Science in connection with the Historical and Scientific Society and the Texas Academy of Science at Alpine in 1938.

SAN ANTONIO, TEXAS H. B. PARKS

## THE ARKANSAS ACADEMY OF SCIENCE

THE twentieth annual meeting of the Arkansas Academy of Science was held at the Agricultural and Mechanical College at Monticello on April 10 and 11.

The annual public lecture was presented by Mr. Adrian Williamson, of Monticello, and the title of the address was "The Amateur Astronomer." Two field trips were arranged and conducted by the local committee—to Posey Bog and to the Mill and Chemical Plant of the Crossett Lumber Company of Crossett.

The following officers were elected for 1936–1937: *President,* L. B. Ham, University of Arkansas; *Vice-president,* P. G. Horton, Henderson State Teachers College; *Secretary,* L. M. Turner, University of Arkansas; *Treasurer,* W. R. Horsfall, Agricultural and Mechanical College, Monticello; *Editor,* Janice Singleton, Central College, Conway.

The 1937 meeting will be held at the University of Arkansas at Fayetteville.

LEWIS M. TURNER,
*Secretary*

## THE MOBILE ACADEMY OF SCIENCE

THE Mobile Academy of Science, a local branch of the American Association for the Advancement of Science, closed its first year with the election of officers on March 5. Those elected were: *President,* Rev. Dr. P. H. Yancey, S.J., head of the department of biology in Spring Hill College; *Vice-President,* Dr. Toulmin Gaines, physician; *Secretary,* Matt J. Lawler, instructor in science, Murphy High School; *Treasurer,* Dr. A. A. English, lapidist; *Historian,* Miss Hazel Driver, head of the science department, Murphy High School; *Members of the Board of Trustees,* Dr. Stephen Hale, physician, and Dr. L. A. Loveridge, professor of physics, Spring Hill College.

During its first year the academy held bi-monthly lectures and field trips in the sciences of biology, chemistry, entomology, geology, medicine, mineralogy and physics. It also undertook the formation of a museum in the Mobile Public Library. It now has fifty active members and one honorary member, Professor A. H. Sturtevant, of the California Institute of Technology, who formerly resided in Mobile. The academy meets on the first Wednesday of every month in the Mobile Public Library.

MATT J. LAWLER,
*Secretary*

# REPORTS

## APPROPRIATIONS FOR GRANTS-IN-AID BY THE NATIONAL RESEARCH COUNCIL

AT its meeting in April, 1936, the Committee on Grants-in-Aid of the National Research Council made the fifty-five following awards:

*Physical Sciences:* Robert G. Aitken, astronomer and director emeritus, Lick Observatory, "card catalog of all measures of double stars"; Willard H. Bennett, assistant professor of physics, Ohio State University, "collision of negative atomic hydrogen ions"; S. L. Boothroyd, professor of astronomy, Cornell University, "ultraviolet spectra of F. G. and M. type stars"; Paul L. Copeland, assistant professor of physics, Montana State College, "secondary emission of electrons from thin metallic films"; William W. Hansen, assistant professor of physics, Stanford University, "production of high speed electrons"; Raymond Morgan, assistant professor of physics, University of Pennsylvania, "studies in electron diffraction"; Harold Osterberg, research assistant in physics, University of Wisconsin, "elastic and piezoelectric properties of crystals"; David H. Rank, instructor in physics, Pennsylvania State College, "fine structure of certain deuterium band spectra"; Francis G. Slack, associate professor of physics, Vanderbilt University, "Verdet constant of crystals"; C. L. Utterback, professor of physics, University of Washington, "transmission of solar radiation in water."

*Chemistry:* Ralph A. Beebe, associate professor of chemistry, Amherst College, "measurement of heats of adsorption at low temperatures and low pressures"; William M. Blanchard, professor of chemistry, DePauw University, "conclusion of several chemical problems"; Richard Bradfield, professor of agronomy, and Wesley G. France, professor of chemistry, Ohio State University, "sedimentation equilibria and colloidal systems"; Merle Randall, professor of chemistry, University of California, "studies of heavy water"; Pierce W. Selwood, instructor in chemistry, Northwestern University, "study of magnetochemistry"; Arthur A. Vernon, instructor in physical chemistry, Rhode Island State College, "the effect of one electrolyte upon the solubility of another electrolyte in non-aqueous solvents."

*Geology and Geography:* Florence Bascom, senior geologist, retired, U. S. Geological Survey, and professor of geology, retired, Bryn Mawr College, "the petrology, origin and history of the Pickering and Baltimore gneisses of eastern Pennsylvania"; Kenneth E. Caster, assistant head of science department, State Normal School, Geneseo, New York, "the stratigraphy

and paleontology of the Pocono formation of Pennsylvania and adjoining areas"; Ernst Cloos, lecturer in geology, Johns Hopkins University, "the 'Martic overthrust' and the age of the Glenarm series in Pennsylvania and Maryland"; David M. Delo, instructor in geology, Lawrence College, "existing types of all North American species of the Phacopid trilobites"; Eleanora B. Knopf, U. S. Geological Survey, "internal evidence of the mechanism of plastic deformation of marble"; Waldemar Lindgren, professor emeritus of geology, Massachusetts Institute of Technology, "annotated bibliography of economic geology"; Chester R. Longwell, professor of geology, Yale University, "preparation of a tectonic map of the United States"; F. J. Pettijohn, assistant professor of geology, University of Chicago, "correlation studies in the Archean of northwestern Ontario"; V. C. Stechschulte, S.J., professor of physics, Xavier University, "study of deep-focus earthquakes"; W. T. Thom, Jr., professor of geology, Princeton University, "structural geology of the north-central Rocky Mountains and of the northwestern Great Plains region."

*Medical Sciences:* Peter Heinbecker, assistant professor of surgery, Washington University, "the mechanism of the altered response of smooth musculature to exogeneous epinephrine"; Albert P. Krueger, associate professor of bacteriology, University of California, "studies on the nature of bacteriophage"; C. Phillip Miller, associate professor of medicine, University of Chicago, "the immunological properties and toxicity of some chemically isolated fractions from Meningococcus"; Carl C. Speidel, professor of anatomy, Universty of Virginia, "observations on nerve and striated muscle fibers subjected to centrifuging at high speeds"; Ernest A. Spiegel, professor of experimental neurology, Temple University, "the function of the cortical labyrinth centers and their relation to the subcortex."

*Biological Sciences:* John B. Buck, assistant in general physiology, Johns Hopkins University, "flashing in Jamaican fireflies"; Frederick D. Chester, bacteriologist, New York Botanical Garden, "comparative study of Erwineae"; J. F. Gates Clarke, National Museum, Washington, D. C., "taxonomic study of the Oecophoridae"; John H. Davis, Jr., professor of biology, Southwestern College, Memphis, Tennessee, "ecology of Florida mangroves"; Arthur H. Graves, curator of public instruction, Brooklyn Botanic Garden, "development of a disease resistant chestnut"; Herbert C. Hanson, professor of botany, North Dakota Agricultural College, "relation of grassland type to soil type"; Frederick B. Isely, professor of biology, Trinity University, Waxahachie, Texas, "plant and soil relations in the ecology of Acridian grasshoppers"; W. Gardner Lynn, instructor in zoology, Johns Hopkins University, "field and laboratory study of the Jamaican tree frog *Eleutherodactylus nubicola* Dunn"; F. A. McClure, curator of economic botany and professor of botany, Lingnan University, Canton, China, "taxonomic investigations of bamboos"; William Seifriz, professor of botany, University of Pennsylvania, "measurement of electric potentials in plants"; M. H. Spaulding, professor of zoology, and C. J. D. Brown, instructor in zoology, Montana State College, "a biological study of the Montana grayling"; A. B. Stout, director of laboratories, New York Botanical Garden, "production and inheritance of seedlessness in grapes."

*Anthropology and Psychology:* Roy F. Barton, senior scientific worker, Institute of Anthropology, Ethnography and Archeology, Academy of Sciences, Leningrad, U. S. S. R., "the somatology and material and social culture of the Ifugao tribe of the Philippine Islands"; Leonard Carmichael, professor of psychology, Brown University, "the onset and development of visually controlled behavior in fetal and new-born mammals"; Paul E. Fields, professor of psychology, Maryville College, "intercorrelation of sensory discrimination abilities in the white rat"; Ernest R. Hilgard, assistant professor in psychology, Stanford University, "quantitative characteristics of the process of acquisition and extinction of conditioned responses in man"; William A. Hunt, assistant professor of psychology, Connecticut College, "behavioral response to a shot stimulus"; Theodore Karwoski, assistant professor of psychology, Dartmouth College, and Mason N. Crook, associate professor of psychology, Skidmore College, "study of the peripheral retina"; T. M. N. Lewis, professor of American archeology, University of Tennessee, "archeological investigations in Tennessee"; Dunbar Rowland, director, and Moreau B. Chambers, curator and field assistant, Mississippi State Department of Archives and History, "archeological survey of Mississippi"; William M. Shanklin, associate professor of histology and neuro-anatomy, American University of Beirut, Beirut, Syria, "anthropological study of the living Near East races"; William S. Webb, archeologist, Tennessee Valley Authority, and professor of anthropology and archeology, University of Kentucky, "archeological survey of the Tennessee River basin"; Ernest G. Wever, associate professor of psychology, and Charles W. Bray, assistant professor of psychology, Princeton University, "determination of the distortion of the ear as shown in the responses of the cochlea and auditory nerve"; Lester E. Wiley, assistant professor of psychology, Ohio Wesleyan University, "empirical testing of the theoretical learning curve derived by L. L. Thurstone."

Since the funds which have been placed at the disposal of the National Research Council during the past few years for the making of research grants have

been discontinued, there will be no further meetings of the Committee on Grants-in-Aid.

A limited fund is still available, however, for the making of grants in the medical sciences only. The next meeting of the Council's Division of Medical Sciences for the awarding of grants will be held in November, 1936. Applications should be addressed to the Secretary, Division of Medical Sciences, National Research Council, 2101 Constitution Avenue, Washington, D. C. Applications to be considered at the November meeting must be on file on or before October 1, 1936.

FRANK R. LILLIE,
*Chairman, National Research Council*

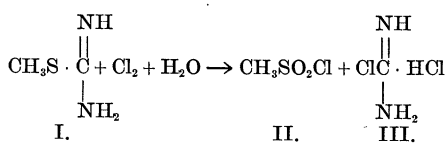
# SPECIAL ARTICLES

## THIOUREA AS A KEY REAGENT FOR THE PREPARATION OF ALIPHATIC SULPHONYL CHLORIDES AND BROMIDES[1]

A CLASS of organic compounds which has not received its proper share of attention by organic chemists is that comprising the aliphatic sulphonyl halides, ($R \cdot SO_2Cl$ and $R \cdot SO_2Br$) and their derivatives. They represent one of the forgotten groups in our rapid development of the chemistry of aliphatic compounds. The introduction of the sulphonic acid radical ($—SO_2OH$) into aliphatic compounds by direct treatment with sulphuric acid is extremely limited in its application and is not of practical utility. The method of synthesis which has proven most serviceable is one involving direct replacement of a halogen atom in an aliphatic compound with the sulphonic acid group by interaction with sodium sulphite. The standard procedure for conversion of sulphonic acids into their corresponding halides is by treatment with the required phosphorus halide ($PCl_5$ or $PBr_5$). In many cases, however, this method is not practical, and furthermore the use of phosphorus halides has serious objections in both industrial and laboratory operations.

Professor Karrer in the revised edition[2] of his well-known book, "Lehrbuch der Organischen Chemie," introduces the chapter on sulphonic acids as follows: "In der aliphatischen Reihe spielen Sulfonsauren eine untergeordnete Rolle (s.d.); sie sind für allgemeinere Verwendbarkeit zu schwer zuganglich."

The authors desire to report in this preliminary note that aliphatic sulphonyl chlorides and bromides can be prepared with ease without the use of phosphorus halides in any form. In place of the common phosphorus halides used in organic synthesis for preparing such halides the authors substitute thiourea. Starting with this cheap sulphur reagent and an aliphatic halide or alcohol we have developed a method of synthesis which makes the sulphonyl halides available in any quantity desired. The reaction applied, for example, for the synthesis of methyl sulphonyl chloride II is expressed below:



I. II. III.

The s-methylisothiourea I, which is obtained in quantitative yield in the form of its sulphate by interaction of dimethyl sulphate with thiourea, reacts with nascent chlorine in cold aqueous solution to form the sulphonyl chloride II in a yield of 76 per cent. of theory. Marvel, Helfrick and Belsley[3] report that the yield of this same sulphonyl chloride II when prepared by treatment of the sodium salt of methyl sulphonic acid ($CH_3SO_2ONa$) with phosphorus pentachloride is 21–27 per cent. of theory. If bromine is substituted for chlorine in the authors' process an excellent yield of methyl sulphonyl bromide ($CH_3SO_2Br$) is obtained. A paper describing this new method of preparing aliphatic sulphonyl halides has been presented by the authors for publication in a future number of the *Journal of the American Chemical Society*.

TREAT B. JOHNSON
JAMES M. SPRAGUE

[1] From the Sterling Chemistry Laboratory of Yale University, New Haven, Connecticut.

[2] "Lehrbuch der Organischen Chemie," Vierte Auflage, Georg Thieme, Verlag, Leipzig (1936).

[3] *Jour. Amer. Chem. Soc.*, 51: 1272, 1929.

## BAR DUPLICATION

IN connection with the article "Bar as a Duplication,"[1] published in the February 28 issue of SCIENCE, and signed by C. B. Bridges in Pasadena on February 21, the attention of American readers is called to the fact that essentially the same findings and interpretation as here given by Bridges had already been set forth by the undersigned in co-authorship with Prokofyeva and Kossikov in a preliminary article without figures, entitled "Unequal Crossing over in the Bar Mutant as a Result of Duplication of a Minute Chromosome Section."[2] This article was sent in on December 15, 1935, to the bi-monthly journal, *Comptes Rendus of the Academy of Sciences of the USSR*, and was published in the second number of that journal for 1936, issued on January 25. This issue probably did not

[1] C. B. Bridges, SCIENCE, 83: 210–211, 1936.

[2] H. J. Muller, A. A. Prokofyeva-Belgovskaya and K. V. Kossikov, *C.R. Acad. Sci. USSR.*, 2: 78, 1936.