

PHYSIOLOGY

Humans Can Breathe Minus Most Muscles

➤ DESPITE ALMOST total loss of breathing muscles, the human body can still maintain effective respiration, reported Dr. Allan Hemingway of the University of California at Los Angeles Medical School.

Dr. Hemingway described results of a U. S. Public Health Service-supported study with paraplegics to a recent American Physiological Society meeting at the State University of Iowa.

The UCLA physiologist and his associate, Dr. Ernest Bors, examined 63 paraplegics from the Long Beach Veterans Hospital. Most of these patients had injuries which had completely severed their spinal cords and paralyzed muscles of respiration. These include muscles between ribs, abdominal muscles, and the diaphragm.

Patients who had injuries high in the spinal cord, in the neck region, had lost the use of all major breathing muscles except the diaphragm. Despite this handicap, they possessed surprisingly effective respiration, as measured by pulmonary function tests.

Their vital capacity was approximately 70% of normal, while maximum breathing capacity was about 55% of normal. They could perform mild exercise without difficulty.

Paraplegics with damage to the middle or lower part of the spinal cord had more breathing muscles available and retained better pulmonary function.

The diaphragm alone is adequate for respiration in paraplegics, Dr. Hemingway concluded. This muscle, however, does not provide any force for coughing, which is necessary to clear respiratory passages.

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CHEMISTRY

Dry Batteries Operate At Temperature Extremes

➤ TWO GROUPS of completely dry batteries that operate at vast temperature extremes were described to the Electrochemical Society meeting in Buffalo, N. Y.

One group of batteries designed for use in arctic regions operates efficiently at temperatures lower than 58 degrees below zero Fahrenheit. Another group, designed for use in electronic equipment, increases efficiency as the temperature is increased up to about 275 degrees.

Neither group of batteries contains any liquid or involves moving parts.

The low temperature batteries contain compounds that can react with ammonia to form ammonium compounds with the release of electrical energy. The dry batteries are activated by the addition of ammonia gas, J. M. Freund of Eastman Kodak Company, Rochester, N. Y., said. He and H. S. Gleason, of Eastman Kodak, developed the batteries with the cooperation of Dr. L. J. Minnick and W. F. Meyers of G. & W. H. Corson, Inc., Plymouth Meeting, Pa., who discovered the method while developing a process for extracting metals from ores.

Mr. Freund said the batteries can be tested by adding ammonia gas, and then deactivated for storage simply by removing the gas with a vacuum pump.

The scientists have used their batteries to operate lamps and small equipment at 58 degrees below zero Fahrenheit. Storage batteries were operated at 65 degrees below zero at the University of Michigan in 1951 as part of an Army Ordnance project. However, these were conventional liquid batteries with structural modifications.

The high temperature batteries reported by Dr. J. L. Weininger, General Electric Company research laboratories, Schenectady, N. Y., are based on silver compounds. The completely dry batteries are smaller and lighter than conventional liquid batteries of the same efficiency.

A major ingredient of the batteries is silver iodide. The compound increases its activity in the cell as the temperature of the battery increases. For purposes of operating photomultiplier tubes, scintillation counters and other electronic devices, the battery becomes more efficient with increasing temperature, Dr. Weininger said, and added that the new batteries could lead the way to the development of thermocells. Such a device could be a power source that is normally non-producing, but is activated by heating it.

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PUBLIC HEALTH

Paralytic Polio Cases Down 80% in Two Years

➤ A DROP of 80% in paralytic polio cases over the past two years has been reported by Marion B. Folsom, secretary of Health, Education and Welfare.

With the Salk polio vaccine now available, this type of polio can be given a "knockout" blow within the next year, if people will use it.

But millions of Americans under 40 still have not received full vaccine protection and are needlessly risking disability or even death, he warned.

Supplies are again beginning to pile up in warehouses as they did last fall before production was cut back. When spring came, however, the demand had picked up so much that vaccine was again in short supply.

"We are most anxious to avoid this sort of boom-or-bust cycle, which seriously impedes an effective vaccination program," Mr. Folsom said.

Only 63 cases of paralytic polio have been reported among the 28,000,000 persons who have received three shots of vaccine, and not all of these have been confirmed yet, Dr. Leroy E. Burney, surgeon general of the U. S. Public Health Service, said.

About 12,000,000 doses of the vaccine are being produced each month and over 215,000,000 have been released since April, 1955, when the vaccine was first manufactured.

The back stock of vaccine has already begun to pile up and now amounts to about 23,000,000 doses waiting to be used.

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IN SCIENCE

MEDICINE

Stop Fatigue With Exercise, Not Rest

➤ IF YOU are "worn-out" from fatigue, physical activity may help you more than rest, Dr. Theodore G. Klumpp, president of Winthrop Laboratories, Inc., New York, reports in the *Journal of the American Medical Association* (Oct. 5).

Rest is no cure-all for fatigue, even among aging persons, since the condition often comes from "atrophy of disuse."

For a long time, doctors used to treat fatigue by having the patient cut out something, no matter how little he was doing. If he did nothing more than sit in a rocking chair all day long, he was no doubt told to stop rocking and go lie down, Dr. Klumpp says.

Now physicians know better. Following the surgeon's practice of getting patients up soon after surgery, they now prescribe physical activity.

Young people can keep in relatively good shape through sports and play, but as they grow older they tend to give up these things and become quickly fatigued.

Labor-saving devices that now include electric golfmobiles cause them to suffer rapidly from atrophy of disuse.

Exercise is the answer but it should be fun and not drudgery. After an emotionally exhausting day behind a desk, a little exercise can work wonders against fatigue.

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AERONAUTICS

Long-Range Radars and Amplifiers Bought by CAA

➤ FOUR NEW long-range radars, and amplifying equipment to increase by 68% the range of ten sets already on order, are being bought by the Civil Aeronautics Administration.

CAA Administrator James T. Pyle said the purchase was "another step in CAA's intensive preparations for the jet age."

Raytheon Manufacturing Company of Waltham, Mass., will furnish the units and equipment at a total cost of \$4,135,000. The long-range radar will be identical to the 23 sets ordered a year ago.

The amplifying equipment, known as Amplitron, increases the power from the radar transmitter by eight times. Under good conditions, a small target otherwise not visible on the radar screen beyond 50,000 feet and 100 miles away could be spotted more than 80,000 feet and 170 miles away on the same equipment with the Amplitron.

The first Amplitron will be installed on the long-range radar at the Washington air route traffic control center.

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CE FIELDS

GEOLOGY

Examine Snail Shells For Past Climate Changes

➤ SNAIL SHELLS are being examined as a clue to patterns of climate change on the earth.

Dr. Dwight W. Taylor of the U. S. Geological Survey, one of the few snail shell specialists in the world, has used the snails to show that the present age is one of the hottest and driest in earth's history. Ultimately, the snails may be important keys to establishing a pattern that would show when the climate might be expected to change again.

In southwestern Kansas, where Dr. Taylor has done most of his work with snails, some shells are like those living today, but others found as fossils are now extinct in that area. The extinct types are living several hundred miles away in cooler climates. Since the snails once lived in Kansas, Dr. Taylor believes the state was not always so hot and dry.

Snails are already helping studies of ground water potential. Their shells indicate the distribution and thickness of underground deposits that might bear water. Oil companies use the shells as an index to oil reserves in some areas.

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ORNITHOLOGY

Sun and Stars Thought To Aid Birds in Migration

➤ HOW DO birds navigate in their north and south migrations? That is a question man has puzzled over for many thousands of years. It is a question for which scientists are at last beginning to find answers.

Frank C. Bellrose, game specialist of the Illinois Natural History Survey, recently joined scientists of England, Germany and Switzerland in contributing to a solution of the mystery of bird navigation.

Working with wild mallards, Mr. Bellrose developed the hypothesis that waterfowl use the sun and stars as aids in charting their courses.

Mr. Bellrose and Robert Crompton, field assistant, trapped mallards along the Illinois River, removed them various distances from the river, released them under various weather conditions, and charted their initial lines of flight.

When weather was clear and sun or stars were visible, the mallards almost invariably set off in a northward direction. When sun or stars were obscured by clouds, the birds acted confused, and set off in any of various directions.

The scientists were able to follow the night flights by means of a tiny flashlight attached to a leg of each bird.

Time of day or of year, as well as wind

direction and velocity, made no difference in the orientation patterns. Only when ducks were held in captivity for a month or more did they lose their ability to orient northward on clear days or nights.

Mr. Bellrose believes the initial northward orientation on the sun or stars is only part of the larger navigation picture. Upon release, the birds fly northward until they are sure of their bearings. In spring they continue their flight northward, and in fall they reverse their course and fly southward.

At the present time, he is working with blue-winged teals to see if other species have flight behavior patterns similar to those of the mallard.

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PHYSIOLOGY

How Seals Dive Helps Jet Scientists

➤ WILD SEALS are being used by a team of scientists from the London Hospital Medical College to help pilots to withstand intense pressures in supersonic planes.

The scientists go to the lonely shores of the Wash, on the east coast of England where seals abound. They are finding how the seals can dive to a depth of 300 feet without damaging their lungs.

The scientists have a difficult time themselves while catching the seals. Several of them have fallen overboard from their small boat. They have been bitten many times.

"The seals are really fierce, and catching them is quite a hazard," one scientist said. "But we must get them. They have amazing lungs and if we can find out more about them and their breathing we can help pilots and other people who are subjected to intense pressures, such as men escaping from submarines."

Some seals are caught and kept in tanks in the college grounds. Others are thrown back in the water after on-the-spot heart tests.

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GENERAL SCIENCE

U. S. Engineering Schools Research in the Millions

➤ THE NATION'S engineering schools spent more than one-fourth of all the dollars doled out for research by American colleges and universities during the 1953-54 period, the National Science Foundation reported.

Approximately \$75,000,000 was expended by the engineering schools for research and development projects. Of this amount, \$55,000,000 represented support by the Federal Government, mostly contracts with the Department of Defense. Altogether, in 1953-54, American schools spent \$300,000,000 on research and development.

Eighteen of the 109 schools surveyed reported each had separately budgeted research expenditures of over \$1,000,000. The study also showed the bulk of the money went for projects in the electrical and aeronautical departments and that the preponderance of research was applied rather than basic.

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PHARMACOLOGY

Report Three New Antibiotic Drugs

➤ THREE NEW antibiotics, Telomycin, pimaricin and sulfocidin, were reported by drug researchers at the Fifth Annual Symposium on Antibiotics meeting in Washington, D. C.

Telomycin has been isolated from an unidentified species of Actinomycete fungus and is active against the type of bacteria that causes pneumonia, tuberculosis, and other diseases. Its discovery was reported by a research team from Bristol Laboratories, Inc., Syracuse, N. Y.

Pimaricin works against a large number of fungus growths and yeast. The drug has no effect on bacteria, scientists from the Royal Dutch Yeast and Fermentation Industries, Delft, Holland, reported to the symposium.

The third new antibiotic, sulfocidin, was found in the broth of an undescribed strain of Streptomyces fungus.

It has been found to be active against both bacteria and fungi and only small amounts of it are needed against many types of bacteria. It is also active against some tumors in mice. It was reported by Drs. Morris Zief, Robert Woodside and George E. Ham of the J. T. Baker Chemical Co., Phillipsburg, N. J.

Reporting on Telomycin were Drs. M. Misiak, O. B. Fardig, A. Gourevitch, D. L. Johnson, I. R. Hooper and J. Lein. The Dutch researchers reporting on pimaricin were Drs. A. P. Struyk, I. Hoette, G. Drost, J. M. Waisvisz, Th. van Eek and J. C. Doogerheide.

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NATURAL RESOURCES

Water Will Be Plentiful But Increasingly Costly

➤ MOST OF THE NATION will have enough water to meet its needs for a long time to come, but the water will cost more and more, Dr. T. B. Nolan, director of the U. S. Geological Survey, said at the Fourth National Watershed Congress meeting in Atlanta, Ga.

"We can say emphatically," Dr. Nolan told conservationists and water experts, "that we will have water to meet our needs except for irrigation in the arid or sub-humid regions in the immediate and even the reasonably distant future. We can say with equal emphasis that there is not the slightest possibility of obtaining new supplies at the same cost as we get those used today.

"This is not a matter of inflation—it is the law of diminishing returns. In resource development, the best and cheapest sites are utilized first, so inevitably increased use is accompanied by increased cost."

"In short," he told the meeting, "the problem is water and people. This being so, water-resource development can proceed in no other fashion than which takes place under the brilliant light of full, if sometimes bitter, public discussion."

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