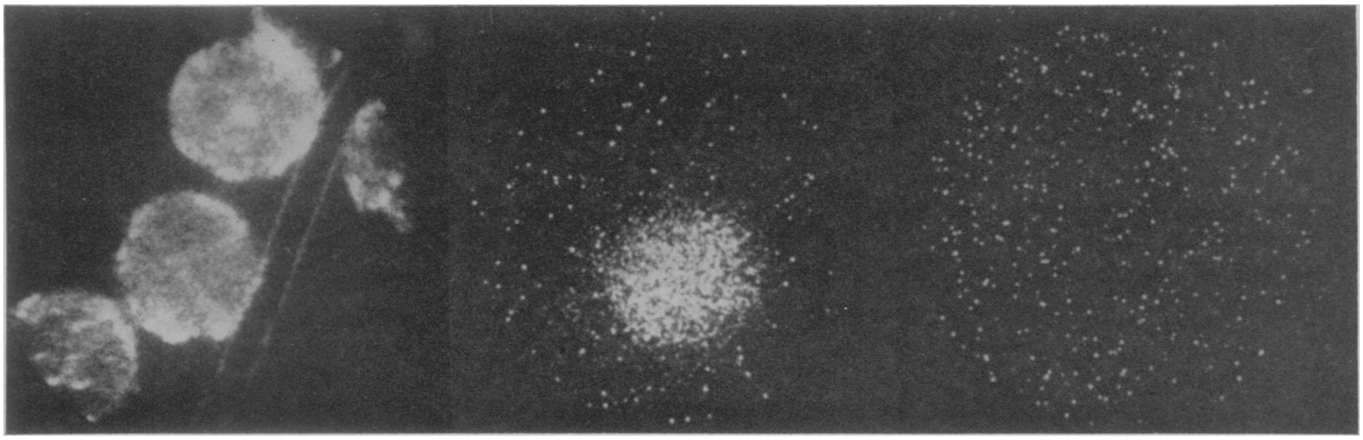

George T. Reynolds

BIOLUMINESCENT FLASHES—Flashes of bioluminescence of a single Gonyaulax polyedra cell (center), two-second exposure, photographed at the output of an image intensifier in a field view of 100 microns are shown in comparison with (left) polarizing microscope illumination, 1/100 second and (right) illumination due to noise, five-second exposure.

BIOPHYSICS

Cell Visible by Own Light

A single living cell can now be photographed by means of its own light intensified up to a million and a half times—By Ann Ewing

➤ SCIENTISTS CAN NOW "see" a single living cell made visible by its own light.

A new image intensifier, which amplifies the very faint light of an individual cell in a way somewhat like the television screen makes its bright picture, has been developed. It can be made to amplify light as much as a million and a half times.

This image intensifier is also being tested for astronomical photography.

The first photographs of a living cell taken by means of its own light were shown by Dr. George T. Reynolds of Princeton University, Princeton, N. J. He used the image intensifier with a microscope to take pictures of *Noctiluca miliaris,* a tiny sea creature that gives the ocean its phosphorescent glow when present in large numbers.

Each individual organism is very faintly luminescent, but this dim light is enough to make its own picture with the light-amplifying device. The organism can thus be investigated without the disturbing effects of external lighting.

The luminescence appears to come from specific spots on the surface of the cell, Dr. Reynolds reported to a symposium on scintillation counters at the Shoreham Hotel, Washington, D. C. The image intensifier Dr. Reynolds used was made by the English Electric Valve Co., Ltd., and amplifies light 500,000 times.

The pictures were taken at the Marine Biological Laboratory, Woods Hole, Mass., with the cooperation of Drs. R. D. Allen, S. Inoue, J. W. Hastings and R. Eckert. The work was supported by the Office of Naval Research, U.S. Public Health Service and the National Science Foundation.

The same kind of light amplifier has been used at Kitt Peak National Observatory, Tucson, Ariz., to take stellar photographs. Its use cut the exposure time required from as much as an hour and a half to two minutes.

The image intensifier consists of a photosensitive surface and a viewing screen, with five intervening membranes of aluminum oxide, each a one-hundred-thousandth of an inch thick.

Light from a distant star, for example, causes the emission of electrons from the photosensitive surface. Each of these electrons is multiplied several times at each membrane so that, after five such multiplications, an amplification of more than 500,000 is attained.

Tubes amplifying light to 1.5 million times have been built.

• Science News Letter, 85:178 March 21, 1964

PHYSICS

Element Thorium May Be Key to Nuclear Power

➤ A LITTLE-KNOWN but plentiful nuclear age element, thorium, may hold the key to U.S. future in atomic power.

The country will eat up its principal nuclear fuel, low-cost natural uranium, within 26 years if use of atomic power grows as expected, scientists of the Babcock & Wilcox Company predict.

If only four of every ten new reactors are of the thorium type, the threat of a nuclear fuel shortage will disappear. Less than one-fourth as much uranium will be required and the U.S. annual electric bill will be cut by $150 million, Babcock & Wilcox experts claim.

Current estimates of low-cost uranium ore reserves, about 700,000 tons, show that nuclear fission will not be a significant future source of energy unless the extra neutrons produced by a fission reaction are used to make new fuel.

Industry is studying two routes for the continuing development of commercial nuclear power.

The two "fertile" materials being considered as raw materials for conversion into man-made nuclear fuels are thorium and non-fissionable uranium-238, the preponderant isotope of natural uranium.

For current and most future reactors, thorium is the more practical and technically easier route of the two for improving fuel utilization and lowering its cost, the experts believe. Thorium is about four times as plentiful as natural uranium.

Thorium can be used with uranium-235 in a reactor to absorb some of the extra neutrons not needed to sustain the chain reaction to produce uranium-233, which is a fissionable isotope. Reactors using the U-233-thorium fuel cycle essentially are developed.

The much more difficult route is the development of fast breeder reactors using plutonium fuel. Here, the extra neutrons are absorbed by uranium-238 to produce plutonium-239, a new fissionable isotope.

Operating with fast neutrons, fast breeder reactors promise to make more fuel than they consume. Technical problems are formidable so development of these reactors may take a long time.

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PHYSICS

Alpha Particle Helium Nucleus Renamed Helion

➤ THE WORD "HELION" will be added to the language of science, if a suggestion made by Dr. Linus Pauling, twice-winning Nobelist of the California Institute of Technology, Pasadena, is adopted for the alpha particle or helium-4 or nucleus of the helium atom. The use of helion would bring the name of the helium-4 nucleus in line with electron, neutron, proton, deuteron and triton as an atomic particle.

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