points, leaving the middle portion of the bridge as a fragment, or (iii) break at one point only, leaving no fragment. These three alternative modes of behavior depend on the location of the half-chromatid exchange in relation to both centromere position and the relative arm lengths of the bivalent. Second, the half-chromatids do not behave as separate mitotic entities at A I or A II. They should do so at the microspore division; and theoretically the sporocytes showing half-chromatid bridges at either A I or A II should give a large proportion of spores with fragments or bridges at the spore division.

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Significance of the Gordon Research Conferences

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SINCE this issue of *Science* contains the program of the 1954 Gordon Research Conferences and W. George Parks's editorial with its revealing statistics, a review of the significance of the Gordon Research Conferences to chemical science seems appropriate. The addition this year of a third conference site at Kimball Union Academy, Meriden, N. H., permits further expansion of the impressively rich and varied program. This growth gives pleasure to those who have seen the venture from its cautious beginnings around 1931 at Johns Hopkins University.

Growth of scientific meetings is, however, not always a sign of corresponding increasing value; to the contrary, size and value may not be favorably related from the point of view of scientific gains. In the case of the Gordon Research Conferences, their unique value on the American scientific scene has been maintained in spite of a substantial increase; moreover, the scope has been advantageously enlarged. It may be profitable to describe and analyze some of the factors that have contributed to this favorable picture.

I have been fortunate in being in a position to observe closely the beginning and the maturing of this venture. As my colleague at Johns Hopkins University, Neil E. Gordon revealed to me his hopes, plans, and visions. He felt that something worth while for American science could be accomplished by informal mingling of scientists working in certain fields. Particularly did he feel that the discussion should be concerned with the frontiers aspects. Hence, it would be important to have a recognized leader in the field as chairman for each particular conference. The group would also require discussion leaders or speakers who were concerned with actual advances of scientific work and who would be present by invitation. To these could be added others who, after publication of the program, felt the desire to attend for the purpose of learning and contributing. These additional members would be carefully screened to keep the group to a productive and creative size, to provide maximum quality and to insure representation of as many laboratories and institutions as possible. Representation from academic, governmental, and industrial institutions, Dr. Gordon felt, should be mixed in suitable manner. Size of a given conference would always have to be limited with emphasis on quality.

Although the main theme would be chemistry, Gordon realized from the beginning that the infusion of neighboring fields, such as physics, mathematics, and biology, would be vital.

With these points in mind, Dr. Gordon started the first experimental conferences on the Homewood Campus of Johns Hopkins University. He felt, however, that a location in the country would be far more ideal. There, the distractions of the city would not exist and the general meetings could be followed by small group discussions, possibly in connection with golf or swimming. He visualized the Gibson Island Club on Chesapeake Bay as a suitable place, and soon the conferences were transferred there.

When Dr. Gordon left Johns Hopkins, the University carried on for a while experimenting with two other locations. Later, Dr. Gordon took over again, establishing eventually a permanent house at Gibson Island. At that time, sponsorship was assumed by the American Association for the Advancement of Science, a logical arrangement which has continued to this day.

Interest in new fields for discussion developed continuously, and, from time to time, the program has been enlarged.

During the formative period, major parts of a mechanism for the perpetuation of the conferences in vital and creative form were developed. Dr. Gordon, as director, felt strongly that each conference should be as autonomous as possible. Although the chairman of a first conference had to be appointed, a system of election by the conference members was soon evolved.

Now, the group elects a vice chairman during the conference sessions. This vice chairman becomes chairman for the next conference, usually in the following year and, with the aid of a program committee, is responsible for the next program. His group is responsible in similar manner for the selection of the conferees. This system seems inherently sound because, after all, each group knows best who is active and qualified.

It soon became apparent that the desirable autonomy of the individual conferences led to certain complications. Scientists are individualists, and, even with the equalizing democratic handling of conference matters, strong individual traits come through. This individualism from time to time leads to apparently pronounced differences of views among the various conferences. Obviously, in order to keep the collection of conferences together, some over-all influence has to be brought to bear, and originally the director provided this factor. As the conferences grew in number, Dr. Gordon and his close advisers deemed it desirable to establish a group that could serve as a sounding board. This group ultimately developed into the Advisory Board, which at first was composed of the director, the chairmen (or vice chairmen) of the individual conferences, the president and secretary of the AAAS, and a representative from each industrial firm that has contributed to a financial plan of the Gordon Research Conferences.

The chairman and vice chairman of a conference are, of course, most vitally concerned with their field of science and provide a fresh and vigorous interest. They change yearly, however, whereas the industrial representatives often bridge a number of years, thus introducing an element of continuity and stability.

The advantages of discussing current important developments in science in congenial groups under ideal surroundings had such appeal that the conferences grew beyond the abilities of Gibson Island facilities to house them. Further, the financial and managerial obligations became extremely burdensome, and Dr. Gordon was forced to relinquish some of the responsibilities. Eventually, the site was moved to Colby Junior College, New London, N. H., with W. George Parks of Rhode Island State College as director. Because Colby had adequate meeting rooms and dormitory facilities, which were unused during the summer months, a profitable symbiosis for both the College and the conferences could be achieved.

Although the Advisory Board continued to be a valuable sounding board, it became apparent that a smaller group was needed to crystallize and to put into action its sentiments and wishes. For this reason, a Management Committee was created through election from the membership of the Advisory Board. The director of the conferences and the secretary of AAAS are also members of this committee. The Management Committee elects its own chairman and is now responsible for formulating and executing, with the director, the policies of the conferences. Naturally, the actions and proposals of the committee are subject to review by the Advisory Board.

During the past year an additional committee has been set up. Known as the Policy Advisory Committee to the Management Committee, it is charged with the responsibility of reviewing and recommending long-term plans and policies. It is hoped that this group will be able to project the role of the conferences into the future course of chemical research as a whole.

It should be realized, however, that these mechanisms are only servants toward a good purpose. The conferences, founded by Neil Gordon and properly named in his honor, are living bodies continuously being rejuvenated. They are meant to serve scientists, and, for this reason, they must be coupled intimately with these men. It is proper that individual conferences select their leaders; it is sensible that the conferences be grouped in a "federation" for over-all advantages. For obvious practical reasons, suitable governing and executive bodies had to be established. Their primary purpose is not to regulate but to serve the advancement of science.

In this spirit, a further provision had to be made in regard to the Advisory Board. A government or academic scientist could be on the Board only by virture of being the chairman of a conference (or vice chairman substituting for chairman). Because his term is of only 1 year's duration, there is little probability that he will be elected to the Management Committee. This deficiency has been corrected through the admission of members-at-large to the Advisory Board. These members are chosen from government and academic circles and often are named to the Management Committee. Thus, a better balance between academic and industrial interests is obtained for both the Advisory Board and the Management Committee.

The discussions at the conferences are strictly "off-the-record," and no publication may be made of any of the material, except with specific permission of the respective authors. This permits "thinking out loud" and presenting material that otherwise might not be contributed. In particular, it enables the industrial participants to add contributions that would be difficult to release. Today, when the contributions to fundamental science from industry play a considerable role in our scientific endeavor, the interchange between academicians and the men from industry is most vital. There can be no doubt that these conferences have contributed greatly to the cross-fertilization of ideas among various men, various institutions, and various fields of science.

It is desirable that the attendance at the conference extend through the whole period of about 5 days, because only in this manner can the participants become thoroughly acquainted with one another. The presence of some of the wives permits the inclusion of the family circle in this acquaintanceship.

In 1950 the New Hampton School, New Hampton, N. H., was added to the conference site at Colby Junior College. And, in this coming summer, Kimball Union Academy at Meriden, N. H., will be added.

No wonder the informality of operating without a constitution and by-laws has to come to an end! This

spring the Advisory Board will vote on such instruments. Adoption, however, will in no way change the fact that these conferences have been so useful to science because they have been alive and allowed to adapt to conditions. Their friends have nurtured them as living organisms with full awareness of their mission for science.

To reemphasize, it is evident that the Gordon Research Conferences as they exist today have been successful because of: first, very good ideas on the part of the founder and his successors on how such conferences should be run; second, experimentation and development within the framework of the original ideas; and third, an active organization assuring that the improvements of procedures developed in one conference or the disadvantages evident in another were used to improve the conference as a whole.

A basic concept was the recognition that the *conference approach* is the most successful method for creating and spreading ideas as well as promoting the personal contacts on which so much accomplishment depends. To realize this concept, profitable use of the following factors was made: A conference should be held in every important field. The physical arrangements should be agreeable enough so that scientists will attend. The distractions that would keep the scientists from one another's company should be avoided. Topnotch specialists should be invited, yet there should also be present men with more general and practical backgrounds. The meeting should not be too large. Enough time should be allowed for full presentation and discussion of a topic; a full week should be allowed for a field. Discussions should be encouraged by all available means, even at the expense of publication.

In other words, the essence of a conference is stimulation and the interchange of ideas and facts. Gordon Research Conferences are a most outstanding example, because this stimulation and interchange has been promoted without having been burdened with overorganization or allowed to lapse because of lack of attention.

Many deserve thanks for their part in this venture. Some of the names can be found among the directors, conference chairmen, and members of the Management Committee.

A full history entitled *The Gordon Research Conferences* was published in 1950 under the auspices of the AAAS and will be available in revised form in 1955.

Program of the Gordon Research Conferences, AAAS, June 14–Sept. 3, 1954

W. George Parks, Director
University of Rhode Island, Kingston

THE Gordon Research Conferences, sponsored by the American Association for the Advancement of Science, for 1954, will be held from June 14 to Sept. 3 at Colby Junior College, New London, N. H.; New Hampton School, New Hampton, N. H.; and Kimball Union Academy, Meriden, N. H.

Purpose. The conferences were established to stimulate research in universities, research foundations, and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of scheduled lectures and discussion groups. Sufficient time is available to stimulate informal discussions among the members of the conferences. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are available for recreation, reading, resting, or participation in discussion groups as the individual desires. This type of meeting is a valuable means of disseminating information and ideas that otherwise would not be realized through the normal channels of publication and scientific meetings. In addition, scientists in related fields become acquainted, and valuable associations are formed that often result in collaboration and cooperative efforts between different laboratories.

It is hoped that each conference will extend the frontiers of science by fostering a free and informal exchange of ideas between persons actively interested in the subjects under discussion. The purpose of the program is not to review the known fields of chemistry but primarily to bring experts up to date on the latest developments, to analyze the significance of these developments, and to provoke suggestions concerning the underlying theories and profitable methods of approach for making new progress.

In order to protect individual rights and to promote discussion, it is an established requirement of each conference that all information presented is not to be used without specific authorization of the individual making the contribution, whether in formal presentation or in discussion. Scientific publications are not prepared as emanating from the conferences.

Registration and reservations. Individuals interested in attending the conferences are requested to send their applications to the director on or before May 15, 1954. Each applicant must state the institu-