PHYSIOLOGY

Must Rush Life-Saving Shocks To Save the Electrocuted

Electric Counter-Shocks Within Four Minutes Revive Dead Animals Without Surgery; Stop Heart Fibrillation

IN CASES of accidental electrocution, life-saving electric counter-shocks must be administered within four minutes. Otherwise all hope of reviving the dead must be abandoned.

Research by Prof. William T. McNiff and Dr. Leonard J. Piccoli of Fordham University has demonstrated this urgent need for heroic treatment of electrical workers or others who suffer killing shocks. But they warned:

"The method of counter-shock would be absolutely ineffectual in reviving any victim of electric shock resulting from legal electrocution."

Their studies showed that damage to animals from electric shock was most severe when one electrode of the shocking apparatus was attached to the skull and the other to the tail. In legal electrocution one electrode is attached to the base of the brain and the other to the calf of the leg. The result, as in the head-to-tail arrangement on animals, is that a strong current causes death by paralysis and destruction of the brain. Furthermore, the body temperature becomes so high in any case of legal electrocution, more than 140 degrees Fahrenheit, that the reestablishment of the blood circulation is impossible.

Like other investigators in this field, Prof. McNiff and Dr. Piccoli find that electric shock kills its victims by throwing the heart into what doctors call fibrillation. This is a condition in which each fiber of the heart muscle contracts individually. The effect is a useless twitching, instead of a strong contraction that will force the blood out into the body.

Counter-shock with a 60-cycle alternating current applied for a very short time stops this fibrillating and revives the animals. The method has been applied in cases of fibrillation during operation when the heart is already exposed and electrodes can be applied directly. But the Fordham investigators point out that by their method of applying one electrode to the back and another to the chest, both near the heart area, it is possible to revive animals without surgery and should be possible in the same way to revive victims of accidental electric shock.

This method should, they feel, be particularly valuable in accidental electric shocks encountered in electrical industries, because in these accidents the victim is generally shocked not through the head but through the arm or body.

Following revival by counter-shock, the patient should be kept in a room the temperature of which is at least 60 degrees Fahrenheit. Animals revived but kept at lower temperatures did not survive.

The Fordham investigators also found that following electric shock animals were ready prey to tuberculosis. They died in from one-sixth to one-third the normal time when tuberculosis germs were injected following revival from previous electric shock.

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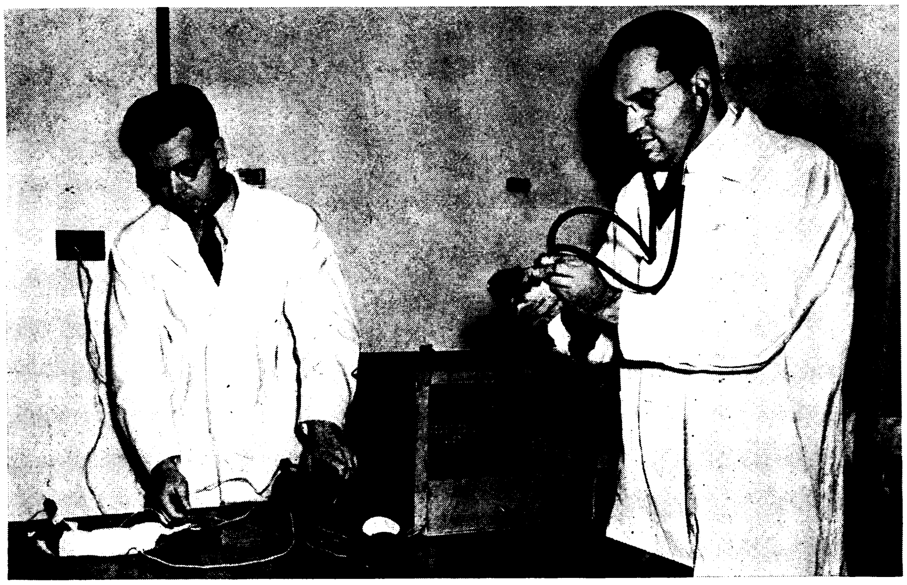

GIVING LIFE

Prof. William T. McNiff, left, is about to restore life to a guinea pig dead from electric shock as Dr. Leonard J. Piccoli listens with a stethoscope to the heart of an animal already so restored.

TECHNOLOGY

Better Coking of Coal Results from Researches

CHEAPER, better and more versatile coking of coal is in prospect as the result of five years of fundamental research at the Coal Research Laboratory of the Carnegie Institute of Technology.

By breaking with traditional methods of turning bituminous coal into coke, gas, tar and chemicals, William B. Warren explained to leading industrialists, it should be possible for coke oven operators to decrease cost, cut operating time by a third, while improving quality and yield of coke.

Mr. Warren recommended that coal be preconditioned before coking by warming it to 200-400 degrees Centigrade (400-750 degrees Fahrenheit). This precarbonization treatment could be carried out in low temperature apparatus that is much less expensive than the coke ovens themselves.

Delving into just what happens when coal is heated and carbonized, Mr. Warren evolved a theory. This theory, applied to practical operation of coke ovens, promises the large economies.

First, when coal is heated the large molecules break apart into much smaller units. At slightly higher temperatures, surface changes take place within the coal that cause the little units to recombine into larger ones once more. This takes place slowly and this temperature must be held for a time. Then as the temperature is raised real thermal decomposition takes place. The surfaces of the molecules are attacked and portions torn off, appearing as tar and gas.

By manipulating the process so that the molecules have large surfaces, which means the molecules are small in size, more tar is produced at the expense of coke. Or if tar is not desired, the high temperatures can be used when the molecules are large.

There is hope that the new knowledge of coking will allow the making of coke from coals which are not at present considered "coking coals."

One-sixth of all the coal produced in the United States is coked and the new methods promised by the Carnegie Institute's researches are for that reason of great economic importance. From coal, in addition to coke and gas, come ammonia and a vast array of drugs, perfumes, chemicals and dyes made from the coal tar.

The Carnegie Institute of Technology's coal research laboratory began operation in 1930 as the result of the international coal conferences organized by Dr. Thomas S. Baker, now president emeritus. Need for fundamental research on coal revealed at these conferences caused Dr. Baker to project and materialize the laboratory, which is the only one of its kind in America. The Buhl Foundation and commercial firms using and producing coal have supported the laboratory.

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BIOCHEMISTRY

Quick Chemical Test for Antineuritic Vitamin B_1

TESTS for the antineuritic vitamin B in foods and food preparations may be very much speeded up as the result of a new method discovered by Drs. E. V. McCollum and H. J. Prebluda of the Johns Hopkins School of Hygiene and Public Health. If successful, this test will be the first chemical test for this vitamin (*Science,* Nov. 27).

A purple red color shows the presence of vitamin B (known to scientists as vitamin B_1) when certain aniline derivatives are added to the vitamin or to foods containing it, the scientists report.

The aniline derivatives are p-amino acetanilid or methyl-p-amino phenyl ketone. Either of these after treatment with nitrous acid produces the characteristic purple red compound when added to vitamin B under certain conditions. The compound is stable and highly insoluble in water. It shows not only the presence of vitamin B but also the amount of the vitamin in the food or food compound. This compound may also give a relatively simple method of obtaining the vitamin in concentrated form. Crystals of the pure vitamin can now be obtained, but by a tedious and expensive method.

Chief advantage of the new test for the vitamin is its speed. Heretofore when scientists wanted to determine whether vitamin B was present in a food or food compound, they had to study the effect of the food when fed to animals that were not getting vitamin B from any other source. This took much time. Yet it was from these animal studies that scientists learned that yeast and whole grains are good sources of the vitamin, and that it is also present in lesser amounts in other foods.

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CHEMISTRY

Four Types of Plastics Now in Familiar Use

A FEW years ago metal, wood, ceramics, rubber, concrete and stone comprised the list of common materials in everyday use. Chemistry has added another class of widely used materials: plastics.

Every day nearly every American handles or uses an organic plastic of some sort. An electric switch, a button on your clothes, an automobile part, jewelry, or a knife handle; these and a thousand other things about you are made of materials that have come out of the laboratory in a relatively few years. Some of the trade names used for plastics are now common words: Bakelite, Celluloid, Beetleware, Cellophane.

Gordon M. Kline in the National Bureau of Standards circular 411 (obtainable from Government Printing Office, Washington, D. C., 5 cents) describes four principal types of organic plastics.

Synthetic Resins

1. Synthetic resins have been produced having the hardness of stone, the transparency of glass, the flexibility of rubber, or the insulating ability of mica. In combination with suitable fillers, they are readily molded into products characterized by excellent strength, light weight, dimensional stability, and resistance to moisture, moderate heat, sunlight, and other deteriorating factors. Some of the cheap raw materials used in their production include phenol, urea, formaldehyde, glycerol, phthalic anhydride, acetylene, and petroleum.

2. Natural resins are more familiarly known by their common names, such as shellac, rosin, asphalt, and pitch, than by proprietary names attached by manufacturers to molding compositions prepared from them. They are used in industry for the production of the fusible type of molded product as distinguished from the infusible articles formed by some of the synthetic resins.

3. The cellulose derivatives are probably the most widely used and best known of any of these materials. To this group belong Celluloid and other cellulose nitrate plastics; cellulose acetate commonly used in the Celanese type of rayon and as a substitute for the slightly less expensive nitrated product when nonflammability is desired; and regenerated cellulose familiar as Cellophane and the common or viscose type of rayon. The basic raw material, cellulose, is obtainable in fairly pure, fibrous condition as either ordinary cotton or pulped wood. Treatment with suitable chemicals converts cellulose into compounds which are characterized by the ease with which they can be formed into desired shapes.

From Milk and Beans

4. The protein plastics are perhaps best known according to the source of the raw material, for example, casein from skimmed milk and soybean meal from soy beans. These protein substances are thoroughly kneaded into a colloidal mass, which is then formed into sheets, rods, or tubes by suitable presses or extrusion devices. The formed pieces are hardened by treatment with formaldehyde. The finished products are machined from blanks cut from the hardened material.

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