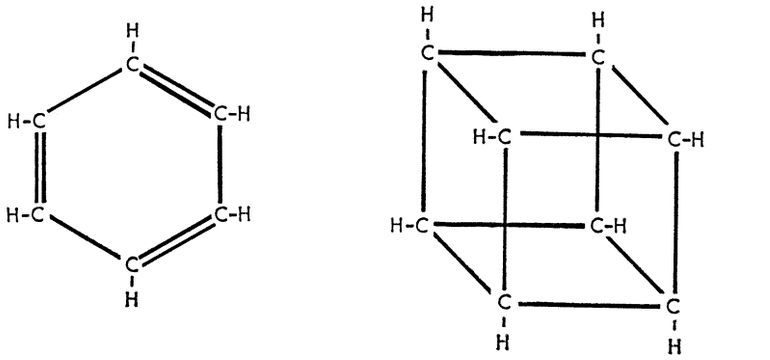

National Science Foundation

CUBANE SYNTHESIZED—On the left, is a diagram of the benzene ring, a six-carbon ring, showing the positions of the carbon and hydrogen atoms in the molecule. On the right, is a diagram of the molecular arrangement of cubane.

CHEMISTRY

New Chemical Molecule

A laboratory-produced organic compound, cubane, has a new box-like chemical structure and has potential uses in drugs, pesticides, herbicides and fungicides.

➤ SYNTHESIS of a new molecule, called cubane because of its box-like chemical structure has been cited as an outstanding achievement in the National Science Foundation's 1964 annual report. Chemical companies already see possibilities in cubane compounds as drugs against viruses.

Dr. Philip E. Eaton, a 28-year-old chemist at the University of Chicago, in June 1964 completed the first successful synthesis of cubane in his research program supported by a Foundation grant. Since then cubane has attracted world-wide attention.

Cubane belongs to the important class of organic compounds known as hydrocarbons. In this group, carbon occupies the central position with hydrogen atoms attached. Up to now two basic types of hydrocarbons have been known. In one, the carbon atoms are arranged in a chain linearly and in the other the core carbons are arranged in a ring. If a ring has six members, each carbon atom has a single hydrogen atom attached to it and alternating carbons are doubly bonded.

In the newly synthesized cubane, the carbon core is radically different. The carbon atoms form a cube producing a box-like or cage structure with a cavity in the center. Each carbon in this molecule is bonded to three carbons and to a hydrogen atom.

Organic chemists have made many attempts to synthesize cubane over the years, the report points out. In 1961, for example, H. H. Freedman of the Dow Chemical Company succeeded in preparing a compound that has a cubical core of carbon atoms. Its complexity made it impossible at the time to be sure of its exact structure.

Dr. Eaton's discovery has paved the way to extensive study of the chemistry of box-like molecular structures. Chemists from United States universities have requested samples of cubane from Dr. Eaton, and an intensive study of its properties is underway.

Not only does cubane have potential practical applications in combating virus infections, but there is also a very good possibility that cubane compounds may have uses as pesticides, fungicides and herbicides. Derivatives of cubane containing chlorine and oxygen could exhibit properties that would make this possible.

• Science News Letter, 87:131 February 27, 1965

PHYSICS

Single Laser Beam Relays Seven Channels

➤ LASER COMMUNICATION is now making it possible to receive and relay, simultaneously, signals from seven television channels.

A single, pencil-thin light beam has been used to relay the seven New York City TV stations to seven different TV sets at the U.S. Army Electronics Command Laboratories, Ft. Monmouth, N.J.

Described by the Army as a "major breakthrough in laser communications," the achievement is viewed as a significant step toward enlarging communications capabilities for both general and military use. The engineers say that this test sets a new record for the amount of information transmitted on a single laser beam.

So far, the transmissions have been held to the laboratory. However, distances of several miles could be spanned directly in the open atmosphere. Unlimited transmission distances could be achieved, researchers say, by using relay stations.

In this successful test, the incoming signals from the TV stations were fed through a regular antenna on the roof of the laboratory and then through a preamplifier and amplifier.

The laser beam is then modulated with the television signals so that the light beam serves as a carrier for both picture and sound. Then the light from the laser modulator is received by a companion demodulator which reconverts the signals into their original form for broadcast on the seven sets.

• Science News Letter, 87:131 February 27, 1965

RADIO ASTRONOMY

Largest Mobile Antennas To Be Built Next Year

➤ THE WORLD'S LARGEST fully mobile antennas, eight 130-foot adjustable dishes to be mounted on rails, are to be built at the Owens Valley Radio Observatory, 250 miles north of Pasadena, Calif.

The first of the giant metal ears, to cost $1.2 million, is scheduled for completion in mid-1966. It is being financed by a $1,645,000 grant from the National Science Foundation to the California Institute of Technology, which has entered into a contract with the Westinghouse Electric Corporation to build the antenna.

The remainder of the grant is for the development of a digital computer drive system capable of operating and coordinating the antenna simultaneously.

The other seven ears are to be constructed during the next 10 years under a decade of development blueprinted for ground-based astronomy by the panel on astronomical facilities of the National Academy of Sciences.

In announcing the railway-carried dish, Dr. Lee A. DuBridge, California Institute of Technology president, said that "the addition of these radio telescopes will increase the observatory's power manyfold, and will enable it to 'see' farther and more accurately than any other radio observatory."

The antennas will supplement the existing twin 90-foot dishes at the observatory.

To accommodate the new facilities, the institute has leased 640 acres of land to be added to the present 940.

The rail system on which the dishes will roll is to be three miles long with a T spur 7,500 feet long.

On the rails, to be set 44 feet apart, the dishes may be moved into a variety of patterns. They can be used singly or linked together. Used together as a single observing unit, the dishes become the equivalent of a much larger antenna than it is now possible to build.

The system will be capable of sharply focusing very small objects, those down to a few seconds of arc in diameter. One second of arc is the size of a dime at a distance of 1.8 miles.

In outlining the project, Gordon J. Stanley, observatory director, said, "with our new ability to resolve and identify radio sources, it will be possible to tackle the cosmological problem of general relativity—that of the size and shape of the universe."

The shape of each dish will remain precise in winds up to 20 miles per hour. Each dish and its pedestal will weigh 406 tons. The pedestal will be 68 feet high.

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