

PHYSICS

Maser Works in "Heat"

Possible uses for the maser, microwave amplification by stimulated emission of radiation, have been extended since it can now be operated at "higher" temperatures.

► **DISCOVERY** that maser amplifiers can operate at a much "higher" temperature than previously known is reported by two British physicists.

In amplifying a weak signal, masers have the great advantage of adding very little background "noise," the equivalent for radio waves of the "snow" seen on television sets. The masers therefore can considerably extend the useful range of sensitive detecting equipment, such as radar or radio telescopes.

The finding that this new kind of microwave amplifier can be made to work at temperatures 60 degrees above zero on the absolute scale opens even more striking future uses for such devices than were expected. This is some 55 degrees higher than previous temperatures used with masers, although it is still mighty cold by usual standards, or about 350 degrees below zero Fahrenheit.

Drs. C. R. Ditchfield and P. A. Forrester of the Royal Radar Establishment, Great Malvern, England, report their discovery of this new action with a ruby maser in *Physical Review Letters* (Dec. 15) a publication of the American Physical Society.

They say the successful operation of a maser at 60 degrees absolute has a practical

importance because the equipment needed to cool a material to this temperature is considerably simpler and less cumbersome than that required to cool it to near zero degrees absolute. Drs. Ditchfield and Forrester used liquid oxygen and nitrogen to cool their ruby specimen, whereas liquid helium is needed to reach temperatures near absolute zero.

The scientists emphasize that their results are preliminary, and they expect better performance of their maser device in the future using equipment designed specifically for the job.

Maser is a coined word, an acronym for microwave amplification by stimulated emission of radiation. In contrast with regular microwave amplifiers, which rely on electronic processes, the maser depends on the properties of molecules.

The first masers used beams of gas, such as ammonia, but more recently scientists have found that solids, such as the ruby used by Drs. Ditchfield and Forrester, are more satisfactory for many purposes. A ruby maser was used for the first time this year with the 50-foot antenna at the Naval Research Laboratory, Washington, and increased its sensitivity many times.

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GENERAL SCIENCE

USSR Science "Impressive"

With the growing importance of the role Russian scientists are playing in making administrative decisions, more emphasis should be placed on scientific exchanges.

► **RUSSIAN SCIENTISTS** are playing an important role in making administrative decisions in Government.

This fact, together with the average Russian scientist's ignorance about the United States and American science, gives an added importance to scientific exchanges between the two countries, Dr. Fred Cagle of Tulane University said.

Just returned from a 41-day trip through the U.S.S.R., Dr. Cagle said that it is now possible for American scientists to visit Russian laboratories and scientific institutions through the regular "In-Tourist" facilities. He covered some 14,000 miles, visiting and talking with more than 200 biologists. At some places Dr. Cagle, who is chairman of the zoology department at Tulane, was the first American scientist to visit.

"I am firmly convinced," he said, "that we have simple administrative devices for getting scientists into Russia."

Although, generally speaking, the Russians are about ten years behind us in biology, Dr. Cagle said, in some fields of the biological sciences their work is very impressive. In inventorying biological resources, such as taking stock of plant and animal life in unexplored areas, the Russians are doing excellent work.

Planning biological research is also conducted in a different manner than in the U.S., he said. For example, if Government officials decide to drain a swamp, scientists are first called in to set up a program. In this way basic research is often carried on preliminary to an applied science program.

We seem to have over-emphasized the influence Lysenko has had on Russian physiology and genetics, Dr. Cagle reported. This may be a result of our lack of information on Russian science since "we have been derelict in obtaining their publications." However, Pavlov remains a strong influence and may have hampered

Russian science in physiology and behavior.

In conversations with the leading Russian biologists, Dr. Cagle found a great lack of information on how scientists worked in the U.S. and how their private laboratories and science institutions functioned.

Concerning the question of scientific freedom, Dr. Cagle said that leading scientists are apparently given complete freedom to study and research. However, the young scientist just graduated worked within a "dictated framework" until his superiors decide he is good enough to carry on independent research.

Dr. Cagle traveled as the official representative of the American Institute of Biological Sciences.

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PHYSIOLOGY

Study Fishes for Facts On Tooth Formation

► **MOST FISH** solve the problem of old, worn out teeth very simply: they replace older teeth by newly formed ones.

Some fish have teeth in their jaws, others such as the carp, goldfish and minnows, have a very efficient set of teeth in their throats, Prof. Howard E. Evans of the New York State Veterinary College said. Regardless of the type of tooth or fish, however, Prof. Evans reported, they are constantly being replaced.

Some fish show an alternate replacement similar to the firing of a five-cycle engine, 1-4-2-5-3. Others show a progressive replacement of 1-2-3-4-5, he told scientists at the vertebrate symposium of the American Society of Zoologists. The meeting is part of the American Association for the Advancement of Science.

There are many questions raised by the study of fish teeth which when answered will shed light on the mechanisms of tooth loss and formation in vertebrates, Prof. Evans concluded.

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BIOLOGY

Algae Studies Show Light Adds to Nuclear Volume

► **"LIGHT-STRUCK"** *Euglena* may explain how visible light helps radiation-damaged cells.

When grown at 95 degrees Fahrenheit, *Euglena* loses its chlorophyll, the pigment that makes it green. It also becomes distorted, enlarged and contains many nuclei instead of the usual one, Dr. J. A. Gross of Michigan State University reported.

Further tests showed, Dr. Gross explained in a paper read by title to scientists at the annual meeting of the AAAS, that light influences the proportion of cytoplasm to nucleus regardless of the temperature.

If the manufacture of nucleoprotein is stimulated by light in this organism, the same may be true in other cells, Dr. Gross concluded. It may explain why visible light induces recovery in cells previously exposed to ultraviolet radiations which are known to damage nucleoprotein materials.

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