

PHYSIOLOGY

**Man Could Fly
If He Had Wings**

MAN COULD fly by his own muscle-power if his body were naturally equipped with wings. But it may be possible to engineer fine equipment to enable him to attain one of the ages-old dreams of mankind: to fly like birds.

Calculations by Dr. D. R. Wilkie of University College's department of physiology, London, England, indicate wings built for two men might be more immediately practical. Nevertheless, he concludes, "calculation thus indicates that practical man-powered flight is possible. . . . Clearly, the matter should be put to experimental test." He called for a skillfully engineered flying device.

In studies on dogs, men, and horses, Dr. Wilkie found that it takes about 0.1 horsepower just to keep a man's body operating properly while resting. This power output is in the form of heat.

He found that a 175-pound man could generate about 0.4 horsepower for five to 30 minutes at such tasks as rowing, bicycling or climbing. The same man could put out a burst of energy at the two-horsepower level, but only for a few seconds. This is done by incurring an oxygen-debt in the body, which ultimately leads to blackout.

Then by calculating the power required to fly, using as his basis the great bustard which weighs about 30 pounds, Dr. Wilkie shows on a graph that the power required for man to fly was about 0.4 horsepower, the level at which he showed a man could work for five to 30 minutes.

The graph also shows that theoretically the dog could fly, but that the horse would soon crash. Dr. Wilkie's full report appears in *Nature* (May 30).

Science News Letter, June 13, 1959

BIOLOGY

**Known Chemical "Meal"
Supports Cell Growth**

RESEARCHERS have just handed the biologists and chemists a menu for mammalian cells.

Now scientists should be able to determine directly differences in food requirements for normal and cancer cells, and different ways the cells use various nutrients. It may also be possible to arrest the growth of malignant cells by merely changing their diet or by introducing cancer-specific poisons.

Instead of "feeding" mouse cells with expensive—and relatively unidentified—substances such as blood serum, embryo juices and proteins, Dr. Charity Waymouth of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Me., is using a culture medium of 40 completely defined ingredients. This chemical solution, costing about \$1.25 a quart, is supporting an "almost explosive growth of mouse cells."

The medium contains, among other compounds, table salt, potassium chloride, calcium chloride, magnesium chloride, dex-

trose, nine vitamins and 16 L-form amino acids.

Development of the synthetic medium is the result of more than seven years of research. Dr. Waymouth gradually altered the proportions of known chemicals in the culture mediums she used to grow mouse cells, removing first the blood serum and then the proteins and protein fragments called peptones.

For more than a year, she said, the mouse cells have been growing on the 40 simple compounds. Each week the number of cells increases seven- or eight-fold.

However, the cells appear to thrive on other diets, Dr. Waymouth reported. She will continue to study possible simpler and better nutrient mediums.

The study was supported by an American Cancer Society grant made to Dr. Philip R. White of the Jackson Laboratory. Dr. Waymouth is a research associate of Dr. White.

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CONSERVATION

**Finance Study to Control
Alaskan Sea Lions**

SEA LIONS along the Alaskan coastline have been a costly nuisance to fishermen, and the Federal Government has decided to do something about it.

The estimated 150,000 sea lions inhabiting the rocky coastal cliffs and seaweed-covered reefs often eat or mutilate salmon and halibut caught in nets, and are even suspected of being serious predators on free-swimming salmon at sea.

In an attempt to determine just how much damage the sea lions are doing to Alaskan fisheries, and what can be done to control their numbers, the U. S. Bureau of Commercial Fisheries has awarded a \$50,000 contract to Arctic Maid Fisheries, a fish-packing firm, to conduct a two-month study near Kodiak Island and westward to the Aleutians.

Another aim of the research will be to try to find a commercial use and profitable market for sea lion carcasses. Sea lions are not now known to be useful.

Possible uses to be tested are the feeding of meat and liver to mink on fur farms, the tanning of hides for specialty leather, and the reduction of carcasses to industrial meal and oil. What little fur sea lions have is valueless and their hides are too thick for most general leather purposes.

The species of sea lions that inhabit Alaskan waters is far larger than the more familiar but less numerous California sea lion. Male animals weigh as much as a ton and females are about half that size. Because of their fewer numbers, the California species has not been a nuisance to fishing.

If the research, which will be conducted from Arctic Maid's freezer ship, can lead to the establishment of a commercial value and market for sea lions, Alaska may have a new industry and fishermen may obtain some relief from "harassment and financial loss," the Bureau reported.

Science News Letter, June 13, 1959

IN SCIENCE

CHEMISTRY

**Brain Chemicals Help
To Explain Hallucination**

BRAIN CHEMICALS may be the cause of hallucinations.

Recent research suggests that hallucinations occur because abnormal brain chemistry causes signal mix-ups between parts of the brain that handle information. Experiments indicate that brain-produced substances called psychotogens disrupt communication between the association and visual centers of the brain. Hallucination may result, Dr. Amedeo S. Marrazzi, director of the Veterans Administration's research laboratories in neuropsychiatry, said.

To test for variations in susceptibility to hallucinations and for the effect of disturbance in brain chemistry, Dr. Marrazzi is working with volunteers. These include normal and mentally ill persons and those with physical damage to the brain's visual association area.

In these experiments, the volunteers are exposed to optical illusions before and after receiving very small doses of certain drugs. These drugs, serotonin is one, are known to increase tendencies to see things different from reality.

Serotonin is a naturally occurring brain chemical that, in excess, slows transmission of messages along the brain's nerve circuits, thus disrupting thought relays.

Tracing the mechanism of hallucination, often found in mental disease, would give scientists a firm basis on which to build toward the specific diagnosis and treatment of mental illness, it is believed.

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ENGINEERING

**System Overcomes
Re-Entry Blackout**

"BLACKOUT" of radio signals from missiles re-entering the earth's atmosphere can be overcome by a new flight-testing system.

Radio "blackout" occurs when a space vehicle plummets back into the dense atmosphere at tremendous speed, causing a shell of electrically charged or ionized gas to be formed around the vehicle by air friction. This shell temporarily prevents radio signals from being sent out of the vehicle.

The system, described at the Institute of Radio Engineers meeting in New York, by R. E. Schmidt, J. R. White and R. A. Porter of Avco Manufacturing Corporation, Wilmington, Mass., transmits flight data to earth as it is gathered. But, in addition, it stores the same data on magnetic tape and transmits it again after a fixed interval. Thus, if the first transmission is blacked out, the second will occur after the vehicle has emerged from the blackout region.

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E FIELDS

NAVIGATION

Navigation System Without Radio or Stars

A NEW NAVIGATION system that enables a person to determine his position above, on, or under the surface of the earth without the aid of radio signals or astronomical readings has been recently patented.

The system is not dependent upon weather conditions as is celestial navigation. Neither is it subject to man-made or accidental interference or to failure of complicated equipment as is radio navigation.

It involves measuring magnetic variation or declination (the angle between the direction indicated as north and true north) and magnetic inclination (the angle at which a magnet needle dips about a horizontal axis when oriented toward magnetic north). The two measurements are combined to determine the position of the observer.

Half of the system's apparatus consists of a regular compass, a gyrocompass and means to determine position along lines of equal magnetic variation, or isogonal lines. These lines extend generally north and south and approximate lines of longitude.

The other half of the apparatus comprises a magnetic inclinometer to measure magnetic dip and a device for determining the angle of the earth's surface at the place of measurement. It establishes a position along isoclinal lines, or lines of equal magnetic declination, running generally east and west, similar to lines of latitude.

By reference to a map carrying isoclinal and isogonal lines, a person's actual position may be determined. Conversion to longitude and latitude may also be easily done.

The inventor, John D. Lawson of Dallas, Texas, assigned his patent to Texas Instruments Incorporated, also of Dallas.

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AGRICULTURE

Treated Irrigation Water Controls Citrus Pest

A NEMATODE that infests more than half the citrus groves in Arizona may be on its way out.

A new method of chemically treating irrigation water has controlled the destructive pest in several test groves, the U. S. Department of Agriculture reported. Citrus is a \$10,000,000 to \$20,000,000 business in just the one state of Arizona.

From two to ten gallons of DBCP (1,2-dibromo-3-chloropropane) was applied per acre, USDA nematologists H. W. Reynolds and J. H. O'Bannon said. Methods of application varied. In one, the chemical and

the irrigation water were discharged into individually bordered rows. In another, the chemical and water, well-mixed, was added in measured amounts directly to the irrigation water.

Soil and root samples collected from treated and untreated plots showed the treatment had given almost 100% effective control.

When the DBCP treatment was combined with various methods of pruning, the nematode-infested trees were rejuvenated and recovered much faster than with pruning alone.

During a five-year period, USDA researchers estimated, the complete treatment would cost about \$16 a year per acre. This is considerably cheaper than pulling out old trees, fumigating the soil and planting new trees that will not bear fruit for several years, they said.

Symptoms of infestation with the citrus nematode are usually not apparent until three to five years after infection. The nematode lives on the outside of the roots, feeding by puncturing the root cortex with its mouth parts. When it has used up all the available nutrients, it dies off after causing serious damage. Symptoms include yellowing leaves, small fruit and leaf-less branch ends.

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PUBLIC SAFETY

Cold-Water Swimmers Cautioned on Dangers

COLD WATER is a special danger to the early-season swimmers, especially those who are not accustomed to cold water, A. W. Cantwell, Red Cross national director of Safety Services, said.

Plunging into cold water creates a shock to the system. It is not true that this effect is stimulating. Instead, it is exhausting. Therefore, swimmers lose energy and become tired more quickly.

"It is not courageous to take a sudden plunge into cold water. It is just plain foolhardy," the director said.

Enter the water gradually. Do not attempt to equal your Labor Day swimming exploits on your first swim. After nine months of sedentary living, the physical condition and endurance of the body are not what they were last summer.

Red Cross safety hints for water sports lovers include: learn to swim; always swim with another person; swim in a safe and familiar area; equip boats with safety devices; do not swim right after eating, when overheated or overtired.

The back yard water fan is not excluded, either. Advice came from the American Medical Association to the approximately 125,000 pool owners plus the owners of more than 1,000,000 plastic pools for small fry.

These pools account for not only drownings, but colds, ear-nose infections, skin troubles and other diseases where strict rules for correct water sanitation are neglected.

The water safety advice appears in *Today's Health* (June).

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ZOOLOGY

Helicopter Used to Take Seal Census

A CENSUS is being taken by helicopter.

The census of 14,000 seals and sea lions has been taken by Drs. George A. Bartholomew and Richard A. Boolootian of the University of California, Los Angeles. The U. S. Air Force and Navy cooperated in the project.

A majority of the census population was made up of California sea lions, which numbered 13,000, a 13-fold increase since the '30's.

The elephant seal which was once brought to the brink of extinction by commercial hunters is making a strong comeback and now numbers in excess of 400, possibly as high as 683. Steller sea lions which numbered 2,000 in 1938 are now down to about 50. The population of harbor seals appears to be about 100.

Two other seals, the Guadalupe fur seal and the Alaska fur seal are known to occur in southern California waters, but none were seen during the census.

It is thought that the rapid increase of the California sea lion and decrease of the Steller sea lion may be due to a warming of the water, resulting in distribution changes of critical food species of fish and invertebrates which are relatively sensitive to such temperature changes. The two varieties of seals are known to have somewhat different food preferences.

The census was taken using aerial photographs in the channel islands of San Nicolas, Anacapa, Santa Barbara, Santa Cruz, Santa Rosa, and San Miguel.

The largest single population observed was on San Miguel, where 8,009 California sea lions, 34 Steller sea lions, 15 harbor seals and 320 elephant seals were photographed during one observation.

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AVIATION

Airline Safety Shows Improvement

AIRLINE SAFETY has shown notable improvement in recent years despite an enormous increase in traffic volume and aircraft speeds.

Domestic and international airlines in 1958 carried more than 48,000,000 passengers and flew more than 32,100 million passenger miles, with a loss of 124 lives in six fatal accidents.

There was one fatality per half million passengers or one fatal accident per 163,000,000 miles flown. The fatal accident rate was 0.40 per 100,000,000 passenger miles compared to 0.10 in 1957 and 0.53 during the period 1955-57.

These figures were reported by the Cornell-Guggenheim Aviation Safety Center, New York, in its annual Survey of Research Projects in the Field of Aviation Safety. More than 600 such projects are now in progress in the United States, Canada, Great Britain, France and The Netherlands, the survey stated.

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