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MERCURY'S ATMOSPHERE

THE question of whether or not the tiny planet Mercury, innermost member of the sun's family, has a layer of atmosphere may be settled within two years when the planet just barely skims the face of the sun on May 11, 1937. Silhouetted against the sun for some forty minutes during this passage, astronomers will have the best chance in a thousand years to settle the baffling atmospheric problem of Mercury.

At present astronomers are divided on the question. Observationists believe that they have evidence that Mercury does have an atmosphere. Theoretical astronomers, however, have a number of reasons for thinking that the planet can not retain an atmospheric layer. The present controversy is summed up in the current issue of the *Journal* of the British Astronomical Association by C. O. Bartrum, secretary of the association.

When, at rare intervals, Mercury passes directly between the sun and earth in transit, there is an instant when the planet is half in front of, and half off, the solar disk. Then, the presence of an atmosphere may show itself by a ring of light which appears completely around the planet. The air on the edge of Mercury away from the sun would bend some of the light around it, just as the earth's atmosphere bends the sunlight so that we really continue to see the sun for a short time after it has set.

With the ordinary transit, such as last occurred in 1924, there is such a brief period, at the beginning and end, when Mercury is thus at the edge of the sun, that there is little time to make any detailed observations. The transit of 1937 will not be visible from England or northern Europe, for from these parts of the earth the planet will just miss coming in front of the sun. But in southeastern Europe and in Africa it will be seen, and there the planet will just skim along the sun's edge, hanging there for about forty minutes. Such a transit occurs but once in nearly a thousand years, and thus it should provide an excellent opportunity of studying Mercury at leisure to see whether there is the arc of sunlight around the portion not projected upon the sun's disk. "The presence or absence of such an arc would go a long way to settle the conflict between the planetary observers and the theoretical astronomers," according to the author of the note.

CHOLINE, A NEW VITAMIN

A NEW vitamin which is essential for liver function and which may play an important rôle in controlling diabetes was described at the Atlantic City meeting of the American and Canadian Medical Associations by one of its discoverers, Dr. C. H. Best, of Toronto, co-discoverer of insulin. The new vitamin has a real name, choline, instead of a letter as do most other members of the vitamin family. It is found in many foods, but the best sources are meat, egg yolk and yeast.

Dr. M. Hershey and Miss M. E. Huntsman, of the University of Toronto, were responsible for many of the fundamental observations that led up to the discovery of the significance of choline, Dr. Best stated. Lack of this vitamin causes the serious condition of fatty liver. When the liver becomes fatty, it fails to make sugar or handle bile or do many of the things it should do.

The vitamin was discovered in the course of insulin investigations. Dogs that had no pancreas, the insulin-secreting organ, failed to live for more than a few months, even when given insulin injections. When they were fed minced pancreas, in addition to the insulin, they lived for years. However, chemical studies of the pancreas showed that in addition to producing insulin and a digestive ferment, this organ contained choline, and that it was the choline in the diet of minced pancreas that kept the dogs alive after they had lost their own pancreas. Cases of fatty liver in human beings, a serious condition of ill health, may be due to lack of choline in the diet; but Dr. Best did not discuss this point.

The choline discovery has thrown further light on the diabetes problem. The latter condition is a liver disorder rather than a disorder of the insulin-producing pancreas, it now appears. According to Dr. Best "The pancreas is not always to blame in cases of diabetes."

Diabetes may be caused in three different ways: the liver, as the result of injury or disease, may become too active and make too much dextrose sugar from the starches, sweets and proteins eaten; or the liver may become overactive due to lack of insulin (the usual explanation, though not necessarily the usual cause of diabetes); or, finally, the pituitary, thyroid and adrenal glands, either alone or in combination, may become overactive and affect the liver through their relation with the insulin-producing part of the pancreas.

The pancreas was evidently at fault in the first case of diabetes treated with insulin, that of Leonard Thompson, of Toronto. Following Mr. Thompson's death from pneumonia in April, 1935, autopsy examination showed remarkably few of the insulin-producing islet cells in the pancreas. This patient, who as a lad was dramatically rescued from danger of diabetes by treatment with some of the first insulin ever produced, grew careless about his diet when he grew older. As a result, he developed diabetic coma and then pneumonia. The physicians were able to relieve the diabetic condition again by insulin but they could not save him from the pneumonia.

LOWERED DIPHTHERIA DEATH RATE IN LARGE CITIES

A BRILLIANT lowering of the death rate from diphtheria in large cities of the United States is reported by the American Medical Association in its twelfth annual survey just completed. Only one section of the country—the east south central states—failed to share in the tremendous inroads being made against this enemy of childhood.

Fifteen large American cities of the ninety-three covered in the survey had not a single death from diphtheria during 1934. They are as follows: Cambridge, Mass.;

Canton, Ohio; Duluth, Minn.; Elizabeth, N. J.; Grand Rapids, Mich.; Long Beach, Calif.; New Bedford, Mass.; New Haven, Conn.; Salt Lake City, Utah; Seattle, Wash.; South Bend, Ind.; Spokane, Wash.; Springfield, Mass., and Syracuse and Utica, N. Y.

The ten cities with the lowest death rates from this disease in the last five-year period, according to figures published in the *Journal* of the American Medical Association, are: Grand Rapids, Mich.; Salt Lake City, Utah; Duluth, Minn.; Seattle, Wash.; Syracuse, N. Y.; New Haven, Conn.; Yonkers and Rochester, N. Y.; Spokane, Wash., and Long Beach, Calif.

Also listed are the ten cities with the worst health records as regards diphtheria: Lowell, Mass.; Louisville, Ky.; Knoxville, Tenn.; El Paso, Texas; Chattanooga, Tenn.; Nashville, Tenn.; Atlanta, Ga.; Jacksonville, Fla.; New Orleans, La., and Somerville, Mass. Baltimore, which had a high diphtheria death rate for 1925–1929, now not only leads the group of south Atlantic states but has one of the best rates among the thirteen cities of the country with more than 500,000 population. San Francisco and Philadelphia alone surpass it.

South Bend, Ind., has had its third successive year without a diphtheria death, a new record among American cities. Five cities reported that they had only one diphtheria death each, in 1934, and it occurred in a non-resident. These cities are Providence, R. I.; Worcester, Mass.; San Francisco and Long Beach, Calif., and Tacoma, Wash.

HUMAN HEREDITARY DEFECTS DUE TO MUTATION

HEREDITARY diseases and defects, such as hemophilia or "bleeders' trouble," are not always due to defective traits in the inheritance of the sufferer. Hemophilia is sometimes called the "king's disease" because the Spanish and Russian royal families have it as a hereditary factor.

A considerable number of all cases originate in persons with no family history of such defects, simply by mutation, or the tendency for new evolutionary characters to crop out in lines where they previously have not existed. This conclusion has been reached independently by two English scientists, Dr. L. S. Penrose, of the Royal Eastern Counties' Institution at Colchester, and Dr. J. B. S. Haldane, of University College, London, who have published their results jointly in *Nature*.

Two hereditary defects were studied: hemophilia, or the inability of the blood to clot, resulting in excessive bleeding from trifling wounds; and epiloia, a condition in which tumors of the skin, brain and sometimes of the heart and kidneys are liable to be associated with epilepsy and mental deficiency. Persons afflicted with either of these disorders naturally have a high mortality rate, and as a rule do not reproduce, at least in severe cases. Yet the number of hemophiliacs and epiloiacs remains distressingly large.

The explanation, in the opinion of Drs. Penrose and Haldane, is that these defects arise by mutation in previously healthy stocks. They estimate that in each generation about 25 per cent. of all cases of epiloia are "sporadic and are presumably due to mutation." In the part of England covered by the study, about one person in every 30,000 of population has epiloia. This, the two investigators conclude, "implies a mutation rate of about one in 120,000 per generation."

Similarly, hemophilia, though an hereditary trait, is so disabling that the marriage rate of hemophiliacs is very low, and their reproduction rate presumably even lower. Dr. Haldane estimates that "the frequency of hemophilia in London males certainly exceeds one in 100,000 at birth and may well exceed one in 30,000. A rough estimate of the mutation rate is one in 50,000 to 100,000 per X-chromosome per generation."

This study is considered to be of importance far beyond its immediate medical and sociological interest. Hitherto there has not been even an approximate estimate of how fast the human race "mutates," although data on mutation in other organisms have been obtained. Drs. Penrose and Haldane, as one outcome of their studies, estimate that "man seems to be somewhat more mutable than *Drosophila*," the tiny insect most used in genetical researches.

THE PROMISE OF SEAPLANE SERVICE

DAILY transatlantic trips, by seaplanes triple the size of to-day's largest, were forecast for "the immediate future" by Igor I. Sikorsky, noted aircraft designer. Speaking before the meeting of the Society of Automotive Engineers meeting at White Sulphur Springs, W. Va., Mr. Sikorsky backed his prediction by citing the extremely rapid progress in seaplane design.

Here is the comparison between the Sikorsky *S–40*, which set payload seaplane records in 1931, and the *S–42*, now about to go into regular commercial service between Hawaii and California:

	S–40	*S–42*
Weight	21,000 lbs.	19,764 lbs.
Gross weight	34,000 lbs.	38,000 lbs.
Equipment	1,000 lbs.	2,181 lbs.
Payload	3,200 lbs.	8,363 lbs.
Cruising speed	115 m.p.h.	157 m.p.h.
Top speed	137 m.p.h.	182 m.p.h.

The important point in the development, Mr. Sikorsky pointed out, is the increase of 5,163 pounds in payload. Or, said another way, if equal payloads are considered, that is, 7,500 pounds, the range of the *S–40* is 479 miles, while the range of the *S–42* is 1,130 miles, an increase of 651 miles.

Even more striking for economical commercial flight is a comparison by what the aircraft engineers call the ton mile. If an airplane can lift a one-ton payload and cruise with it at 100 miles an hour for one hour, it is credited with a rating of 100 ton-miles. The Sikorsky *S–40*, on this basis, every flying hour receives credit for (1.65 tons × 115 miles) 189.75 ton-miles. The *S–42*, however, receives credit for (4.25 tons × 145 miles) 616.25 ton-miles. On this comparison the new *S–42* is over three times as efficient.

Discussing how the future of transatlantic flying lies in the use of larger seaplanes, Mr. Sikorsky said: "Several conditions point to the usefulness of increased size

of future flying boats as compared with land transports. In the latter case, the great frequency of departure is of value because of the relative short distance to be covered, and it has been generally found that small ships can be used successfully. In the case of North Atlantic trans-oceanic flying boats, the frequency of departure is of less importance, as a tremendous saving in time is made, reducing perhaps the time involved from four or five days to 24 hours per trip. Needless to say, daily departures will be made.

"Eight professional men will be required for such 24-hour flights, not counting the stewards. Furthermore, the improved efficiency and seaworthiness with respect to the increased size of flying boats are indicative of the possibilities offered. Therefore it is probable that in the immediate future we shall see flying boats of up to 100,000 pounds; and in a decade or so flying boats of several hundred tons will probably make their appearance."

ITEMS

A METHOD of photographing heart sounds has been devised by three Iowa scientists: Dr. Walter Bierring, president of the American Medical Association; Dr. H. C. Bone and M. L. Lockhart, all of Des Moines. The apparatus, called the electrostethograph, is said to have advantages over other methods of recording heart sounds in current medical usage. It is described in the *Journal* of the American Medical Association. A viewing screen is used on which the vibrations from the heart can be seen at the same time the physician is listening to and photographing the heart sounds. This aids in obtaining good photographic records and in detecting certain abnormal sounds and locating their position in the heart cycle, a feature of particular aid in training medical students. The photograph provides a permanent record of heart action.

THE cause of acute rheumatic disease is probably a virus, Drs. Bernard Schlesinger and Gordon Signy, of the Hospital for Sick Children, and C. Russell Amies, of the Lister Institute, report in a recent issue of *The Lancet*. Microphotographs of fluids from the chest and lungs of persons dying of acute rheumatic infection revealed elongated bodies closely resembling those previously identified as the virus bodies of chickenpox. The microphotographs were taken and described by J. E. Barnard, fellow of the Royal Society. Tests with the blood serum of thirty-six living patients suffering from acute rheumatic disease confirmed the belief that the bodies seen in Mr. Barnard's microphotographs are the "germs" of the disease. The streptococcus, previously considered the microorganism that caused acute rheumatic disease, plays an important part in the development of the malady, probably by lowering the individual's resistance to the virus.

RIGID quarantine has been clapped down following a smallpox outbreak at Nabaiuna in the northwest district of the colony of Essequibo, British Guiana, approximately one hundred miles northwest of Georgetown. Report of the outbreak has just been received by the U. S. Public Health Service from the American consul at Trinidad. The outbreak is small and the disease occurring in mild form. Existing cases have been isolated and the rest of the district quarantined. First news of the epidemic reached federal health officials when a scientifically-minded official of an airline company noticed the word "serum" on a forty-five pound shipment being rushed over his company's lines from a Detroit manufacturing firm for delivery in Georgetown, British Guiana. His inquiry to Detroit brought out the fact that the shipment was smallpox vaccine. Suspecting a wide-spread outbreak because of the size of the shipment, the federal health officials promptly investigated.

EVER mindful of better ways to link European Russia with the far-flung provinces and cities like Vladivostok across Siberia, U. S. S. R. is completing plans for a new ice-breaker to convoy ships along the icebound northern sea route for 4,000 miles. It is proposed to install engines capable of generating 24,000 horsepower in the new ice-breaker which will make it over twice as powerful as the *S. S. Krassin*, rated at 10,000 H.P. With great fuel capacity the new vessel should be able to make the 4,000-mile trip in a single season without touching at intermediate ports for fuel. Further exploration of the Arctic ocean is projected, the vessel conducting freight ships through the hazardous stretch of sea.

BAGILUMBANG oil may be introduced in the American paint and varnish industry, benefited years ago by the coming of the more tersely-titled tung oil from China. The oil is a product of the Philippines, and the big-seeded fruits that produce it are now being raised on a small experimental scale in Florida. Oil extracted from these Florida seeds was demonstrated by Dr. G. S. Jamieson and R. S. McKinney, of the U. S. Department of Agriculture, before the American Oil Chemists' Society. The oil, a limpid, light-colored fluid, resembles tung oil in its valuable quick-drying properties. Bagilumbang trees prefer a limestone soil, in contrast to tung oil trees, which are grown most successfully in the hopeless-looking sandy soils of northern Florida and the Gulf Coast.

YOUR heart and your foot move to the same rhythm when you sit with your legs crossed. This natural, almost invisible, swing of the foot has suggested to a Baltimore doctor a new test for disease of the blood vessels of the legs. A preliminary report of the new test, devised by Dr. Bertram M. Bernheim, of the Johns Hopkins Medical School, will appear in the *Journal* of the American Medical Association. Dr. Bernheim attaches a short rod to the side of the shoe of the free leg. The pointed tip of this rod rests lightly against the revolving drum of an instrument that traces the swing of the leg. The less the swing, the more serious is the condition, according to his interpretation. The greater and more regular the swing, the better is the condition. While Dr. Bernheim is not certain of the cause for this, he suspects that the calf muscles spread according to the amount of blood sent to them and then contract again in a rhythm.