BIOLOGY

Exchange Hydrogen Hearts

That living processes within our bodies exchange energy by tossing protons back and forth is novel idea. Analogy to electric battery is drawn.

➤ A NEW idea of how living processes within our bodies exchange energy by tossing back and forth the hearts of hydrogen atoms, called protons, was presented to the National Academy of Sciences meeting in Washington, D. C.

Instead of electricity, which is the exchange of electrons, doing the work, the heavier protons are exchanged in the novel conception of Dr. Theodore Shedlovsky, of the Rockefeller Institute for Medical Research, New York.

The biological battery that makes our nerves work uses these protons in the same way that an electric battery is operated by electrons, which flow in electricity.

Explanation of life processes on an electrical basis has been hampered by the lack of good conductors, such as metals, within living matter. But water and acids, which do exist in the body, can conduct protons. Pure water is an 80% conductor of protons compared with metal being 100% conducting for the electrons that make up electricity.

Protochemistry, as Dr. Shedlovsky calls it by analogy with electrochemistry, seems to appeal to many who have studied life processes as a logical explanation of what can happen within living cells and tissues. But it will be very difficult to demonstrate the reality of the effect in living matter. Dr. Shedlovsky has experiments to show the existence of proton conductance, using the so-called glass electrode that is familiar to biologists. This is a tube of glass, through which the hydrogen ions, as the protons are also called, can pass.

The energy potential in such a glass "protode," as he calls it, combined with a fatty acid protode is sufficient to give the energy that living processes require.

"The biological bill for living energy can not be paid by electrons," Dr. Shedlovsky explained, "but it can be paid with protons."

In chemical terms, the new theory finds that the oxidation-reduction system does not operate in living matter, but the acid-base system does.

Just as theory has preceded practice in atomic energy and other fields, this new idea may help scientists to understand life more clearly.

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ELECTRONICS

Electronic Business System

➤ A COMPLETELY electronic record-keeping system — untouched by human hands—could be built starting right now. It might be used, for instance, to figure and make out gas bills or insurance premium payment notices, or to keep track of inventory for the military or in a department store.

But even though our knowledge is sufficient to build a pilot model of a electronic record keeper, it will need the investment of "one megabuck," states Dr. S. N. Alexander of the National Bureau of Standards.

One megabuck, he told the Washington section of the American Institute of Electrical Engineers, is $1,000,000. That much money and about three years of hard work would give a pilot model of the desired machine, he predicted.

The elements needed to build such a pilot model are available now. A pilot model is preferable to a full-sized machine, Dr. Alexander said, in order to iron out the "bugs" that might show up. Scientists could now build such a machine if they had the money.

Although the electronic computers have been used mostly for complicated mathematical problems, the steps involved in record keeping would be equivalent. To get information into the machine and out of it at the rate at which it is capable of chewing up data, using a magnetic recorder seemed most likely, Dr. Alexander said.

He likened the problem of feeding information to the machine by specially set-up instructions, as is now generally done, to feeding a modern production line with goods brought to the factory by ox-cart.

The magnetic recorder would work somewhat like the automatic weather forecasts that can be heard repeating current weather predictions on the telephone. The machine's recorder, however, would have, not information by voice, but information coded in somewhat the same way as teletype printers. The record player would then turn until it came to the desired information on the tape, John Doe's account number and account, for instance. This could then be processed by the arithmetic, or computer, unit according to instructions. The results would then be put back into the magnetic recorder file, either adding to the information already there or starting fresh, since magnetic tapes can be cleared of previous records.

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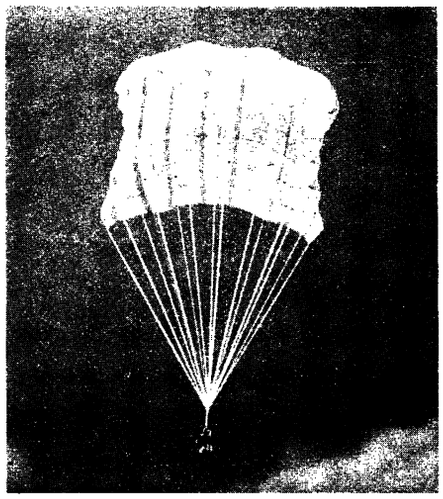

COTTON PARACHUTE — Square cargo chute made from strips of cotton muslin will replace the old rayon cargo chute. The unique strip design gives added strength to the new type chute.

AERONAUTICS

Square Cotton Parachute Replaces Rayon for Cargo

➤ A SQUARE of cotton muslin strips constitutes a new inexpensive type of parachute for dropping cargo packages from airplanes. It is designed to replace the more costly rayon cargo delivery parachute now in use.

Developed at the Wright-Patterson Air Force Base, Dayton, Ohio, the parachute has already successfully undergone severe field testing. The cotton chute will deliver 500 pounds of cargo from a plane traveling 175 miles an hour. Its rayon predecessor could handle only 300 pounds at 150 miles an hour.

The official tag for this parachute is the G-13. It is rated as "expendable" because cheap. The secret of its strength lies in the simple design. It is fabricated from nine strips of material attached to cotton tapes to form a 28-foot square.

Up-rushing air can escape through spaces between the strips, thus cutting down opening shock and enabling it to carry heavier loads.

One of these 28-foot square parachutes costs only half as much as the 24-foot rayon chute it replaces. For heavy cargo drops, a cluster of them may be used. Four of them can be used to replace the present large 64-foot nylon chute. The cost of the four is only one-fourth that of the nylon type.

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Diffraction *gratings,* which can be used to identify 100,000 color segments of the spectrum, are made of aluminum-coated glass and may have up to 30,000 parallel lines etched on their surfaces.