

PHYSIOLOGY

Lindbergh and Carrel Grow Organs Outside of the Body

Living and Functioning in a Glass Jar, Glands and Heart Will Add to Knowledge of Organic Diseases

COL. CHARLES A. Lindbergh, premier aviator, has written his name in the annals of experimental medicine, bracketed with that of Dr. Alexis Carrel, Nobelist of the Rockefeller Institute for Medical Research.

A new method of transplanting living glands or any other parts out of the body into a glass chamber, there to live for days artificially fed on a blood substitute by an ingenious Lindbergh-designed mechanical "heart," has been announced by the scientific team of Carrel and Lindbergh. (*Science*, June 21).

For the first time an entire organ has been made to live outside the body.

The Lindbergh apparatus for maintaining a sterile pulsating circulation, combined with the Carrel techniques for transplanting organs and keeping them free from bacteria, has been used in twenty-six recent experiments. The organs made to live in vitro were: thyroid, ovary, suprarenal, spleen, heart and kidney.

The organs not only continued to live but some grew and added new cells and tissues to themselves. One organ more than tripled its weight in five days.

In explaining their research on "the culture of whole organs," Dr. Carrel and Col. Lindbergh hint as to its ultimate purposes:

1. Manufacture in glass jars outside the body of the secretions of the endocrine glands.
2. The isolation of the substances necessary to growth.
3. The discovery of the differences and the functions of the body's glands.
4. The discovery of how organs affect one another.
5. The production and treatment of organic and arterial diseases in glass jars outside the body.

The suggestion that organic and arterial diseases may be first produced and then treated in healthy body parts kept alive outside the body will create great interest and hope in medical circles. Scientists find some of the most deadly of human diseases most difficult to study.

Heart diseases, kidney disorders, hardening of the arteries, and perhaps even cancer, are just a few of the "killers" among diseases that might be studied and combated by the new Carrel-Lindbergh methods.

Since glands and their secretions may create dwarfs and giants, or bring on a variety of diseases, the hope of better knowledge of the glands will also intrigue medical experimenters.

The Carrel-Lindbergh experiments mark the fulfilment of a 123-year-old hope, first expressed by the French scientist C. J. J. Le Gallois, who wrote in 1812 that "if one could substitute for the heart a kind of injection . . . of arterial blood, either natural or artificially made . . . one would succeed easily in maintaining alive indefinitely any part of the body whatsoever."

Only recently have surgical and mechanical procedures become sufficiently perfected to allow organs to be culti-

vated in vitro. In 1908, Dr. Carrel worked out methods in connection with organ transplantations for handling the arteries, washing the organ free from blood without injuring the cells and preventing blood clots. Then came the World War, and under the stress of necessity there were developed in Rockefeller Institute laboratories in France the antiseptic procedures that permit complete protection for tissues from bacteria in the course of surgical operations.

Then there was lacking only an apparatus capable of playing the role of heart and lungs and of keeping an organ free from infection indefinitely. Dr. Carrel began a long search for the proper apparatus.

Col. Lindbergh enlisted as Dr. Carrel's collaborator. After five years of work, during which many pieces of apparatus based on different principles were built and discarded, success was achieved.

Striking deep into the heart of medicine's great unknown areas, the Carrel-Lindbergh research follows Dr. Carrel's spectacular and important Nobel researches on tissue culture that have added much knowledge of bodily processes. Most widely heralded to the public was the achievement of keeping chicken heart tissue growing for over twenty-three years.

But the new "culture of whole or-



POROXYLON	CORDAITES	WALCHIA	BAIERA
CARBONIFEROUS-PERMIAN	DEVONIAN TO TRIASSIC	CARBONIFEROUS-PERMIAN	PERMIAN TO JURASSIC
PALEOZOIC GYMNASPERMS			

MILLIONS OF YEARS IN ONE PICTURE

Something rather out of the ordinary is achieved in a series of restoration paintings of ancient plants done for the Brooklyn Botanic Garden by Miss Maud Purdy under the direction of Dr. Alfred F. Gundersen. Instead of representing a mixed forest of one geologic age, Miss Purdy's paintings show plants of the same general botanical group from several different ages in one frame, making possible a bird's-eye view of a considerable sector of botanical evolution. In the above picture are shown representative paleozoic gymnosperms, grandsires and greatuncles of modern pines, spruces, ginkgos, etc.

gans" is not a substitute for the method of tissue culture, Dr. Carrel and Col. Lindbergh explain. It is a new technique.

"It is not in any way a substitute for the method of tissue culture," they report. "Its techniques, as well as its purposes, are quite different. As is well known, tissues and blood cells grow like bacteria in flasks containing appropriate media. The techniques for the

cultivation of tissues are somewhat analogous to bacteriological techniques, although far more delicate. But it is through the employment of complex mechanical and surgical procedures that organs are enabled to live isolated from the body. Tissue culture deals with cells as units of bodily structures; the new method, with cellular societies as organic wholes."

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ENGINEERING

Low-Priced Air Conditioning System Seen for Home Use

Key is Silica Gel, Well-Known Cheap Chemical With Extraordinarily High Water-Absorbing Ability

A STRANGE substance that looks like sand but has the power to absorb water vapor from air and which seems destined to reduce the cost of air conditioning to within reach of average home owners, was described before the meeting of the American Society of Heating and Ventilating Engineers at Toronto by W. E. Stark of Cleveland.

This substance, known as silica gel, was widely used in gas masks during the war to absorb poison gases. Until recently it was mainly a laboratory curiosity, although some of its properties have been familiar to science for many years. A new development is its use in air conditioning where it has been proved to be an ideal dehumidifier.

Each crystal of silica gel consists of hard core surrounded by many sub-microscopic pores which, while invisible, reveal their presence in laboratory experiments. The air conditioning device contains silica gel reactivated by passing ordinary natural or coke gases through.

Use of the new system may result in the simplification of air conditioning systems which up to now have been confined to large buildings because of the cost of installing the required equipment. Silica gel was envisioned as playing a leading role in lowering the cost and making air conditioning available to small residences.

The water-absorbing compound is now industrially used as a purifying agent in oil processing and for removing moisture from dry ice. It is also used medically in powdered form to ab-

sorb certain poisons from the intestinal tract. Prof. Auguste Piccard carried silica gel on his stratosphere flights to keep the gondola free of moisture.

The possible use of silica gel for cheap home air conditioning systems will strike at the humidity phase of keeping comfortable. The old quip "It's not the heat but the humidity" that makes one uncomfortable has, of course, much reality. Two cities, one on the seashore and the other far inland, may both have the same temperature on a given day in summer but the one—usually the coastal city—may be more uncomfortable because the atmosphere over it contains so much water vapor. The reason is principally that moisture on the skin cannot so easily evaporate (and thus cool the body) when the surrounding air is heavily laden with moisture.

The use of silica gel which will absorb much of the existing vapor should thus be able to bring comfort in the home, not by tackling the heat side of comfort but by lowering the water content of the air. The more complete and costly air conditioning systems like those in modern theaters control bodily comfort by both methods. The air is cooled and at the same time its water content (humidity) is lowered.

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Contagious diseases are not so common among mammals as among birds.

Oil from a wild cucumber is believed to have been used by western Indians in paint which has withstood exposure for 150 years.

ASTRONOMY

Mercury's Visit to Sun May Reveal Its 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.

The present conflict between observational astronomers who believe they have obtained definite evidence of such an atmosphere, and others who believe just as definitely, on theoretical grounds, that Mercury could not possibly have retained an air layer, is summarized in a note in the current issue of the *Journal of the British Astronomical Association*. (May). It is signed C. O. B., which are the initials of C. O. Bartrum, secretary of the Association.

Dr. H. N. Russell, of Princeton University, and Dr. H. Spencer Jones, astronomer royal and president of the association, are named as the opponents of the atmosphere theory. On the other hand, Dr. E. M. Antoniadi, of the Meudon Observatory in France, has made observations, with a large telescope, indicating that some of its markings are frequently more or less hidden by local clouds. These observations, declares C. O. B., have been corroborated by a British amateur astronomer, Mr. H. McEwen, director of the Association's Mercury and Venus Section. Of course, if there are clouds, there must be an atmosphere, even though rarefied, to hold them.

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 all of Africa it will be seen, and there the planet will just skim along