SCIENCE NEWS

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HIGH PRESSURES

THE highest useful pressures ever created in the laboratory by man, one and a half million pounds per square inch, have been achieved through experiments by Dr. Thomas C. Poulter, formerly second in command and senior scientist of the Byrd Antarctic Expedition and now director of the research foundation of the Armour Institute of Technology in Chicago.

To the University of Pittsburgh's industrial physics conference at Mellon Institute, Dr. Poulter told how he is now exploring the realms of high pressure instead of braving and studying the low temperatures of Antarctica.

Safer serums for the prevention and treatment of disease are expected through use of high pressures. Pressures of about 180,000 pounds per square inch kill certain bacteria, and it is hoped that they can be used in manufacture of serums instead of heat.

At 400,000 pounds per square inch pressure, ordinary automobile lubricating oil becomes as hard as metallic lead and copper at ordinary pressures. This is important industrially because these pressures are actually reached in some ball-bearing machinery.

High pressures can also precipitate colloids and particles out of solutions and this may find industrial applications.

High pressure applied to milk for a short time will keep it sweet for a month, other experimenters have found, but commercial application will be slow because of the difficulties of applying the pressure. Meat can be preserved in a like manner.

Dr. Poulter's research also shows that the atoms themselves are actually compressed by high pressure, not just moved closer together, causing lower energy levels within the atoms.

At the extreme pressure of 1,500,000 pounds per square inch lubricating oil was compressed to half its original volume.

WATSON DAVIS

THE VÄISÄLÄ COMET AND THE PONS-WINNECKE COMET

WHEN Professor Y. Väisälä, of the University of Turku, Finland, recently reported the discovery of a new tiny asteroid, astronomers throughout the world were interested but not surprised, for the Finnish astronomer is a specialist in finding such stellar wanderers.

They were surprised, however, when they learned that the asteroid, provisionally called object 1939 CB, had been found to be a comet with a ten-year period as a result of new observations by Professor Väisälä. The new discovery has been reported by radio to the American collecting center for American astronomical information, Harvard College Observatory.

The new Väisälä comet is very faint, of the fifteenth magnitude, and can be seen only with powerful telescopes. It is located in the "sickle" of the constellation Leo just north of the bright star Regulus. It passes the north-south meridian line about 9:30 o'clock in the evening. On March 15, its position was right ascension 9 hours, 37 minutes and six seconds and its declination plus 23 degrees seven minutes.

The comet has been found to possess a short tail, about one degree in length, by Professor G. Van Biesbroeck, of the Yerkes Observatory. It is unusual for a comet so small (fifteenth magnitude) to have a tail.

Observed by Dr. H. M. Jeffers, of the Lick Observatory, University of California, is the Pons-Winnecke comet, now back in the region of the sun and visible to powerful telescopes on earth. This comet is near the constellation of Bootes, which contains the bright star Arcturus. The comet passes the meridian line about three o'clock in the morning. Position of the Pons-Winnecke comet on March 17 was right ascension 14 hours, 36 minutes and 11.7 seconds and declination plus 31 degrees, 20 minutes and four seconds. At that time it was very faint, about the seventeenth magnitude.

VACCINE FOR PROTECTION AGAINST INFLUENZA

A VACCINE for protection against influenza and solution of the problems of virus-caused diseases such as infantile paralysis may be achieved by a new scientific approach described by Professor Ernest W. Goodpasture, of Vanderbilt University School of Medicine, at the meeting in New Orleans of the American College of Physicians.

This approach or technic, using chick membranes to grow viruses, may prove as valuable for the conquest of virus-caused diseases, though in a different way, as the new chemical, sulfanilamide, has proved for conquest of bacteria-caused diseases like streptococcus infections.

The anti-influenza vaccine particularly seems very close at hand. The virus of epidemic influenza, when cultivated on successive chick membranes, lost its disease-producing power to such an extent that it did not cause sickness when dropped into the nose. At the same time, it increased the level of the body's own flu-fighting forces in about one half of those tested. Development of this weakened virus with good immunizing ability, which Professor Goodpasture called "very promising for an eventful successful vaccine for human epidemic influenza," was achieved by Dr. F. M. Burnet and collaborators, at the Hall Institute, Melbourne, Australia.

This and the possible solution of other virus disease problems all hinge on the original discovery by Professor Goodpasture and his associate, Dr. A. M. Woodruff, that the chorio-allantois of developing chicken eggs is an ideal substance on which to grow the virus that causes fowlpox. It has since been found that this same membrane of the developing chicken egg can be used for cultivating viruses of other diseases, including yellow fever and influenza, and for studying these viruses. Bits of human skin can also be successfully grafted on to the egg membrane and the grafts can be used to study virus infections.

Yellow fever vaccine, which has been used on over a million persons in South America, is now being produced from chick embryos. Vaccine used to protect animals against the so-called horse sleeping sickness, which has spread to humans and killed several children last fall, is also being produced from virus grown on chick embryo membranes. If a vaccine is needed to protect human beings from this animal plague, it may be produced in the same way.

Viruses such as cause these ailments and the more familiar infantile paralysis, unlike other disease germs, can not be grown on chemicals outside the body. For this reason progress in the control of such diseases has lagged behind that in other diseases whose germs can be more easily cultivated and studied. Heretofore laboratory animals and expensive monkeys have been used in attempts to conquer the virus diseases. The chick membrane technic is far superior, Professor Goodpasture believes, and should be more extensively used.

BARRIER AGAINST PNEUMONIA GERMS

THE body's Maginot Line against invading pneumonia germs, which bars their passage from lungs to blood, may have been located as a result of research reported by Dr. O. H. Robertson, of the University of Chicago, at the meeting of the American College of Physicians.

In the depression of the lung known as the hilum are lymph nodes which Dr. Robertson believes "may constitute the principal barrier to the passage of pneumococci from the infected lung into the blood."

The blood has certain natural pneumonia-germ-killing powers. Studying this during the course of pneumonia in dogs, Dr. Robertson found that usually so long as the blood could kill the germs, none could be found in the blood and the animal recovered. In numerous cases, however, the germs were found in the blood even when the blood had marked germ-killing ability. Given sufficient time, however, such blood, in test-tube experiments, was capable of destroying large numbers of pneumonia germs. Apparently the blood's ability to destroy the germs is not the only factor in keeping them out of the blood during the disease. Searching further, Dr. Robertson found that in dogs with pneumonia, but with no pneumonia germs in their blood, large numbers of these germs were often found in the lymph nodes. This and other findings suggested that the lymph nodes in the hilum of the lung act as chief barrier between lungs and blood.

THE DIAGNOSIS OF INFLUENZA

THAT specific diagnosis of epidemic influenza is now possible, was reported by Dr. Thomas Francis, Jr., of New York University College of Medicine.

Lack of such a specific diagnostic test for this ailment has been one of the stumbling blocks in the way of getting an accurate report of cases during an epidemic. The specific diagnosis is possible when it was discovered that a filterable virus, believed the cause of the disease, can be obtained from throats of patients suffering from epidemic influenza, and because methods have been developed for using mice in studying this virus. Not all the cases that occur in the course of an influenza epidemic are the same disease, Dr. Francis reported. In fact, the various epidemics of supposed influenza are not the same disease.

A person who has had influenza acquires immunity or resistance to the disease, though Dr. Francis did not say how long this immunity lasts. Healthy carriers of influenza—persons infected without showing any signs of it—probably play an important part in keeping the infection going and spreading the disease.

SOYBEANS

SOYBEANS, the crop without a surplus, received high praise from agricultural and chemical leaders, at the fifth annual meeting, at Jackson, Mich., of the National Farm Chemurgic Conference.

G. G. McIlroy, of Irwin, Ohio, president of the American Soybean Association, described the spread of soybean cultivation in the United States. In 1930, he said, the American soybean crop was only nine million bushels. In 1938 the production reached fifty-eight million bushels.

Illinois is the leader in soybean culture. This one state produced more than half of last year's crop, thirty-one million bushels. With four other neighboring states, from Iowa across to Ohio, a new "Soybean Belt" is growing up, that at present accounts for more than nine-tenths of the national production.

Although soybean culture began in the South, it has not increased rapidly in that part of the country. Southern farmers are now putting in a larger share of the national soybean acreage.

Soybeans are capable of use on the farm, as hay or ensilage, and the press cake left after oil extraction is also good for either feed or fertilizer. But large and ever-increasing uses are found in industry. Henry Ford attracted a lot of attention to soybeans a few years ago, when he undertook the use of soybean meal as a material for steering-wheels, panels, knobs and other plastic parts. But the real follow-through has been given by scores of less prominent figures in many industries.

H. W. Galley, of the National Soybean Processors Association, Decatur, Ill., told of some of the manifold uses of soybean oil. Refined, it has proved to be a very good food oil. Last year forty million pounds were used in the margarine industry, a jump from 1,750,000 pounds three years ago. Heavy use of the natural oil is made in paint, varnish, linoleum and other manufactured products requiring drying oils.

Along with soybean oil naturally goes the oil meal left after extraction. The meal or its proteins have been used in plastics, as sizing and glue, and in the preparation of numerous foods for human consumption. However, said Dr. J. W. Hayward, chairman of the Soybean Nutritional Research Council, Minneapolis, 95 per cent. of soybean oil meal is still used for feeding livestock. This is and should remain its major use, in his opinion.

THE TUNG OIL INDUSTRY

C. C. CONCANNON, chief of the chemical division in the Bureau of Foreign and Domestic Commerce, told the meeting of the American Tung Oil Association meeting at Gulfport, Miss., that the United States needs to grow

and process more of its own tung oil, to render American manufacturers of paint, varnish, linoleum and other commodities independent of the Chinese supply.

Tung oil is produced from the nuts of two species of trees that grow in the hill country of China. Its quick-drying properties make it indispensable in many industrial processes. Substitutes have been sought at times of high prices, but nothing satisfactory has been found.

First serious experiments in the development of an American tung-oil industry began something over thirty years ago, and some of the trees planted then are still bearing well. They require light, well-drained, acid soil and a frost-free climate, so that they can be grown in this country only in a zone along the Gulf Coast and across the northern part of Florida. At present there are about 175,000 acres in tung trees, but most of them are young and not yet bearing.

The principal supply of the oil therefore continues to come from China. This country takes almost all the oil exported by the Chinese. In 1937 our imports amounted to 175,000,000 pounds of tung oil, valued at $20,000,000. Last year there was a drop to 108,000,000 pounds, worth $12,000,000. There is a considerable hold-over stock now on hand—61,500,000 pounds as of December thirty-first, 1938.

COTTONSEED OIL

SPEAKING at the National Farm Chemurgic Conference, Dr. H. P. Stuckey, director of the Georgia Experiment Station, pointed out that cottonseed oil was once a mere by-product of the cotton industry. Now, cotton bales pile into mountains that are a national economic headache, while the market is still thirsty for the oil.

National production of cottonseed oil in 1938 was 1,683,000,000 pounds. The food industries absorbed nearly all of it, taking 1,529,000,000 pounds. About two thirds of this quantity—1,040,000,000 pounds—went through the hydrogenation process, to become shortening. Oleomargarin accounted for 143,000,000 pounds, and an additional 198,000,000 pounds went into other food uses. The relatively small residue was absorbed into industry, principally soap making.

How to get more oil without further increasing the surplus of cotton is the problem. Breeders may have to reverse their efforts of recent years, which have constantly been aimed at raising the ratio of lint to seed. "Seedier" cotton varieties may actually be demanded.

It has even been proposed that cotton-for-lint be given up in part, and a lintless cotton, developed from the "bald-headed" stalks that frequently crop up as mutations, be raised as a straight oil-seed crop, harvested by machinery. This is not an impossible suggestion, for cotton is evolutionally derived from plants with lintless seeds, being a member of the mallow family.

New outlets for cotton fibers were also up for discussion at the conference. A possible major use is in the building of the so-called cotton roads. In these roads, wide strips of cotton are laid down on the prepared ground as foundations for tar, asphalt, crushed rock and other surfacings. Clinton T. Revere, of New York City, stated that large-scale experiments in the South have already conclusively demonstrated the practicability of such roads.

ITEMS

PROVISION of improved weather forecasting service along the Atlantic and Pacific coasts, asked by the Air Safety Board of the Civil Aeronautics Authority in a series of recommendations designed to prevent repetition of an accident three months ago which cost five lives, has been laid squarely in the lap of Congress. Improvements in Weather Bureau operations are limited by the funds provided by Congress, Commander Francis W. Reichelderfer, chief of the Bureau, declared. Funds earmarked in the 1939–40 budget for the Bureau will permit extension of services, but not to the extent urged by non-governmental air and weather experts, or by the Air Safety Board. The aviation body wants more reports from ships as well as more radio-meteorograph observations from land stations. It also asks more predictions of winds pilots will encounter, and a new type of airway weather map showing conditions at different altitudes.

PAA–17, the first of four Boeing clippers which will go into service on a transatlantic airline this spring, has arrived at the Baltimore terminus of the line. The ship, capable of carrying between 40 and 50 passengers across the Atlantic at a time, was flown from San Francisco, where it had been undergoing operation tests. Three more planes, of which one has already been delivered and another is due in a matter of days, will follow at a later date. The first clipper's eastward journey was *via* the Pacific coast, across a narrow part of Mexico, and then across the Caribbean and up the Atlantic coast.

RADIO echoes promise to help make aerial maps. Hailed as 1938's outstanding contribution to air safety, the echo altimeter tells a pilot just how high he is above the ground. It not only can prevent mountainside crashes but it traces the contour of the ground below. To the American Society of Photogrammetry meeting in Washington on January 16 two Bell Telephone Laboratories engineers, Russell C. Newhouse and Lloyd Espenscheid, responsible with Peter C. Sandretto, of United Air Lines, for the echo altimeter's development, explained that theoretically it can show changes in ground height as small as 10 feet. The echo altimeter sends a radio beam earthward whose frequency is being continuously changed up to 500 megacycles. A frequency measuring device compares the reflected beam, which has taken time for its journey proportional to the transmitter's distance from the earth, and the beam just being sent out, to tell the elapsed period of time between sending and return of the beam. This is an exact measure of the distance of the transmitter or the plane above the earth.

GLASS stronger than steel is now being produced by investigators engaged in developing glass fibers for weaving into "fabrics of tomorrow." By careful melting to remove as much as possible dissolved gases and bubbles so as to reduce strength-killing "discontinuities" in the fiber, fiber glass with a tensile strength of 400,000 pounds to the square inch can be made according to the report of F. O. Anderegg, of the Owens-Corning Fiberglass Corporation. Glass and other materials, Dr. Anderegg states, can potentially be made to be far stronger than they are, but impurities giving rise to discontinuities must first be reduced or eliminated.