of the National Academy of Sciences (1948), the Max Planck Medal of the German Physical Society (1955), and the Franklin Medal of the Franklin Institute of Philadelphia (1959).

Research Corporation Award

This year's Research Corporation Award has been presented to Bernd T. Matthias of the Bell Telephone Laboratories and the University of California at La Jolla. The $10 000 Award was given to Dr. Matthias on April 18th for "his discovery of new and unexpected ferroelectrics and superconductors, including those with the highest superconducting transition temperatures and those which have recently been shown to have the greatest potential for the production of large magnetic fields on a scale heretofore considered impossible. . . ."

Dr. Matthias, who was born in Frankfurt, received his PhD in physics from the Federal Institute of Technology in Zurich in 1943. He came to the United States four years later, and after spending a year at the Massachusetts Institute of Technology he became a member of the technical staff of Bell Telephone Laboratories in 1948. During the academic years 1949–51, while on leave from Bell Laboratories, he served as assistant professor of physics at the University of Chicago, and it was there that he began the intensive studies of superconducting materials that he and his colleagues have continued to pursue for the past twelve years.

Bernd T. Matthias

In announcing the award, the Research Corporation paid particular tribute to Dr. Matthias for his "foresight in recognizing the tremendous technological potential" of high-temperature superconductors. "Investigators all over the world have been stimulated by his researches," the announcement continued. "The most recent tabulation of superconducting materials lists over 500 entries and points out that most of them have been discovered by Matthias and co-workers. His researches have changed superconductivity from what was considered a rare phenomenon to one that is now known to occur quite commonly. In fact, his collaborative research in the past year has led to the discovery that molybdenum and irridium are superconductors and that the failure of previous investigators to uncover superconductivity in these elements was due to trace impurities of iron. This has opened up the possibility that all nonmagnetic metals will become superconducting when prepared free enough from trace impurities.

"His intuitive, uninhibited way of thinking and experimenting has led him to discover superconductivity where it was not at all expected. An early example is a compound containing elements that are normally ferromagnetic and semiconducting, respectively—namely, $CoSi_2$. He and his collaborators were *first* to synthesize the compound Nb_3Sn and discover it to be superconducting with the highest known transition temperature. This compound, together with V_3Ga, and the alloy system Nb-Zr, all of which were discovered by him and collaborators, have recently been found to possess the unexpected property of retaining superconductivity at unusually high magnetic fields, while carrying large electrical currents. As a result these three materials are currently being used in the production of high-magnetic-field superconducting solenoids.

"The multitude of ways in which humanity will benefit by the utilization of the superconducting properties of these materials which he has discovered are still hard to visualize. Most certainly they will make high (in excess of 100 kilogauss) magnetic fields a tool at the disposal of ordinary laboratories and research institutes in contrast to the present situation where they are restricted to a handful of large, expensive installations. The feasibility of obtaining large-volume high-magnetic fields with very little power consumption is having a great impact on, and causing much activity in, the field of controlled nuclear fusion. The use of high-field well-defined magnetic superconducting lenses gives promise of improving the resolution of electron diffraction cameras significantly and could make possible, for example, the direct observation of the atoms responsible for genetic coding in DNA molecules.

"Aside from the technological impact of Matthias' new superconducting systems, his researches have contributed much insight into the nature of superconductivity and its relation to ferromagnetism. Matthias has found that certain crystal structures such as the beta-tungsten and Laves phases are the most favorable for the occurrence of superconductivity and that within these structures the transition temperature is an oscillatory function of the average valence electron concentration per atom. Empirical relations which he has formulated are known in the literature as 'Matthias Rules' and have proved to be a useful guide. The application of these rules led, for example, to the discovery of the now famous Nb_3Sn.

"Recently he has discovered some systems that are simultaneously ferromagnetic and superconducting de-

spite the fact that the prevailing belief and standard treatises had considered the two phenomena to be incompatible. Both the remnant magnetism and the diamagnetic screening currents have been observed at the same temperature and magnetic fields for solutions of Gd in La, $GdOs_2$ in YOs_2, and $GdRu_2$ in $CeRu_2$. The dilute ferromagnetism which occurs in these systems is itself quite new. The strong interactions, sometimes favorable for the occurrence of superconductivity and other times not, that Matthias discovered between magnetic ions in superconductors led him to postulate there may be mechanisms other than the accepted phonon-electron interaction which can give rise to superconductivity. His intuitive view has been given added support by his recent collaborative discovery that the isotope effect (dependence of transition temperature upon isotopic mass), which heretofore had been considered a universal property of superconductivity, does not exist in the elements Ru and Os. These findings are proving to be important challenges for modern solid-state theory.

"Matthias has also made important contributions in the field of ferroelectricity. This activity has continued in parallel with his work in superconductivity. He and his colleagues have published more than 25 papers on ferroelectricity and have discovered unexpected new classes of ferroelectrics such as triglycine sulfate, guanidine aluminum sulfate hexahydrate, and simple ammonium sulfate. These surprising results have shown that the ferroelectric state which had previously been thought to be rare is actually quite common and has stimulated research by many other workers in fields of chemistry and biochemistry as well as in physics."

Dr. Matthias is currently serving both as a staff member at Bell Laboratories and as professor of physics at the University of California at La Jolla. He is a fellow of the American Physical Society.

Tillyer Medal

During the spring meeting of the Optical Society of America in Jacksonville, Fla., in March, the Society presented its Edgar D. Tillyer Medal for 1963 to Clarence H. Graham, profesor of psychology at Columbia University. Established by the Society ten years ago, the medal is bestowed biennially for accomplishment in the scientific understanding of human vision.

Professor Graham received his PhD in psychology from Clark University and served in the Psychology Departments at Temple, Clark, and Brown Universities prior to joining the Columbia faculty in 1945. In his more than seventy publications, he has contributed to many areas of physiological optics and vision. He was awarded the Warren Medal of the Society of Experimental Psychologists in 1941 for studies of the intensity-time and area-intensity relations in visual perception. During World War II, he directed several projects dealing with visual problems in the design of optical instruments and served on the Applied Psychology Panel of the National Defense Research Committee.