ical interpretations of results on human beings are open to serious criticism. But there remains a residue of clinical observations that justify further study, alike for their scientific importance and for their commercial possibilities. The fact that so wide a range of wave-lengths have been involved in most research upon effects of ultra-violet light may account for conflicting observations, if it can be shown that some wave-lengths in this series are beneficial to man and the higher animals while other lengths are ineffective.

For *Plant Physiology,* meetings were made possible in Washington on March 14 and 15, 1930, by the committee on grants-in-aid of the Research Council, with an attendance of about twenty-five individuals. The results of the discussions in all these gatherings will be assembled for the confidential use of the committee on radiation and for other purposes, including, no doubt, ultimate publication of certain derivative material of value to investigators.

Grants during the period of January 1, 1929, to June 30, 1931, may be summarized as follows:

Some 32 investigators have been assisted with money and many of these have also received apparatus; 9 have received apparatus only; 4 have been loaned for extended periods the 125 milligrams of radium placed at our disposal by the Radium Chemical Company; 17 of the above 32 investigators received grants for both 1929–30 and 1930–31; 15 received a grant for only the first of these years or for the first time in 1930–31. The total amount of these grants to June 30, 1931, is $53,315.73. The amounts in single grants during the two and one half years since January 1, 1929, include: 1 for $2,100; 8 for $2,000; 4 for $1,800; 1 for $1,750; 1 for $1,170; 1 for $1,600; 1 for $1,500; 1 for $1,250; 2 for $1,200; 4 for $1,000; 2 for $900; 3 for $800; 6 for $750; 5 for $500; 1 for $400; 6 for $300; 1 for $200; 1 for $150; 2 for $100.

In preparing this statement attention has been drawn to the titles listed on the program of the principal organization of American geneticists at the scientific meetings in Cleveland, December 29, 1930, to January 2, 1931. Papers by individuals who have been substantially assisted by the committee constituted a relatively large fraction of this program. In addition to Blakeslee, Muller, Patterson, Stadler, Weinstein and Whiting, there appear the names of several students introduced by these individuals. This may be cited as an example of the wide-spread influence of the committee in one of the principal fields in which it is supporting investigation.

W. C. CURTIS,
Chairman

SOCIETIES AND ACADEMIES

THE IOWA ACADEMY OF SCIENCE

THE forty-fifth annual meeting of the Iowa Academy of Science was held at Davenport, Iowa, at the Davenport Public Museum and Saint Ambrose College on May 1 and 2 with 203 members and visitors in registered attendance.

The president's address, "Some Remarks on Mathematical Statistics," was given by Dr. H. L. Rietz, of the State University of Iowa, after a welcome by Mr. E. K. Putnam, the director of the Davenport Public Museum, and Fr. Martin Cone, president of Saint Ambrose College. The address, presented by the academy to the citizens of Davenport, was made by Dr. M. F. Guyer, chairman of the department of zoology at the University of Wisconsin, on "Internal Secretions and Human Well-being."

A grant from the academy research fund was made to Professor H. E. Jaques to help carry on an entomological survey of the State of Iowa.

The academy approved the organization of a junior academy of science, composed of high-school science clubs, which would be affiliated with the senior academy. A provisional constitution was approved and the furtherance of the movement was placed in the hands of a committee on high-school relations.

Officers and section chairmen for the year 1931–32 were elected as follows:

President, J. E. Lees, Des Moines.
Vice President, H. E. Jaques, Mt. Pleasant.
Treasurer, W. F. Loehwing, Iowa City.
Editor, G. H. Coleman, Iowa City.
Secretary, J. C. Gilman, Ames.
Representative of the American Association for the Advancement of Science, C. W. Lantz, Cedar Falls. The new chairmen of sections are: Botany, G. W. Martin, Iowa City. Chemistry, inorganic and physical, T. H. Liggett, Pella. Chemistry, organic and biological, H. A. Mattill, Iowa City. Geology, E. J. Cable, Cedar Falls. Mathematics, C. W. Strom, Decorah. Physics, T. C. Poulter, Mt. Pleasant. Psychology, T. F. Vance, Ames. Zoology, R. L. Abbott, Cedar Falls.

Botany Section: E. W. Lindstrom. Twelve papers were presented before this section, some of which were of sufficient general importance to merit attention. W. E. Loomis and K. H. Burnett reported on the photosynthetic efficiency of maize, using field plants from which certain parts (leaves or ears) were removed. Soil aeration of experimental plants was found by W. F. Loehwing to exercise a profound effect on root growth and on general plant growth

and maturation. J. M. Aikman discussed the microclimate of maize in relation to other ecological factors in field plants. Tetraploid tomatoes derived from three different genetic sources were shown to possess differential fertility (pollen and seed formation) dependent upon their chromosomal makeup. A true-breeding tetraploid tomato was also reported by E. W. Lindstrom. I. E. Melhus gave a comprehensive résumé of recent advances in corn disease investigations. J. C. Gilman and E. M. Summers reported on the thermogenic capacities of some fungi from heating corn. Three mycological papers, largely of taxonomic interest, were presented by G. W. Martin, Ella Baskerville and Marion C. Fisher. Notes on Iowa mosses by Lucy M. Cavanagh were read. An ecological study of glacial relict plant communities was presented by H. S. Conard. The sessions closed with a round-table discussion on teaching botany, led by S. M. Dietz.

Chemistry, Organic and Biological: L. Chas. Raiford. The program of the section of organic and biological chemistry listed 10 papers, which included the results of researches that have been in progress during the past year in several of the laboratories of schools and colleges in Iowa. The section was in session Friday afternoon and Saturday morning. By vote of the group two papers not listed on the program were presented at the Saturday morning session. The attendance was large and the reports called forth considerable discussion. The chairman selected for the coming year is Professor H. A. Mattill, of the State University of Iowa.

Geology Section: L. W. Wood. The program of the geology section included an unusually large number of papers of general interest to all parts of the state. Two papers by G. F. Kay on classification and duration of the Pleistocene were outstanding in the importance of new material presented in them. Papers by A. C. Tester and N. C. Georgeson dealt with certain phases of the stratigraphy of the Cretaceous System in western Iowa and the adjoining portions of the adjacent states. A paper by Paul T. Miller on the "Iowan Gravels in Northeastern Iowa" was well received and provoked considerable discussion. Mark Morris delivered a paper on "Unsoundness of Certain Types of Rocks," pointing out the importance of this characteristic as affecting their serviceability in structural uses. A. C. Tester presented evidence of a case of contemporaneous deformation in the Cedar Valley Limestone. G. F. Kay gave an explanation of a possible method of formation of the "Peble Band" often found on the surface of the Iowan Till. The final paper was a discussion by James H. Lees of the extremely interesting section obtained in the Clarinda oil prospect drilling. Five other papers were read by title in the absence of their authors. The section meeting was attended by a group of about thirty people.

Mathematics Section: John F. Reilly. The twentieth regular meeting of the Iowa section of the Mathematical Association of America was held in conjunction with the forty-fifth meeting of the Iowa Academy of Science. A program of nineteen papers was presented, a majority of which treated of some phase of theoretical or applied statistics. The retiring chairman, Professor George W. Snedecor, gave an address on "Standard Deviations of Standard Regression Coefficients." Officers for the coming year were elected as follows:

Chairman, Carl W. Strom, Luther College.
Vice Chairman, Byron D. Roberts, Parsons College.
Secretary, John F. Reilly, University of Iowa.

Psychology Section: E. O. Finkenbinder. About 75 workers in psychology discussed 30 studies of exceptional interest to all. Harry A. Green's paper evaluated Iowa University's new technique of recording speech so as to study it objectively. Dean Seashore presented a new scientific musical staff that indicates exactly when a tone is produced, the length of time it is held, its intensity, and its timbre, all mechanically produced. Seven other papers on the psychology of music were presented, among which were: hearing the vocal vibrato, by Harold Seashore; the vibrato of stringed instruments, by Scott Reger; an artistic pianogram, by Miss Laila Skinner; an analysis of intensity in piano playing, by D. A. Rothchild. There were two papers on art and three on attitudes of delinquents as compared with normals. E. O. Finkenbinder showed that twice as much information learned from scored quizzes composed of direct questions was remembered for six weeks as that learned from scored quizzes made up of true and false statements. B. F. Zuehl showed that students prefer objective tests as motivation for their study. F. B. Knight's paper indicated that the position of a given combination of numbers in a problem influenced its difficulty greatly. J. W. Charles pointed out that upper classmen receive the higher marks. E. O. Finkenbinder's tabulation of the amount of absence since the beginning of the century at the State Teachers College showed that the amount of absence was cut from 2.2 per cent. per pupil that existed before the rule was adopted in 1916 that deducts one tenth of a credit for each absence not excused, to 1.2 per cent. after the rule went into effect; and that the percentage of pupils who were in perfect attendance per term was raised from 42 to 69—more than a 50 per cent. gain in regularity due to the rule. E. C. Denny found that the Ayres spelling scale has some words in a column that are much more difficult than others. Miss Gertrude Cox indicated that the Ames psychological tests predict college success.

Clelland Morgan presented two papers on learning, and C. A. Ruckmick gave some recent improvements in galvanic technique.

Zoology Section: H. E. Jaques. The program, while utilizing only one half day, covered a range of interests almost as wide as the zoological field. Two papers were taxonomic, Robert L. King describing new protozoans of the genera *Vorticella* and *Thecacineta,* and Owen Smith illustrating some thirty species of *Tenebrionidae* known to occur in Iowa and providing a key for their identification. Records of golden and bald eagles as well as some other rather unusual birds which have been seen recently in southeastern Iowa were presented by Pete Parks, while F. L. Fitzpatrick showed that raptorial birds rather frequently possess bilateral ovaries. William T. Levine found the ovaries of frog tadpoles to degenerate when treated with x-ray. In a study of the hormone influence on the reproduction functions of parabiotic female rats Robert T. Hill reported the corpus luteum hormone stronger and more positive in action than the oestrous producing hormone, and E. W. Shrigley told of a marked difference in the susceptibility and resistance to anaphylactic shock in guinea-pigs and discussed methods of selecting. H. E. Jaques explained some methods used in conducting field contests to increase student interest in biological subjects, while Elizabeth Blagg displayed an exceptionally large earthworm and aroused a likely discussion as to the size and abundance of these creatures. Much interest was taken in Roy L. Abbott's recital of some almost human-like readjustment made by the golden digger wasp when its established routine was interfered with by the experimenter.

JOSEPH C. GILMAN,
Secretary

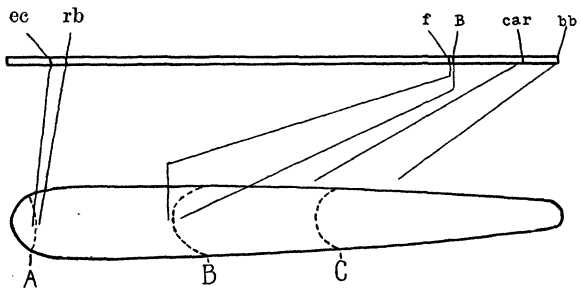
SPECIAL ARTICLES

A CYTOLOGICAL MAP OF THE X-CHROMOSOME OF DROSOPHILA MELANOGASTER

SEVERAL years ago the writer, together with Dr. H. J. Muller, pointed out that as a result of our combined genetic and cytological studies of deletions and translocations in *Drosophila melanogaster* we were forced to the conclusion that the genetic crossover maps do not give a proper concept of the morphological spacing of the genes along the chromosomes. Dobzhansky was led to the same conclusion by evidence similar to ours and his cytological maps of the second and third chromosomes have amply proved the correctness of this point of view.

Since the publication of our original papers, I have been collecting data which would permit me to plot a cytological map of the X chromosome. Dr. H. J. Muller and Dr. J. T. Patterson and their students have placed at my disposal many cases of breaks, translocations and deletions and by a cytological study of these it is now possible to give the approximate location of certain genes.

In the accompanying figure I have indicated the location of the genes involved on the genetic map and below this an outline drawing of a typical X chromosome with lines to show the position morphologically of the points which have been determined.



Beginning with the so-called left hand end of the X chromosome (left in the figure), this winter Patterson obtained a break in the X chromosome between the loci for echinus (5.5) and ruby (7.5) and this segment became attached to one of the fourth chromosomes. (See Patterson and Painter in a recent issue of this journal for genetic and cytological evidence). Morphologically this piece which carries at least 5.5 genetic units (but does not extend to 7.5) is about three times as large as a normal fourth chromosome. The estimated proportional size of this segment is indicated on the schematic X chromosome by the line A, and since echinus is carried by the translocated piece and ruby is not, these two loci must lie to the left and the right of the line A, respectively.

Recently, Mr. Wilson Stone, a student of Dr. Muller, obtained a break in the X chromosome between the loci for forked (56.6) and bar (56.8)—genetic data unpublished—and the segment from the left hand end which must thus carry at least 56.6 genetic units was translocated to a fourth chromosome. This case was studied cytologically in females carrying a normal X and the two pieces of the broken X, and also in females hyperploid for the bar-carrying piece. The piece of the X chromosome which carries bar was found to be about three fourths the size, in length and volume, of the normal X chromosome in the same cell, and the piece which was translocated to the fourth chromosome is about a fourth the volume of the normal X. On the figure the length of the bar segment is indicated by the line B. The locus for