by the two days (October 28, November 4, 1831) in which he experimented on electromagnetic induction at Mr. Christie's with the great magnet of the Royal Society. On the first of these days he records no less than 27 separate experiments, and on the second 29, many of which were tried over and over. The number of tests made in one day with the electrolytic cells during his study of electrolysis in 1833 and 1834 is even more astonishing.

The notes exhibit, even better than his published work, the marvelous fertility of Faraday's mind. Every page, nay, nearly every paragraph contains a new thought, often unimportant, occasionally in error, but sometimes, when good fortune and inspiration combine, rising to the highest flights of the scientific imagination. From the best of these he constructed the great scientific poems of his published papers.

It also appears very plainly that a great deal of Faraday's work was done in his mind and is not recorded in his notebooks. To perceive this we need only compare the notes of his discovery of the induced current, with the beautifully ordered presentation of the subject in his first paper and in the Bakerian Lecture, or consider the notes on the phenomena of self-induction before, as Faraday says, he begins to see light. After he saw the light his experiments became more systematic and show how he worked when led by a guiding principle.

This publication constitutes a noble memorial to one of the greatest leaders in experimental science. Its value as a history of the way in which an honest, industrious and powerful mind operates on the facts of nature is inestimable. The thanks of the scientific world should be given to the managers of the Royal Institution and to any others who may have cooperated with them to make it possible.

W. F. MAGIE

PRINCETON UNIVERSITY

SOCIETIES AND MEETINGS

THE TEXAS ACADEMY OF SCIENCE

THE Texas Academy of Science held its annual meeting on November 11 and 12 in Houston, Texas. The number of papers appearing on the program was large and well distributed over the field of science. To bring together papers of like interests, five sections were in session throughout the meeting.

The section devoted to geological sciences was very popular. The notable papers included: "The Big Springs of Texas," by R. E. Ryan, of Houston; "The Salt Domes and Gulf Coast Oil Fields," an illustrated lecture by Marcus Hanna, of Houston; "Leaves of Geologic History from the Topography around Houston," Donald C. Barton. Among the twelve other papers, one by W. T. Carter, of the U. S. Soil Survey, on the "Relationship of Texas Soils to the Geological Formations" was considered as an outstanding piece of work. The Section of Zoological Sciences contained twelve papers. Several of these were abstracts of longer papers, which are to be printed. Of outstanding worth was the paper "The Fleas of Texas and their Economic Importance," by M. A. Stewart, of the Rice Institute, and of unique purport was the paper by Karl Bleyl, of the Sam Houston State Teachers College, in which he describes a new remedy for snake bite, which is a serum taken from the snake itself. The Botany Section was largely given over to papers on the technical side of investigation into the relationships of cotton. Several papers on regional ecology in Texas were given.

The Physical and Chemical Sciences gave papers ranging from the chemical contents of grapefruit, a study in vitamins; a description of a gigantic permanent magnet, and up to cosmic rays. L. M. Mott-Smith, and L. G. Howe, of Rice Institute, told of measuring this mysterious ray at the altitude of twelve thousand feet in an airplane. The Educational Section was given over to archeology; papers on the present social and financial conditions of the world; on mental operations accompanying emotions and including papers on the comparison of the Texas Academy of Science with other state academies, by S. W. Bilsing, representative to the American Association for the Advancement of Science, and one by Clyde T. Reed, College of Arts and Industries, on "Science Clubs and the Junior Academy." The annual lecture, given at the banquet, was "Genetical Views of the Origin of Life," by Edgar Altenberg. Just before Dr. Altenberg's lecture, H. Y. Benedict, president of the University of Texas and also of the academy, made an announcement relative to the new McDonald Observatory which is to be built by the university somewhere in the state of Texas. The last session was the annual business meeting. Seventy-five new members were taken in and five new fellows created. It was announced by F. B. Plummer, of the publication committee, that Volume XV of the *Transactions* would be ready for distribution in a few weeks, and P. L. Turner, representative of the Southwest Press, stated that "The Bird Life of Texas" had reached the point where subscriptions were asked for. The new officers are: E. N. Jones, Baylor University, *president;* F. B. Plummer, *executive vice-president;* H. A. Wilson, Rice Institute, *vice-president of Section 1;* Colonel M. L. Crimmins, *vice-president of Section 3;*

H. B. Parks, San Antonio, *secretary and treasurer*. S. W. Bilsing was continued as the representative to the American Association Council and given the authority to represent the Texas organization at the next annual meeting.

Following the business meeting, three papers were given by members who were unable to attend on the first day. The best of these was a paper by O. M. Ball, supplementing his recent publication "The Eocene Plants of Texas." This paper was illustrated by lantern slides showing newly discovered and described specimens. One of them was a beautiful leaf recently found in a quarry in East Texas and has been named Warneri after S. R. Warner, of Sam Houston State Teachers College, who collected the specimen. S. R. Warner is a member of the academy and was in the audience and heard for the first time of the importance of his discovery and the fact that the plant was named for him.

H. B. PARKS,
Secretary

THE OKLAHOMA ACADEMY OF SCIENCE

THE twenty-first annual meeting of the Oklahoma Academy of Science was held on November 25 and 26 at the University of Oklahoma, Norman. The meetings were divided into four sections and the number of papers presented in each section was as follows: Biology, 37; geology, 19; physical sciences, 22; social sciences, 29, making a total of 107.

The president's annual address was presented following the luncheon on Friday by Dr. Herbert Patterson, of the Oklahoma Agricultural and Mechanical College. The title of this address was "A Challenge to the Social Sciences." One hundred and fifty members and guests of the academy attended the annual banquet on Friday evening and Dr. Andrew Ellicott Douglass, professor of astronomy at the University of Arizona, gave an illustrated lecture entitled "Dating Prehistoric Ruins of the Southwest." Dr. W. B. Bizzell also gave a talk on "The Spirit of Adventure in Research." Dr. Douglass gave a second address at the general meeting of the academy on Saturday morning on the subject of "The Sun Spot's Cycle and the Cyclogram Method of Cycle Study."

One hundred and ninety members were registered and about 275 people attended the meetings.

The following officers were elected for 1933:

President, F. E. Knowles, Enid, Oklahoma.
Vice-president, Section A (Biology), Ralph D. Bird, University of Oklahoma, Norman, Oklahoma.
Vice-president, Section B (Geology), C. W. Tomlinson, Ardmore, Oklahoma.
Vice-president, Section C (Physical Sciences), Wm. V. N. Garretson, Stillwater, Oklahoma.
Vice-president, Section D (Social Science), O. D. Duncan, Stillwater, Oklahoma.
Assistant Secretary-Treasurer, Duane Roller, Norman, Oklahoma.

HORACE J. HARPER,
Secretary-Treasurer

STILLWATER, OKLAHOMA

SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN APPARATUS FOR DETERMINING THE ABSORPTION OF CARBON DIOXIDE BY LEAVES UNDER NATURAL CONDITIONS

THE equipment described below was designed primarily for studies involving a large number of determinations of the photosynthetic activity of apple leaves under field conditions. The chief features are, first, a simple CO_2 absorption unit which can be made up of standard glassware and which is efficient, even though the air passes through the liquid at a rapid rate, and secondly, a light-weight, closely fitting leaf chamber made of cellophane, which is easily attached and held in place without cumbersome supports. The apparatus is essentially a simplification of that described by S. Kostytschew, K. Bazyrina and W. Tschesnokov,[1] and by Schandrel,[2] but involves less elaborate technique, so that a large number of determinations can be carried out at one time. An electric current is required to operate the pump.

The absorption unit is a modification of the Reiset tower used by Brown and Escombe[3] and consists of a glass tube, about 60 cm long and 3 cm in diameter, which is supported in an upright position. A glass Gooch crucible, with fused-in fritted glass disks, is attached to the lower end of the tower by means of thin-walled rubber tubing and serves to break the gas stream into minute bubbles. The size of the pores in the disks used was 100–120 microns, but finer grades of porosity down to 20–30 microns are available. The small end of the crucible is fitted with a rubber stopper, through which extends a short piece of glass tubing. A standard mercury filter with fused-in fritted glass plate may be used as a gas distributor instead of the Gooch crucible, but it is more expensive.

The upper end of the absorption tower is connected

[1] S. Kostytschew, K. Bazyrina and W. Tschesnokov, *Planta*, 5: 696–724, 1928.

[2] Hugo Schandrel, *Wiss. Archiv. für Landw. Abt. A Pflanzenbau*, 3: 529–560, 1930.

[3] H. T. Brown and F. Escombe, *Proc. Royal Soc.*, London, B 76: 29–111, 1905.