

Faith in Science Urged

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Faith in science, Sir Cyril told his colleagues, is not incompatible with other kinds of faith. He said that there seems to be no inconsistency in believing that scientific knowledge is itself one of the great instruments of higher ends.

Sir Cyril predicted that in the future a great upheaval of ideas may well cause a complete re-orientation of science in relation to philosophy and to the conceptions of possible worlds.

He said the Royal Society's responsibility is to work as a smaller creative community within the larger. Its members have responsibility to mankind in general as well as to their native country and the Royal Society.

The most original minds, Sir Cyril said, are those who continue the work done by their predecessors and whose own work is fulfilled by their successors.

He said that this trait is true not only of genius but of all men. This continuity is the stuff of history and is what the Royal Society honors at its tercentenary celebration.

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Do You Know

Americans are expected to draw perhaps 12 billion *checks* for all purposes in 1960—double the volume of ten years ago.

Of the 573,000 tons of *natural rubber* imported by the United States in 1959, 185,000 tons came from Malaya and 158,000 tons from Indonesia.

A recent census showed 36 unprovoked attacks on swimmers by *sharks* in 1959, 13 of which resulted in death.

The Geological Survey plans to conduct an inventory of *water use* in the United States in 1960.

The Soviet Union is currently graduating 90,000 *engineers* annually, double the number of United States engineering graduates.

One birth in 87 produces *twins*, and, among twins, only one set in three is identical.

Questions

ANTHROPOLOGY—Who were the two most famous lawyers in the Scopes trial? p. 69.

ASTRONOMY—What is the diameter of the white dots found in a sunspot? p. 66.

GENERAL SCIENCE—What are three important results of space research? p. 70.

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METALLURGY

Iron Rust Theory Given

A BASIC EXPLANATION for the rusting of iron, one of the most destructive and wasteful chemical reactions known, has been found by Dr. Earl A. Gulbransen and T. P. Copan at Westinghouse Research Laboratories, Pittsburgh, Pa.

Iron corrosion is believed to waste up to seven billion dollars annually in the United States alone. Eighty million dollars alone are spent by automobile owners replacing mufflers each year.

The new theory suggests that hydrogen ions are the culprit. The hydrogen ions come from water vapor, which must be present if iron rusts very much at room temperature. The tiny hydrogen particles are thought to penetrate the iron and enlarge the sites at which oxygen normally combines with the metal.

Previous explanation for iron corrosion was that it is an electrochemical reaction, somewhat like that occurring in an ordinary battery. The new theory suggests that something more fundamental takes place in the iron, although an electrochemical reaction may also be present.

In a series of experiments during which the conditions required for electrochemical reactions were eliminated, the Westinghouse scientists reduced the rusting of iron to the simplest possible process. Pure iron wires about as thick as a fine sewing thread were reacted with oxygen and then with water vapor at 835 degrees Fahrenheit under controlled conditions.

Results of the corrosion were then studied under an electron microscope capable of magnifying objects up to 300,000 times.

The scientists reported that with dry oxygen the iron forms a protective coating from which grow billions of tiny round oxide whiskers less than one-millionth of an inch in diameter and 30-millionths of an inch high. Each whisker grows from a single, specific growth site.

With water vapor, however, there is a "startling change" in the oxide surface, the scientists reported. From the growth sites erupt thin, pointed bits of iron oxide that spread across the metal surface. Shaped somewhat like blades of grass, they are about one-millionth of an inch thick, 30-millionths of an inch wide and 300-millionths of an inch high.

As they grow, they spread more than 50 times in area over the sites observed for dry oxygen alone, reaching a density of nearly one billion per square inch of surface area.

The amount of iron rust they represent is 250 times that which forms when the water vapor, and the hydrogen ions it releases, are absent from the reaction.

The experiments by the Westinghouse scientists show that less than one part of water vapor in 200 parts of the dry oxygen atmosphere will cause the blade-shaped crystals to form. At room temperature this would correspond to a relative humidity of about three percent.

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MEDICINE

Hypertension Research

HIGH BLOOD PRESSURE (hypertension) caused by poor kidney blood supply can be corrected by surgery linking the main aorta and the kidney with synthetic vessels.

Dr. John R. Derrick of the medical branch of the University of Texas made this report at a meeting of the International Congress of Medicine and Surgery at the University of Puebla, 50 miles from Mexico City.

A minority of persons have a kidney that depends upon two or three small arteries rather than one big artery for its major blood supply, Dr. Derrick pointed out. He explained that research at the medical branch revealed that a blood-starved kidney of this kind gets local help when it calls for more blood, but usually this is at the cost of increasing blood pressure throughout the entire body. It also is a contributing cause of heart damage.

Dr. Derrick reported on a three-year study based on autopsy examinations of 520 hospital patients, many of whom had high blood pressure. The investigators found that 69% of the adults with small, dual kidney arteries had suffered from hypertension. Only 17.7%, a six-to-one ratio, of those with one large normal artery per kidney had this trouble.

Surgeons at the medical branch and elsewhere have been successful in a high percentage of cases in reducing blood pressure permanently by linking the main aorta and the kidney with synthetic vessels.

When a kidney needs more blood, the organ produces a chemical substance called renin. This is combined in the system with a substance in the liver known as angiotensinogen. This combination produces angiotensin, which then flows throughout the entire blood system of the body, causing a constriction of blood vessels resulting in elevation of the patient's blood pressure.

Dr. Derrick said further study in flow dynamics (motion and force) of blood is needed to bear out the initial findings of the medical research team.

To determine what kind of arteries supply a patient's kidney with blood, doctors are using new techniques for injecting dyes into the blood system of the suspect area, after which they obtain accurate X-ray photos.

The American Heart Association supported the research work of the Texas investigators.

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