are to be still considered as possibilities, though not probabilities. The six and seven factor hypotheses appear to be definitely eliminated.

The non-susceptible back cross animals which should by the multiple factor hypothesis contain in many cases part, but not all, of the factors for susceptibility are being tested by breeding back with the F_1 animals. If four factors are involved, as seems likely, of every fifteen such back cross animals approximately four or 26.6 per cent. should have three; six or 40 per cent. two; four or 26.6 per cent. one; and one or 6.6 per cent. none of the four factors necessary for continued growth of the tumor. When crossed with F_1 animals these back cross types should give the following ratios of susceptible to non-susceptible animals in their progeny.

Type of Back Cross	Ratio of Susceptible to Non-Susceptible Progeny
Having three factors	1: 3.7
" two factors	1: 6.1
" one factor	1: 9.7
" zero factors	1: 15

The first two categories should be easily recognizable and together form 66.7 per cent. of the back cross animals. Such tests have now been begun.

The sex chromosome has been eliminated as a probable carrier of any of the four factors as follows. If mice like other mammals have the female XX and the male XY in formula, the use of susceptible Japanese waltzing males to form the F_1 animals used, gives daughters carrying his X, and sons his Y chromosome. If now his *sons* only are used to produce the back cross generation by mating with common non-susceptible females, all the X chromosomes in the resulting animals will be derived from common non-susceptible mice. Unless therefore, crossing over between the X and Y chromosomes occurs frequently, any susceptibility factor borne in the X chromosomes of the original Japanese waltzing males used, has been eliminated.

While further investigations are in progress, we may conclude provisionally that:

1. From three to five factors—probably four—are involved in determining susceptibility to the mouse sarcoma J. W. B.

2. That for susceptibility the simultaneous presence of these factors is necessary.

3. That none of these factors is carried in the sex (X) chromosome.

4. That these factors Mendelize independently of one another. C. C. LITTLE

THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

THE fifth annual meeting of the American Association of Petroleum Geologists was held in Dallas, Texas, March 18 to 20, with headquarters at the Adolphus Hotel. The annual meeting of 1919 also was held there, and Dallas was selected for a second time because of its accessibility to the southwestern oil fields, where large numbers of members are now working. Almost three hundred members and more than a hundred visitors were registered from all parts of the United States. The association was honored by the presence of Dr. George Otis Smith, director of the United States Geological Survey, who was made an honorary member of the association. Other distinguished members present from a distance were R. P. McLaughlin, oil and gas inspector of California; Dr. Ralph Arnold, consulting geologist, of San Francisco, New York and London; Professor Roswell H. Johnson, of Pittsburgh; and Everett DeGolyer and Donald F. McDonald, of New York.

The opening session was called to order by President I. C. White, state geologist of West Virginia, well known as the father of the anticlinal theory. Greetings were given by a representative of the Oil Development Committee of the Chamber of Commerce of Dallas, and by Robert H. Hill, president of the Southwestern Geological Society, and responded to by President White.

The general subject of this session was New Mexico and Northwestern Texas. Papers were given by Dr. John K. Knox, on "The geology of New Mexico as an index of probable oil resources," by Dan L. Garrett on "The stratigraphy of northeastern New Mexico"; by Wallace G. Matteson on the "Oil possibilities of northeastern New Mexico," and by Dr. Chas. N. Gould on "Types of structure at Amarillo, Texas."

The Thursday afternoon session was devoted to a consideration of the Louisiana and Texas fields, and papers were given by Chester A. Hammill on "The structure of northwest Louisiana"; by Sid-

ney Powers on "The Sabine uplift," and by Dr. Irving Perrine on "Some problems of the Louisiana oil fields." A paper on "The geological structure of Eastland and Stephens counties, Texas," was read by H. H. Adams, one of the "Position of the Ellenberger formation in north central Texas"; by Dr. E. H. Sellards, and one on "Unconformities in the Texan Permian," by Dr. J. W. Beede. A paper by Dr. J. A. Udden, director of the Texas Bureau of Economic Geology, on "Suggestions of a new method of making underground observations," was read by Dr. Sellards.

On Thursday evening a public meeting was held in the City Temple, and the citizens of Dallas had the privilege of hearing Dr. George Otis Smith, director of the United States Geological Survey, in a lecture on "The public service opportunity of the oil geologist." Dr. Smith emphasized the responsibility of the oil geologist as a public servant and educator, and held that while it is the first duty of the oil geologist to find the oil, it is no less his duty to see that it is protected from the effects of improper operations in its recovery, and to raise his voice against the practise of mining oil with total disregard of underground property rights. He urged that membership in the association should carry its guaranty of both professional ability and moral reliability. The lecture was followed by an informal reception and smoker, to give members and visitors an opportunity to meet Dr. Smith.

A technical session was held in the municipal auditorium Friday morning, and most of the papers were illustrated by figures and diagrams. Dr. E. A. Stephenson and H. R. Bennett had prepared diagrams showing the decline of the Ranger oil field, and Glenn H. Alvey gave "Decline curve predictions." Papers were read by Charles V. Millikan on "The interrelation of the folds of Osage county, Oklahoma; J. L. Tweedy gave "A criticism of the 10 to 1 increase in Barrel Day prices"; and Professor Roswell H. Johnson and Alden W. Foster one on "Barrel Day" versus "One Day costs." Professor Johnson also gave a paper on "The cementation process in sandstone." A summary of the work of the California State Mining Bureau in petroleum and gas was given by R. P. McLaughlin. Mr. McLaughlin brought to the convention a very interesting model of a California oil field. This model was described and illustrated in the *Literary Digest* of February 28, 1920.

Friday afternoon was given to a consideration of the Kansas and Oklahoma fields. Dr. Eliot Blackwelder gave "Origin of the domes of central Kansas," Dr. Raymond C. Moore and F. L. Martin "The relation of granite to oil production in Kansas," and Dr. Moore and Dr. Winthrop P. Haynes "The outcrop of basic igneous rock in north central Kansas." Dr. J. W. Merritt's subject was: "Pennsylvania sedimentation around Healdton Island, Oklahoma," and Fritz Aurin gave "Pre-Pennsylvanian oil and gas horizons in Kay county, Oklahoma." A paper on "New oil development in Oklahoma," was given by C. W. Shannon, state geologist of Oklahoma, at an earlier session.

A preliminary business meeting followed the Friday afternoon program. The reports of officers and committees were presented, new business introduced, and nominations made. The business session was concluded Saturday morning, and this was followed by a regional session which was carried over into the closing session on Saturday afternoon. A paper by David A. Reger on "Recent oil developments in West Virginia," was read by Ray V. Hennen, and "Notes on the Canadian foothills belt," by Wesley Purdy, was read by E. DeGolyer. F. W. DeWolf, state geologist of Illinois, gave one paper on "The new Trenton development," illustrating it by maps and diagrams, and one on the "Blue sky laws of Illinois," showing that laws are being enacted for the protection of the public against unscrupulous promoters. A paper on the "Development of oil and gas in Wyoming," was given by C. H. Wegemann. Dr. Edward Bloesch gave a résumé of "Petroleum investigations in Switzerland," showing that the drill would have to decide whether oil was present in commercial quantities.

The engineer's side of the petroleum problem was given by A. W. Ambrose, head of the Petroleum Experiment Station at Bartlesville, Oklahoma, in a paper on "The petroleum production engineer and his relation to future production." Mr. Ambrose said that by present processes only a small percentage of the oil is recovered, and emphasized the necessity of more effective methods. The last paper of the session and of the convention was one read by Earl A. Trager, who gave a résumé of "The oil shale industry, with an outline of methods of distillation." This is a subject that will be given more attention as the demand for oil increases and the supply from wells diminishes.

The following papers were read by title: "Types of structures in Chaves county, Texas," J. W. Merritt; "Problems of production and methods of solving them," T. E. Swigart; "Oil

shales of Wyoming,'' Professor E. F. Schramm; ''Recent oil developments in California,'' Robert B. Moran; ''Some geological problems in oil and gas recovery in Kentucky,'' W. R. Jillson; ''Probability of oil and gas in Montana,'' Professor J. P. Rowe. Prior to adjournment a vote of thanks was extended to the retiring president, Dr. I. C. White, and to the Dallas Chamber of Commerce and the Southwestern Geological Society, for courtesies during the convention. Invitations for the next annual meeting have been received from San Francisco, New York, St. Louis and Oklahoma City, and will be considered by the executive committee. The proceedings of the convention will be published as Volume IV. of the bulletin of the association.

The following officers were elected for the coming year: *President,* Wallace E. Pratt, chief geologist, Humble Oil Company, Fort Worth, Texas; *Vice-president,* Alex. W. McCoy, consulting geologist, Bartlesville, Oklahoma; *Secretary-Treasurer,* Charles E. Decker, associate professor, University of Oklahoma, Norman (reelected); *Editor,* Raymond C. Moore, state geologist of Kansas, University of Kansas, Lawrence, Kansas.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

MINUTES OF THE EXECUTIVE COMMITTEE OF THE COUNCIL

The meeting was called to order by the president at 5 P.M., on April 26, 1920, in the Board Room of the Cosmos Club, and Dr. Howard was elected chairman for the meeting. The following members were present: Cattell, Fairchild, Howard, Humphreys, Livingston, MacDougal, Osborn and Ward. Mr. Woodward, the treasurer, attended the first part of the meeting.

1. *Grants.*—A resolution was passed to the effect that appropriations made to the Grants Committee shall be limited to the calendar year for which made. At the end of that year they automatically revert to the Treasury. (The executive committee may, of course, take special action before the end of the year, in cases where reversions would occur. For the year 1920 the amount of one grant made in 1919 and not withdrawn had been added to the 1920 appropriation of the grants committee, making this appropriation $4,500 instead of $4,000.)

2. *Life Memberships.*—A recommendation of the treasurer was adopted, to the effect that the treasurer is to pay to the permanent secretary three dollars each year for each life-membership requiring a subscription to the journal. (This special action was called for by the fact that the income from the fifty-dollar life-memberships is not sufficient to pay for the journal at the present rate.) At the beginning of the treasurer's fiscal year, the permanent secretary is to inform the treasurer in regard to the number of subscriptions to the journal to be thus cared for.

3. *Remission of Dues in Arrears.*—A resolution was passed to the effect that all members whose accounts show arrearage in dues for the years 1917–1919 (3 years), 1918–1919 (2 years), and 1919 (1 year), be *reinstated* as if back dues had been paid in full, providing they pay the annual dues for 1920 before the end of the present fiscal year. (This action was taken on account of war conditions.)

4. *Moratorium for Members Residing in Continental Europe.*—A resolution was passed to the effect that members residing in continental Europe may retain membership and receive the journal on account for three years (1920, 1921 and 1922) if specifically requested. (The preceding resolution of course also applies in these cases.)

5. *Toronto Meeting (1921–1922).*—The permanent secretary was instructed to accept with appreciation the invitation of the University of Toronto and of the Royal Canadian Institute and that he notify the secretaries of sections, of divisions and of affiliated societies to the effect that the annual meeting for 1921–1922 will be held at the Christmas season in Toronto.

The meeting was adjourned at 6 o'clock, to convene again at 7 in the private dining room of the Cosmos Club.

The adjourned meeting was called to order by President Howard. The following members were present: Cattell, Fairchild, Howard, Humphreys, Livingston, MacDougal, Noyes, Osborn and Ward.

6. *Science News Service.*—Mr. MacDougal presented a report on the organization of the Science News Service, supported by Mr. E. W. Scripps.

7. *Representatives for Conference with Science News Service.*—At the request of the Science News Service a committee was appointed, which consisted of Messrs. Cattell, Humphreys and George T. Moore, to confer with three representatives of the National Academy and three representatives of the National Research Council, and with representatives of the Science News Service, in the organization and operation of that service.

8. *Minutes of Last Meeting.*—The minutes of the last meeting were read and approved.

9. *Action of Committee during Interim.*—Mr.