As a summary of these crop ratings, lands are listed as to their general agricultural worth or productivity. Each type receives a general agricultural rating, based primarily on its productivity for the great staple crops, particularly grass and grain crops. The most productive land is designated Grade 1. Land incapable of producing crops, such as rock outcrop or desert, is listed as Grade 10.

A supplementary index of productivity has been added in the case of all land types on which farm practice, mainly through the use of fertilizer, is more intensive than in standard practice. There are said to be some who believe this index to be the more important. It has the disadvantage, however, of becoming invalid with time and it gives no indication of the disadvantage of lands requiring fertilization to produce equivalent yields.

MOTION PICTURES AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THE first of a series of animated scientific and engineering motion pictures designed to facilitate methods of teaching has been completed by the new division of visual education at the Massachusetts Institute of Technology. It presents for the first time in visual animated form the behavior of an electrical wave as it travels along a 250-mile transmission line.

Other films in the proposed series include the presentation of descriptive geometry in animated form, the operation of complex machinery, principles of physics, problems of human relations and many others. This method of visual education is expected to be particularly effective in helping students to grasp the meaning of many of the more difficult subjects, which are not easily described by conventional teaching methods. The films, while designed primarily for instruction of students of the institute, are expected to be available to other educational institutions.

The new film "Traveling Waves on Transmission Lines" is a combination of animation and outdoor scenes showing various types of high voltage power lines. What happens when a switch is closed and electricity flows along such lines is graphically presented in the form of a dark wave flowing along a power line. The picture reveals that for a few millionths of a second after a switch is closed the electrical wave flows back and forth on the line and is often accompanied by extra high voltages. The effect is similar to the wave forms produced when water flows into a trough, strikes the end and rolls back and forth, finally reaching a steady level. The same phenomenon occurs on a smaller scale when an ordinary household light is turned on.

The mathematical analysis of the complete effect is so complicated that it has never been worked out, even for the simplest actual conditions. The form and progress of the electrical impulses have, however, been accurately reconstructed in the department of electrical engineering at the institute from precise continuous records made at short intervals along the line which was carrying the impulse. The study was made on a laboratory model of a 250-mile power line in which actual operating conditions could be reproduced. It was carried out by Professor Louis F. Woodruff. The films produced by the new division of visual education are being directed by Frank H. Conant, head of the photographic service, in consultation with Floyd H. Ramsdell, general manager of the Worcester Film Corporation.

PHOTOGRAPHIC TELESCOPE FOR THE LICK OBSERVATORY

A GIFT of $65,000 for the construction of a powerful wide-angle star camera or photographic telescope at Lick Observatory on Mt. Hamilton has been received by the University of California from the Carnegie Corporation of New York. This announcement was made by President Robert Gordon Sproul following the receipt of official notification of the gift from President F. P. Keppel, of the Carnegie Corporation.

Director R. G. Aitken, of the Lick Observatory, states that the instrument which is to be built will be the largest and most powerful of its kind, taking in a sky area of six or more degrees at the equator, and recording all stars down to at least the nineteenth magnitude in a two-hour exposure.

Stars of the nineteenth magnitude are about 150,000 times as faint as any that can be seen with the naked eye. An instrument capable of recording them will, according to the most reliable estimates, allow astronomers to study almost 300,000,000 stars in the stellar system immediately surrounding the earth.

Dr. Aitken adds that this gift, aside from being the largest received by Lick Observatory since its founding more than fifty years ago, will provide an instrument which in many ways will be the most powerful at Mt. Hamilton. It will enable astronomers stationed there to extend their investigations of the stars in several directions.

Particularly it will make possible a study of the structure and dynamics of the stellar galaxy, including the question of its rotation. This study will be carried on by Astronomer W. H. Wright, who submitted designs for the instrument with this purpose in view. It is hoped that the telescope will be completed and ready for use before the end of 1936.

Lick Observatory opened its doors in 1888, although the money for its construction was made available, and the search for a desirable site began fourteen years

before. The funds consisted of a deed of trust for $700,000, left in 1847 by James Lick.

GRANTS FOR RESEARCH OF THE VIRGINIA ACADEMY OF SCIENCE

AT the recent meeting of the Research Committee of the Virginia Academy of Science, the following grants were made in aid of scientific research in Virginia:

To Dr. J. W. Beams, of the University of Virginia, $150.00 for the study of the initiation of lightning discharges. He plans to photograph lightning discharges with a special camera which will make a million or more exposures each second.

To W. B. Bell, of the Virginia Polytechnic Institute, $28.50 to enable him to purchase a LaMotte blood pH outfit with which to study the reaction of the blood of normal and leukotic fowls. This work will be done in connection with Dr. E. P. Johnson, who won the academy prize last year for his work on the leukosis of fowls.

To Dr. Walter S. Flory, of Bridgewater College, $70.00 with which to purchase an oil-immersion objective and other accessories for the microscope needed in his study of the genetic cytology of the genus gilia of the phlox family. This is part of an extensive study of the character and significance of the chromosomes of various plants which is in progress at the Blandy Experimental Farm of the University of Virginia under the direction of Dr. O. E. White.

To Dr. H. B. Haag, of the Medical College of Virginia, $50.00 with which to purchase pigeons needed in the development of his new method of assaying preparations of digitalis.

To Dr. Carl C. Speidel, of the University of Virginia, $50.00 with which to purchase supplies for photomicrographic work in his study of living cells.

To Dr. Edward Steidtmann, of the Virginia Military Institute, $100.00 with which to purchase an electric hydrogen-ion apparatus for use in his study of the relation of hydrogen-ion concentration of the water to the formation of travertine deposits in the streams near Lexington, Va.

The money thus appropriated is the income from a trust fund which was raised for the academy a few years ago by Dr. J. Shelton Horsley when he was president. The purpose of the trust fund is to encourage and develop scientific research in Virginia.

Besides these grants made directly to research workers, the Research Committee, which administers the fund, also awards a prize of $50 each year at the annual meeting of the academy for an especially meritorious paper presented at that meeting.

These grants are made only to members of the Virginia Academy of Science, but the Research Committee is greatly interested also in the development and encouragement of scientific research in Virginia outside of its own membership and invites persons who have problems on which they need advice or assistance of any kind to communicate with any member of the committee or with the secretary of the academy.

The members of the Research Committee and their fields of interest are: Dr. William G. Guy, of the College of William and Mary, chemistry; Dr. J. Shelton Horsley, of St. Elizabeth's Hospital, Richmond (chairman), medicine; Dean Earle B. Norris, of the Virginia Polytechnic Institute, engineering; Dr. T. McN. Simpson, Jr., of Randolph-Macon College, mathematics, and Dr. O. E. White, of the University of Virginia, biology.

E. C. L. MILLER,
Secretary

GRANTS FOR RESEARCH OF THE GEOLOGICAL SOCIETY OF AMERICA

THE council of the Geological Society of America, meeting in New York in October, approved the following grants in aid of geologic research:

A grant of $3,000 to L. B. Slichter, for assistance and field expenses in connection with an investigation of the elastic properties of the upper crust of the earth.

A grant of $800 to John P. Buwalda, to cover field expenses in connection with geophysical investigation by seismic methods of the depth of fill in the Yosemite Valley.

A grant of $150 to Adolph E. Sandberg, to cover field expenses in study of the Keweenawan lavas of the north shore of Lake Superior.

A grant of $800 to Margaret Fuller Boos, to cover transportation, field and laboratory expenses in study of the youngest pre-Cambrian batholiths in the Front Range, Colorado.

A grant of $230 to P. S. Warren, for field expenses in connection with study of the Mississippian rocks of the Rocky Mountains of Canada, particularly near Crow's Nest Pass, Nordegg and Jasper.

A grant of $450 to F. Fitz Osborne, for field and laboratory expenses covering investigation of sills intruding the Lower Grenville near Shawinigan Falls, Quebec.

A grant of $250 to C. E. Resser, to cover field expenses in study of the Cambrian in the southern Appalachians.

A grant of $350 to Adolph Knopf, to cover the cost of chemical analyses of rocks from the Spanish Peaks, Colorado, in connection with study of the igneous geology of the region.

The council also made the following additional allowances in connection with researches which had received prior support from the society:

An additional grant of $500 to Paul MacClintock and Horace G. Richards, for completion of study of correlation of the marine deposits of Pleistocene age with those of known glacial origin, along the Central Atlantic Seaboard.