailed automobile traffic and there was less chance for fatal accidents."

MILLIONS OF HORSEPOWER IN SOUTHERN RIVERS

From 2,125.000 to 3,750,000 horsepower are running down the mountain sides of southeastern United States, the World Power Conference at London was told by W. S. Lee, vice president and chief engineer of the Southern Power Company. There are now six large power companies operating in this region in addition to many smaller ones. Last year the combined output of the larger companies was 2,918,000,000 kilowatt hours.

The Muscle Shoals plant of the United States Government when in full operation will add fifty per cent. to the present output of these companies, Mr. Lee said. These power companies are interconnected by transmission lines, making a southeastern superpower system. As early as 1918 and on several occasions since, serious interference with public utilities and private industries have been avoided by the use of the interconnecting lines of the cooperating companies.

WHITE CIVILIZATION KILLS NEW GUINEA SAVAGES

Additional light on the social evolution of mankind is shed by a report of Dr. Paul Wirz, who recently returned to Berlin from a stay of several years among the primitive Marind people of Dutch New Guinea. He also brought further evidence of the destructive effect of contact with white civilization upon barbarous people. The tribe, which numbered more than 7,000 in 1915 had declined to 5,587 in 1917, and is still decreasing in numbers. The catastrophe is due principally to syphilis, which appearing in the natives in a severe form resulted in much sterility, and in a great mortality among new born infants. An epidemic of influenza killed a third of the tribe.

The social organization is extremely primitive. The boys are separated from their parents early in life and brought up in bachelor houses which they quit only when married. The girls live with their mothers until marriage. In spite of this enforced separation of the sexes, immorality is common. Strong jealousy is characteristic of married life in the tribe but periodical promiscuity is the custom.

The industrial organization is a remarkable blend of individualism and state socialism. In general a person has sole property only in what he makes with his own hands alone; things which are made through communal effort belong to the entire community. As an instance of individualism, children have their own little plantations of sago and of cocomut trees; while on the other hand the grassland is owned by the community as are the boats and the big drums.

Fire is made by use of the drill-bow and is carefully preserved even in long wanderings. Pottery is unknown and food is generally roasted, except fruits, which are eaten raw. Intoxicating plants are known and used. The betel nut and th the strongly intoxicating kava are consumed in large quantities. Tobacco smoking is general. Salt is unknown. Kangaroo, wild boar, sea food and fruit comprise the most of the diet.

WAR DISINFECTANT NOW GOES TO WASHTUB

Paratoluolsulfochloramidsodium -----

It is a bleaching powder recently introduced in Germany. Rather, it is an organic compound which may take the place of bleaching powder. During the war it was used as a disinfectant and experimental surgery is still experimenting with it.

But its German makers see its greatest future in the housewife's washtub. They claim it is much less dangerous to linen than the average bleaching powder.

Lime salt derived from this compound also is claimed to have valuable properties as a weed killer on gravel paths. Not being easily soluble in water the rain does not wash it away easily.

Many banded birds return to the same place year after year.

MONOPOLY ON TORNADOES HELD BY AMERICA

Tornadoes, such as the one which left a path of death and destruction in Ohio recently, are a strictly American product, according to Dr. W. J. Humphreys of the U. S. Weather Bureau. This type of storm is very rare in other parts of the world and almost unknown in Europe.

The middle Mississippi valley is the region in which they are most prevalent. They are very rare in and east of the Appalachian Mountains, but are known in greater or less intensity in every part of the country east of the Rocky Mountains. None are recorded from the Pacific coast.

The exact conditions productive of tornadoes are not known. It has been observed, however, that they most frequently occur in the southeastern part of large circular storms and on the eastern part of V-shape storms.

Just as cross-currents produce whirlpools in swiftly moving water, so tornadoes are produced by cross-currents of wind. The waterspout observed over the Lake during the Ohio storm was merely the tornado passing over the water. The only difference between a waterspout and a Kansas twister is that the whirling winds are passing over water instead of land.

TABLOID BOOK REVIEW

STORAGE BATTERIES, By George Wood Vinal. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. Price $4.50.

The National Bureau of Standards' expert on storage batteries has written, not a handbook for the worker in the storage battery service station, but a scientific treatment of the principles of storage batteries and their increasing application to transportation and commerce.

A PREHISTORIC TREE

The maidenhair tree, introduced into America and Europe from China and Japan but now not known to be growing wild anywhere, is the only survivor of an extensive family of prehistoric plants. It grows to be 100 feet tall and has leaves like the maidenhair fern. The most unique thing about it, however, is the way it gets its start in life. The flowers appear in April or early May and the pollen is distributed to the femaleflower. But sometimes the embryo is not formed until the seed has become full grown and fallen to the ground.

Many banded birds return to the same place year after year.

If we could magnify the point of a pin a billion-fold, we should find that a billion billion molecules could rest comfortably on this small area.
