The purpose of these grants is to encourage and assist in maintaining researches directed primarily to the solution of fundamental biological problems, and to the development of apparatus essential in such studies. In making short-term grants, as for 1938–39, special consideration will be given to work in progress or to programs definitely formulated. Next in importance to the scientific promise of the project is the availability of facilities and of cooperation in case the work involves other fields, such as special chemical or physical techniques. The committee endeavors to keep in touch with interested industrial corporations manufacturing apparatus or materials used in such biological studies, and in the past the cooperation of these agencies has been valuable both for the loan of certain types of apparatus and for assistance in the construction of special facilities.

Applications for grants should be made promptly, and these should include an adequate statement of the status of the problem or project, the extent of the support received or promised, or the time offered, by the university or institution with which the applicant is associated and the character of the apparatus available or obtainable for the work.

The conditions under which grants of money or apparatus may be made are essentially the same as those made by the Committee on Grants-in-Aid of the National Research Council, and in brief are as follows:

1. Grants will cover such expenses as apparatus, materials and supplies, technical assistance, and, to a limited extent, field expenses.

2. Ordinarily, grants will not be made for any part of the personal salary of the grantee, for expenses of publication, for the purchase of books or for travel in attendance upon scientific meetings.

3. In general, preference will be given to the support of investigations, (a) requiring a moderate allotment, (b) from which definite results may be expected with the aid of the grant, (c) which are supported in part by the institution with which the applicant is associated, and (d) for which it is reasonably certain that the facilities are available or procurable, or in which cooperation is arranged between the biological and physical interests.

It is expected that allotments for 1938–39 will be made in late August. Those planning to apply for grants should immediately request application forms from the Division of Biology and Agriculture, National Research Council, 2101 Constitution Ave., Washington, D. C. The applications, together with any supporting documents, should be sent promptly, preferably by July 15, 1938, to the Division of Biology and Agriculture.

B. M. DUGGAR,
Chairman, Committee on Radiation

NEWTON'S THIRD LAW

THE recent discussions of "Osgood's Mechanics," by J. W. Campbell and H. M. Dadourian (SCIENCE, November 12, 1937, and April 29, 1938) prompts me to add a comment. In my experience students usually fail to distinguish between the equality of opposite forces in equilibrium and the equality of forces expressed by Newton's third law. It is therefore disconcerting to find this confusion on page 1 of Osgood's excellent text. He says: "Thus if a barrel of flour is suspended by a rope (and is at rest), the attraction of gravity—the pull of the earth—will be represented by a vector pointing downward and of length W, the weight of the barrel. On the other hand, the force which the rope exerts on the barrel will be represented by an equal and opposite vector, pointing upward. For, action and reaction are equal and opposite."

But the weight of the barrel and the force which the rope exerts on the barrel are not related as action and reaction. The reaction to the weight is not the force exerted by the rope, but the pull of the barrel on the earth. Forces in equilibrium act on the same body, whereas action and reaction act on different bodies. A principle of equilibrium is therefore not derivable from the third law. I remark that "An Advanced Course in General College Physics" by Bayley and Bidwell contains a precise statement of the distinction.

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SOCIETIES AND MEETINGS

SOUTHWESTERN DIVISION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE Southwestern Division of the American Association for the Advancement of Science held its eighteenth annual meeting at Albuquerque, New Mexico, from April 25 to 28, 1938. The University of New Mexico was host institution.

The meetings were very well attended in all sections. The following organizations met in conjunction with the division: The Mathematical Association of America, Southwestern Section; Society of American Foresters, Southwestern Section; American Association of University Professors, Rocky Mountain Region; and New Mexico Section, American Society of Civil Engineers.

The following officers were elected for the coming year: *President,* E. F. Carpenter, University of Arizona, Tucson; *Vice-president,* J. R. Eyer, New Mexico State College, Las Cruces; *Secretary-Treasurer,* Veon C. Kiech, University of New Mexico, Albuquerque. *Executive Committee*—S. A. Northrop, University of New Mexico; D. S. Robbins, Las Cruces, New Mexico; F. W. Sparks, Texas Technological College, Lubbock; Emil Haury, University of Arizona, Tucson; F. E. E. Germann, University of Colorado, Boulder.

Officers of the various sections for the coming year were announced as follows:

Biological Science: Chairman, W. H. Bell, University of New Mexico, Albuquerque; *Secretary,* C. K. Cooperrider, U. S. Forest Service, Tucson.

Mathematics Section (Southwest Section Mathematical Association of America): Chairman, R. S. Underwood, Texas Technological College, Lubbock; *Secretary,* Harold D. Larsen, University of New Mexico, Albuquerque.

Physical Science Section: Chairman, E. J. Workman, University of New Mexico, Albuquerque; *Secretary,* C. W. Botkin, New Mexico State College, Las Cruces.

Social Science Section: Chairman, V. J. Smith, Sul Ross Teachers College, Alpine, Texas; *Secretary,* J. Charles Kelley, Sul Ross Teachers College, Alpine, Texas.

Future meeting places of the division were scheduled as follows: Alpine, Texas, with Sul Ross Teachers College and the McDonald Observatory as host institutions for 1939; Tucson, Arizona, with the University of Arizona in 1940; Lubbock, Texas, with Texas Technological College in 1941.

Of the resolutions passed unanimously the following is of general interest:

Since first they were founded nearly a thousand years ago, Universities have always been homes for research—homes for the discovery and dissemination of truth. They have been and should still be both the preservers of the best that civilization has attained and extenders of the bounds of knowledge in every field of human interest. This work has been accomplished because universities have been free to seek for and to proclaim the truth when discovered. To-day we note with the deepest regret, which should be showed by all people, that universities in many parts of the world are no longer free. Some have been reduced to agencies for propaganda for special ideas and isms with no scientific foundation. Not all of our own universities are entirely free from the same sort of pressure from special groups, but happily they have not been prostituted in the same way as has happened abroad.

We therefore wish to emphasize in the strongest possible terms our belief that any such interference with the unrestricted freedom of universities to search for and to proclaim the truth according as the evidence points is fatal to sound and continued progress. We would further urge all who love truth and freedom to protect against any such interference, if and when it is attempted, with all the power at their command.

With the cooperation of the Soil Conservation Service, a general symposium was held on the topic, "The Results of Soil Conservation." Papers were presented on the topics: "Soil Conservation Service Activities in the Southwest," by Herbert C. Stewart, head of the section of erosion control practices, Soil Conservation Service, and "Research of the Soil Conservation Service in the Southwest," by Thomas Maddock, associate engineer, Soil Conservation Service.

A symposium of special interest was held in the Physical Science Section on "Meteorology," headed by R. H. Byers, head of the Air Mass Analysis Section, U. S. Weather Bureau, Washington, D. C., with other papers by E. F. George, department of physics, Texas Technological College, and by R. E. Holzer and E. J. Workman, both of the department of physics of the University of New Mexico.

Another symposium of particular interest was held in the Biological Science Section on "Syphilis," papers being presented by Myrtle Greenfield, New Mexico State Public Health Laboratory; Willis Barnes, University of New Mexico; Julian O. Long, health officer for District No. 3, Santa Fe, New Mexico; and E. F. McIntyre, New Mexico Bureau of Public Health.

The Section of Mathematics featured a symposium on the "Teaching Problems in Mathematics," and addresses by E. R. Hedrick, provost, University of California, Los Angeles, and Aubrey J. Kempner, University of Colorado.

The John Wesley Powell Lecture, an annual address for the general public, was presented by E. R. Hedrick, on the topic of "Relations of Science to Economics and to War."

The retiring president's address, delivered by F. E. E. Germann, was on the topic, "The Occurrence of Carbon Dioxide, with Notes on the Origin and Relative Importance of Subterranean Carbon Dioxide," at an evening banquet session.

The Rocky Mountain Region of the American Association of University Professors heard addresses on the topics of "Place and Function of Faculties in University Government," by E. R. Hedrick; and "University Administration in the Americas," by Dean Harold Benjamin, University of Colorado.

Social events included an informal tea to all visitors at the home of Dr. J. F. Zimmerman, president of the university, and various affairs for the visiting ladies by wives of the faculty members of the University of New Mexico.

The sessions were closed by an all-day excursion, the

route of which covered 170 miles and included inspection of methods of control in the U. S. National Forests, with forestry officials acting as guides; visits to modern Indian Pueblos and sites of ancient pueblos where archeological work is being done. The route of the excursion led the party through a portion of the state which is of very great geologic as well as scenic interest.

VEON C. KIECH,
Secretary

SPECIAL ARTICLES

BROMINATION OF OPTICALLY ACTIVE METHYLPHENYL- AND PROPYL-PHENYL-CARBINOLS

IT is the general conclusion of physical chemists that every reaction of substitution by a negative group or atom following a bimolecular course is connected with a Walden inversion. Granting that in the majority of reactions thus far observed this conclusion is valid, yet there is evidence that the conclusion is not *generally* valid. In the higher members of the homologous series of methylphenylcarbinols, from propylphenylcarbinol on, the reaction of bromination by means of hydrogen bromide gas proceeds, predominantly, without inversion. Certain considerations led us to investigate the effect of the temperature on bromination from 160° C. to −80° C. Dry hydrogen bromide gas was allowed to act on the carbinol. At 0° C. the reaction was practically instantaneous. The rotation of the bromide formed from *propylphenylcarbinol* (carbinol and bromide rotating in the same direction) increased markedly with lowering of the temperature of reaction.

At the higher temperatures of reaction, the rotation of the bromide formed from *methylphenylcarbinol* under similar conditions is opposite to that of the carbinol. The bromide showed a small increase in rotation with a drop in temperature, but *when the reaction proceeded at about −35° C. and at all lower temperatures, the rotation of the bromide obtained changed sign, the reaction then proceeding without inversion.*

The results are summarized in Table 1.

Thus it is evident that at every temperature two simultaneous reactions take place—one with, the other without inversion. At lower temperatures the latter predominates. That is, the reaction proceeds without inversion when the hydroxyl group has a higher mobility than the other three groups, for then the asymmetry of the molecule remains unchanged during the reaction of substitution. The reverse takes place at higher temperatures. The reason perhaps is that the mobility of the hydroxyl group has a lower temperature coefficient than that of the other groups.

TABLE 1

Methylphenylcarbinol $[M]^{25}_{5780.1} = -41.5°$

Propylphenylcarbinol $[M]^{25}_{5780.1} = -49.1°$

Compounds	Methylphenylbromomethane				Propylphenylbromomethane			
Temperature of Bromination	0 °C	−30 °C	−35 °C	−80 °C	160 °C	0 °C	−50 °C	−65 °C
$[M]^{25}_{5780.1}$	+13.5°	+36.4°	−22.6°	−27.0°	−1.3°	−41.7°	−146.5°	−154°

This observation may also have a practical significance, since by the changes in rotation with the lowering of temperature of the reaction, it may be possible to discern whether a reaction of substitution took place with or without inversion.

A complete report will be published elsewhere.

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IS AGGLUTINATION AN EXPLANATION FOR THE OCCURRENCE AND FOR THE CHROMOMERE-TO-CHROMOMERE SPECIFICITY OF SYNAPSIS?

NO current hypothesis accounts adequately for the occurrence of synapsis between homologous chromosomes. Still less do these hypotheses, electrical or otherwise, account for the one-to-one specificity displayed by hundreds of different pairs of chromomeres at synapsis.

The hypothesis here considered is that synapsis of homologous chromosomes is a process comparable to agglutination of a given kind of bacteria or blood corpuscles.

A necessary preliminary to the agglutination of a given bacterium is the formation of its specific antibody or antibodies. For example, when a rabbit is injected with bacteria, the surface materials of the